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(54) **VERTICAL BALER WITH AN IMPROVED ARRANGEMENT FOR EJECTION OF A BALE**

(57) Disclosed herein is a vertical baler for compacting waste such as e.g. cardboard or plastic. The baler comprises:

- a compartment for containing the waste to be compacted, the compartment comprising interior sides;
- an opening to the compartment;
- a ram arrangement comprising a press plate which is configured for moving vertically inside the compartment for compacting the waste;
- a door for providing access to the compartment;
- a bale ejector;
- an activation member exterior to the compartment;
- a grabbing arrangement on one or more of the interior sides of the compartment, and
- a triggering arrangement.

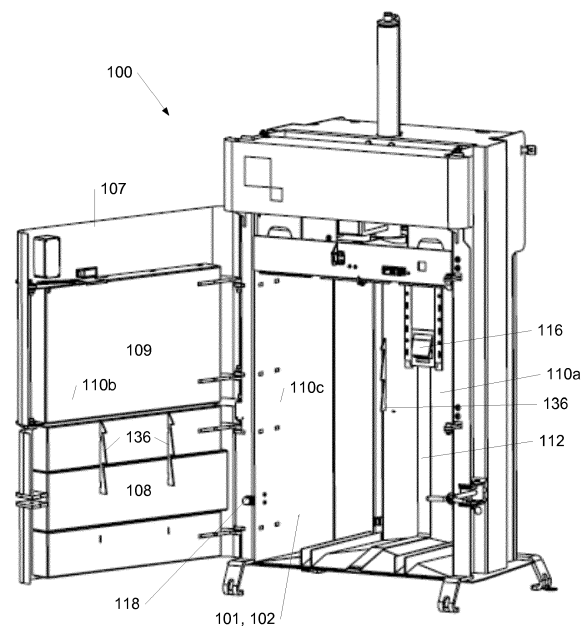


Fig. 1

Description

[0001] The invention relates to a vertical baler for compacting waste such as e.g. cardboard or plastic.

Background

[0002] Waste compactors (also known as balers) for compacting waste such as paper, cardboard, cans or the like are well known.

[0003] These generally comprise a displaceable ram which is vertically displaceable inside a compartment enclosed by walls in order to compact the waste into bales. As such bales may become quite large and heavy, and thus more difficult to handle, the waste compactor may comprise an ejector arrangement to automatically eject the bale from the compartment after compacting the waste.

[0004] EP0899088B1 discloses a waste compactor/baler with a bale ejecting equipment. The ejecting equipment comprises a tiltable stroke plate and a pull rod for ejecting the bale out of the compactor. A coupling member transmits the movement of a press plate of the compactor to the tiltable stroke plate by a pivotable connecting unit, which is disposed externally at the rear wall of the press housing of the compactor. The pivotable connecting unit is pivotably connected with the pull rod. A lower U-shaped guide part and an upper U-shaped guide part are, respectively, pivotably mounted at the outer side of the rear wall by way of a shaft.

The solution in EP0899088B1 provides disadvantages as it is a complex solution. Moreover, the solution in EP0899088B1 provides a solution with many movable parts at the outside of the baler, which may be disadvantageous from a safety and/or mechanical point of view and/or may be considered as rather space consuming.

[0005] EP2565024 A1 discloses a hand operated lift arrangement for a waste compactor to discharge a bale of compressed waste.

[0006] It may be a purpose of the present invention to provide a solution to one or more of the above mentioned issues.

Description of the invention

[0007] Disclosed herein is a vertical baler for compacting waste such as e.g. cardboard or plastic. The baler comprises:

- a compartment for containing the waste to be compacted, the compartment comprising interior sides;
- an opening to the compartment;
- a ram arrangement comprising a press plate which is configured for moving vertically inside the compartment for compacting the waste;
- a door for providing access to the compartment;
- a bale ejector;
- an activation member exterior to the compartment;

- a grabbing arrangement on one or more of the interior sides of the compartment, and
- a triggering arrangement.

[0008] By activation of the triggering arrangement, the activation member is configured for displacing the grabbing arrangement from an inactivated position to a grabbing position extending partly into the compartment.

[0009] In the baler, the grabbing arrangement in the grabbing position is vertically displaceable in the compartment by means of the ram arrangement.

[0010] The grabbing arrangement is connected to the bale ejector such that a vertical movement of the grabbing arrangement is configured to provide an activation of the bale ejector thereby ejecting a bale from the vertical baler.

[0011] The vertical baler described above may provide a simple solution for providing a control of a bale ejector arrangement in order to eject a bale from the vertical baler.

[0012] By providing a grabbing arrangement which is displaceable from an inactivated position to a grabbing position inside the compartment for containing waste to be compacted, and so the grabbing arrangement is vertically displaceable in the compartment along an inside surface of the baler by means of the ram arrangement, the number and/or size of openings at this surface to the exterior of the baler may be reduced, and thereby it may be possible to reduce the risk of the waste in the compactor blocking such openings.

[0013] Moreover, by the present invention, a simple solution may be achieved where less movable parts may be utilized.

[0014] Additionally, by providing that the activation member exterior to the compartment is configured for displacing the grabbing arrangement inside the compartment from an inactivated position to a grabbing position, and by the fact that the grabbing arrangement is vertically displaceable in the compartment along an inside surface of the baler by means of the ram arrangement, a simple, solution may be provided, e.g. as the activation member exterior to the compartment does not need to be moved vertically in order to provide an activation of the bale ejector to eject a bale from the vertical baler. This may also be advantageous from a safety point of view as there may be a reduced risk of personal injury.

[0015] The present invention may additionally help to provide a simple, space saving and/or cost efficient baler solution as the present invention provides the possibility of implementing a simpler and/or space saving triggering arrangement.

[0016] Additionally, as the grabbing arrangement is vertically displaceable in the compartment by means of the ram arrangement, the ram arrangement for compacting the waste may also provide the necessary forces in order to eject the bale after the compacting, thus e.g. providing a more cost efficient and simple solution as the same drive means, such as a linear actuator, e.g. a hydraulic or pneumatic actuator, may be needed for both

operations.

[0017] The bale ejector is preferably configured to be arranged underneath the waste in the compartment so that a subsequent moving of the bale ejector to lift the bale ejector will lift/tilt the bale and thereby eject the bale from the compartment.

[0018] Also disclosed herein is a method for ejecting a bale from a vertical baler, where the vertical baler comprises:

- a compartment for containing the waste to be compacted, the compartment comprising interior sides;
- an opening to the compartment;
- a ram arrangement comprising a press plate which is configured for moving vertically inside the compartment for compacting the waste;
- a door for providing access to the compartment;
- a bale ejector;
- an activation member exterior to the compartment;
- a grabbing arrangement on one or more of the interior sides of the compartment, and
- a triggering arrangement.

[0019] The method comprises the steps of:

- opening the door in the vertical baler, whereby the triggering arrangement activates the activation member thereby displacing the grabbing arrangement from an inactivated position extending along an interior side of the compartment to a grabbing position extending partly into said compartment;
- sliding the ram upwards whereby the grabbing arrangement is vertically displaced upwards from a first initial predefined position inside the compartment thereby activating the bale ejector connected to the grabbing arrangement so as to eject a bale from the vertical baler.

[0020] Further disclosed herein is the use of a vertical baler according to the above for ejecting a bale according to the method described above.

[0021] The advantages of the method and the use of the baler are as described above for the baler.

Description of preferred embodiments

[0022] Disclosed herein is a vertical baler for compacting waste such as e.g. cardboard or plastic. The baler comprises:

- a compartment for containing the waste to be compacted, the compartment comprising interior sides;
- an opening to the compartment;
- a ram arrangement comprising a press plate which is configured for moving vertically inside the compartment for compacting the waste;
- a door for providing access to the compartment;
- a bale ejector;

- an activation member exterior to the compartment;
- a grabbing arrangement on one or more of the interior sides of the compartment, and
- a triggering arrangement.

[0023] By activation of the triggering arrangement, the activation member is configured for displacing the grabbing arrangement from an inactivated position to a grabbing position extending partly into the compartment.

[0024] In the baler, the grabbing arrangement in the grabbing position is vertically displaceable in the compartment by means of the ram arrangement.

[0025] The grabbing arrangement is connected to the bale ejector such that a vertical movement of the grabbing arrangement is configured to provide an activation of the bale ejector thereby ejecting a bale from the vertical baler.

[0026] The vertical baler described above may provide a simple solution for providing a control of a bale ejector arrangement in order to eject a bale from the vertical baler.

[0027] By providing a grabbing arrangement which is displaceable from an inactivated position to a grabbing position inside the compartment for containing waste to be compacted, and so the grabbing arrangement is vertically displaceable in the compartment along an inside surface of the baler by means of the ram arrangement, the number and/or size of openings at this surface to the exterior of the baler may be reduced, and thereby it may be possible to reduce the risk of the waste in the compactor blocking such openings.

[0028] Moreover, by the present invention, a simple solution may be achieved where less movable parts may be utilized.

[0029] Additionally, by providing that the activation member exterior to the compartment is configured for displacing the grabbing arrangement inside the compartment from an inactivated position to a grabbing position, and by the fact that the grabbing arrangement is vertically displaceable in the compartment along an inside surface of the baler by means of the ram arrangement, a simple, solution may be provided, e.g. as the activation member exterior to the compartment does not need to be moved vertically in order to provide an activation of the bale ejector to eject a bale from the vertical baler. This may also be advantageous from a safety point of view as there may be a reduced risk of personal injury.

[0030] The present invention may additionally help to provide a simple, space saving and/or cost efficient baler solution as the present invention provides the possibility of implementing a simpler and/or space saving triggering arrangement.

[0031] Additionally, as the grabbing arrangement is vertically displaceable in the compartment by means of the ram arrangement, the ram arrangement for compacting the waste may also provide the necessary forces in order to eject the bale after the compacting, thus e.g. providing a more cost efficient and simple solution as the same drive means, such as a linear actuator, e.g. hy-

draulic or pneumatic actuator, may be needed for both operations.

[0032] The bale ejector is preferably configured to be arranged underneath the waste in the compartment so that a subsequent moving of the bale ejector to lift the bale ejector will lift/tilt the bale and thereby eject the bale from the compartment.

[0033] In one or more embodiments, the grabbing arrangement in the inactivated position is extending along an interior side of the compartment.

[0034] In one or more embodiments, the bale ejector is a flexible member such as one or more flexible straps.

[0035] Flexible members such as one or more flexible straps, or alternatively one or more chains, may provide a space saving and yet simple bale ejector which may adapt to the shape of the compressed material. Accordingly, by one or more flexible members such as one or more flexible straps, the bale ejector can adapt to the interior of the inside the compartment.

[0036] Thus, in an empty state, the flexible strap may be arranged substantially at the bottom of the compartment and the waste material can thus be loaded into the compartment on top of the flexible member, and the press plate of the ram arrangement can compress the waste in the compartment. Then, when ejecting the bale, the bale can be ejected by vertically displacing the flexible member by means of the grabbing arrangement, thereby lifting the flexible member and thus the bale.

[0037] In one or more embodiments, a flexible cable, e.g. a bowden type cable, connects the triggering arrangement and the activation member.

[0038] A Bowden cable is a type of flexible cable used to transmit mechanical force or energy by the movement of an inner cable/wire relative to a hollow outer cable housing of the Bowden cable. The cable housing may be of a composite construction, having an inner lining, a longitudinally incompressible layer such as a helical winding or a sheaf of steel wire and a protective outer covering.

[0039] The flexible cable is preferably arranged externally to the compartment for compacting waste.

[0040] As the present invention may provide a solution where triggering of the activation member may e.g. be provided by means of small forces, a cable solution, such as a Bowden cable solution may be provided. Cable solutions provide a flexible and space saving solution which may easily be adapted in order to place the triggering arrangement in the desired position, e.g. in order to be triggered by opening/closing a door, and the cable solution can moreover easily be arranged in order to activate the activation member(s) at e.g. the back/rear side of the baler.

[0041] A Bowden cable solution may be preferred as it provides the possibility of both pushing and pulling the activation member by means of the same cable arrangement, and thus, the hollow outer cable housing of the Bowden cable may in preferred aspects of the invention be fixed/connected to a frame of the baler.

[0042] Preferably, the flexible cable may be resiliently

loaded by e.g. a spring. This may be provided in order for the triggering arrangement to automatically trigger a moving of the activation member when opening a baler door of the baler. Hence, when opening the door of the baler, the spring is released, thereby activating the activation member. When closing the door, the spring is "deactivated" by e.g. compressing the spring, thereby deactivating the activation member so that the grabbing arrangement can be moved to the inactivated position again.

[0043] In one or more embodiments, the triggering arrangement comprises a release button positioned on a frame of the vertical baler surrounding the opening to the compartment.

[0044] Preferably the door of the baler will trigger the release button when opening the door.

[0045] A release button may provide a simple, mechanical solution for controlling the activation member. In advantageous aspects of the invention, the release button may be arranged to trigger a spring loaded cable arrangement as e.g. described above.

[0046] In one or more embodiments, the door for providing access to the compartment comprises an upper door and a lower door.

[0047] This may provide a simple and yet safe solution. The lower door may thus be opened when ejecting the bale by the bale ejector, whereas the upper door may be used for filling waste into the compartment to be compacted by the press plate of the ram arrangement. Accordingly, the vertical baler is preferably arranged to provide a downwardly directed, substantially vertical pressure to the waste by the press plate and a stamp in order to compact the waste and provide a bale of compressed waste at the bottom of the compartment of the baler.

[0048] In one or more embodiments, a release button is positioned on a part of the frame in contact with the lower door such that when the lower door is opened, the release button is activated and when the lower door is closed, the release button is deactivated.

[0049] This may be advantageous from a safety point of view as the upper door may thus remain closed during the ejection of the bale by the bale ejector, thereby screening personnel from movable parts inside the baler.

[0050] When the lower door is opened, a resiliently loaded member of the triggering arrangement may be triggered, thereby e.g. pulling or pushing a wire/cable in order to move a part of the activation member into the compartment of the bale through an opening in a wall, thereby activating the grabbing arrangement.

[0051] When closing the door, the resiliently loaded member is deactivated again and the wire/cable thus pulls or pushes the activation member out of the compartment again.

[0052] The resiliently loaded member may e.g. be resiliently loaded by means of a spring, a rubber element, a linear, e.g. pneumatic, actuator and/or the like.

[0053] In one or more embodiments, the vertical baler further comprises a rail arrangement on the interior side

of the compartment for guiding the grabbing arrangement vertically in the compartment along a wall of the compartment, wherein the rail arrangement preferably comprises two rails positioned on each side of the grabbing arrangement for guiding the grabbing arrangement when being moved vertically up and down in the activated position.

[0054] The rail arrangement may provide a simple and yet reliable guiding means for guiding the grabbing arrangement in order to e.g. assure that the grabbing arrangement does not slip horizontally during the vertical movement to activate the bale ejector.

[0055] Moreover, as the rail arrangement may be arranged vertically, the wall arrangement may provide a vertical guiding feature while force components in horizontal plane and subjected to the rail arrangement may be rather low.

[0056] The rail may, moreover, provide that the grabbing arrangement is not pulled away from the wall, e.g. a rear wall of the baler, along which it is intended to slide vertically during the ejection of the bale. The rail arrangement may accordingly provide a trail between the wall and a part of the rail arrangement facing the compartment. The grabbing arrangement extends into the trail and thus slides vertically in the trail(s) between the rail and the wall such as the rear wall.

[0057] In one or more embodiments, the bale ejector at a first end is connected to a bottom end part at the front opening into the compartment.

[0058] In one or more embodiments, the bale ejector at a second end is connected to the grabbing arrangement which is arranged at the rear part of the vertical baler.

[0059] This may provide an efficient way of obtaining a tilting of the bale out of the compartment. Accordingly, if the bale ejector e.g. comprises a flexible member, the grabbing arrangement, when moved upwards, will lift the bale ejector, thereby providing that the flexible member will be arranged slantingly into the compartment between the front part and the rear part of the compartment. This will cause the bale ejector to lift and tilt the bale during the movement of the grabbing arrangement until the bale is tilted out from the compartment to the exterior of the compartment.

[0060] In one or more embodiments, the press plate of the ram arrangement is configured for grabbing the grabbing arrangement at an upper surface of the press plate to displace the grabbing arrangement.

[0061] This may provide a simple and yet reliable solution where the same drive means used for compressing the waste may be used for providing the necessary forces to the bale ejector arrangement to eject a bale from the compartment of the vertical baler.

[0062] Accordingly, the lower surface of the press plate may face the waste during compressing and thus compact the waste during a downwards movement of the press plate, whereas an upwards movement of the press plate, when the grabbing arrangement has been activated by the activation member, will cause the grabbing ar-

angement to grab the upper surface of the press plate and thus be moved upwards by the press plate.

[0063] In other aspects of the invention, another part of the ram arrangement may, however, be configured/adapted to grab the grabbing arrangement to eject a bale.

[0064] In one or more embodiments, the grabbing arrangement comprises a hinged member, e.g. a grabbing plate, which is preferably hinged at a hinge connection at the upper part of the hinged member, wherein the lower part of the hinged member is configured to extend into the compartment in the grabbing position.

[0065] This e.g. provides a simple solution for facilitating the activation and deactivation of the grabbing arrangement. It may, moreover, result in a simple solution for providing that the hinged member can move to the inactivated state again automatically by gravity when the grabbing arrangement is released from the ram arrangement after an ejecting operation.

[0066] The hinge connection preferably provides a substantially horizontal rotation axis, so that the hinged member may rotate around the horizontal axis when activated by the activation member.

[0067] In one or more embodiments, the ram arrangement comprises a stop member for engaging with the grabbing arrangement.

[0068] The stop member provides a simple and effective stopping functionality so that, when the ram arrangement grabs the hinged member which may e.g. be a hinged grabbing plate or a hinged grabbing rod, the hinged member will by the stop member be prevented from further movement at the hinged connection relative to the ram arrangement. The stop member thus provides that the force from the upwardly moving press plate will be transferred through the hinged member to a vertical force exerted at the grabbing arrangement and thereby move the grabbing arrangement upwards as the hinged member is now in a temporary locked position.

[0069] It may, moreover, provide a cost efficient, simple and sustainable solution as more complex stopping functionalities at the grabbing arrangement may be prevented.

[0070] The stop member may be arranged as a protrusion at the upper surface of the press plate. In an example, it may be provided by a recessed channel at the upper surface of the press plate ending at the stop member which may be an integrated part of the press plate and/or the like.

[0071] The ram arrangement may in aspects of the invention provide an upper surface, such as the upper surface of the press plate, on which the hinged member may slide towards and away from the stop member.

[0072] The stop member may preferably be arranged to provide that the hinged member is arranged in an angled position, which preferably provides an angle between 10° and 80°, such as between 25° and 65° between the hinged member and the wall along which the grabbing arrangement is intended to slide.

[0073] In one or more embodiments, the grabbing arrangement comprises a grabbing frame and a grabbing plate with a top surface and a bottom surface, wherein the grabbing plate is hinged to the grabbing frame at the top part, and wherein the bottom surface is configured to extend into the compartment in the grabbing position thereby being in an angled position.

[0074] This has shown to provide a simple and yet efficient grabbing arrangement, where the grabbing arrangement may be moved to the activated state by the activation member extending into an opening in the wall separating the activation member from the interior of the compartment, and which, when the activation member has been moved back to the exterior of the compartment, can return to the inactivated state by gravity.

[0075] Additionally, the grabbing plate may provide that the openings through which the activation member extends when activating the grabbing arrangement can be covered by the grabbing plate when the baler is in a filling and compressing state, thereby preventing waste from getting stuck in the opening(s).

[0076] In one or more embodiments, the activation member comprises one or more members arranged to extend into the compartment when displacing the grabbing arrangement, wherein the one or more extending members have inclining edges.

[0077] Hence, the grabbing arrangement can be pushed mechanically into the compartment to the grabbing position by the member(s) of the activation member. When the press plate slides upwards to grab the grabbing arrangement, the inclining edges of the activation member provide that the press plate will slide along the inclining edges and thus push the activation member outwards, thereby preventing that the activation member will prevent the press plate from moving past the openings through which the activation member extends.

[0078] As the activation member in advantageous aspects of the invention may be activated by a flexible cable or the like which may be resiliently loaded by e.g. a spring, the resilient member may be compressed or extended by the press plate/ram arrangement and thus allow the displacement of the activation member.

[0079] In one or more embodiments, the grabbing arrangement comprises a grabbing frame and a hinged grabbing member with a top surface and a bottom surface. The hinged grabbing member is hinged to the grabbing frame at the top part, wherein the bottom surface is configured to extend into the compartment in the grabbing position thereby being in an angled position, and wherein said grabbing frame is configured to be guided vertically by means of a rail arrangement on the interior side of the compartment for guiding the grabbing arrangement vertically in the compartment along a wall of the compartment.

[0080] The above aspect has shown to provide a simple, space saving and yet effective and cost efficient solution for an arrangement for controlling a bale ejector

[0081] In one or more embodiments, the releasing of

a bale is provided mechanically.

[0082] A mechanical solution for controlling the bale ejector may e.g. be advantageous from e.g. a safety point of view.

5 **[0083]** Also disclosed herein is a method for ejecting a bale from a vertical baler, where the vertical baler comprises:

- a compartment for containing the waste to be compacted, the compartment comprising interior sides;
- an opening to the compartment;
- a ram arrangement comprising a press plate which is configured for moving vertically inside the compartment for compacting the waste;
- 10 - a door for providing access to the compartment;
- a bale ejector;
- an activation member exterior to the compartment;
- a grabbing arrangement on one or more of the interior sides of the compartment, and
- 20 - a triggering arrangement.

[0084] The method comprises the steps of:

- opening the door in the vertical baler, whereby the triggering arrangement activates the activation member thereby displacing the grabbing arrangement from an inactivated position extending along an interior side of the compartment to a grabbing position extending partly into said compartment;
- 25 - sliding the ram upwards whereby the grabbing arrangement is vertically displaced upwards from a first initial predefined position inside the compartment thereby activating the bale ejector connected to the grabbing arrangement so as to eject a bale from the vertical baler.
- 30
- 35

[0085] In one or more embodiments, the ram arrangement:

- 40 • moves the grabbing arrangement in the grabbing position from the first initial predefined position to an upper position in order to activate the bale ejector such as to eject a bale, and
- 45 • moves the grabbing arrangement from the upper position to the first initial predefined position to allow a release of the grabbing arrangement back to the inactive state.

50 **[0086]** In one or more embodiments, the ram arrangement moves to a position below the first initial predefined position to release the grabbing arrangement.

[0087] In one or more embodiments, the triggering arrangement moves the activation member to an inactive state such that the grabbing arrangement is allowed to return to the initial inactivated position.

[0088] Further disclosed herein is the use of a vertical baler according to the above for ejecting a bale according to the method described above.

Description of the drawings

[0089] The invention will now be described in further detail with reference to the figures, wherein:

- figure 1 shows a vertical baler according to an embodiment of the invention in a front view,
- figure 2A-B show the vertical baler of figure 1 seen from the rear side with a close-up shown at the top of the figure,
- figure 3 shows the ram arrangement in the vertical baler of figure 1 with a close-up shown at the top of the figure,
- figure 4 shows the grabbing arrangement in the vertical baler of figure 1 with a close-up shown at the top of the figure,
- figure 5 shows the triggering arrangement in the vertical baler of figure 1 with a close-up shown at the top of the figure,
- figure 6A shows the vertical baler of figure 1 seen from the front and figure 6B shows the cut marked with the A-A lines in figure 6A, and
- figure 7a-f schematically show the operation of the vertical baler during an ejector operation according to one or more embodiments of the invention seen from the side.

[0090] Figure 1 shows a vertical baler 100 for compacting waste such as e.g. cardboard or plastic. The baler 100 comprises a compartment 101 for containing the waste to be compacted.

[0091] For gaining access the compartment is an opening 102. The opening is defined by opening the door 107. The door 107 may be split into a lower door 108 and an upper door 109, which can be opened separately and together.

[0092] The compartment 101 is defined by its interior sides 110, including the rear side 110a of the compartment, the front side 100b of the compartment which is also the rear side of the door 107 and left and right sides 110c of the compartment.

[0093] The protrusions 136 in the compartment 101 on the rear side 110a and on the door 107, 108 are for holding the waste down after being compacted.

[0094] The baler has a bale ejector 112. In the figures, the bale ejector 112 is shown as a flexible strap. Alternatively, one or more flexible straps or other flexible members could also be used.

[0095] The baler also has an activation member 114 exterior to the compartment. The activation member is most clearly seen in figures 2A-B, which show the baler from the rear side. The activation member 114 comprises

one or more members 115 extending into the compartment 101. The one or more extending members 115 have inclining edges which allow the press plate 104 of the ram arrangement 103 to push the activation member 114 backwards when traveling up and/or down passing the extending members 115 of the activation member 114.

[0096] The baler comprises a ram arrangement 103, which is shown in more detail in figure 3. The ram arrangement 103 comprises a press plate 104 which is configured for moving vertically inside the compartment 101. The ram arrangement 103 also comprises a stamp 105, which compacts the waste by moving the press plate 104 downwards.

[0097] The baler has a grabbing arrangement 116 on the rear side 110a of the compartment 101. The grabbing arrangement is most clearly seen in figure 4. On the press plate 104 of the ram arrangement 103 is a stop member 106, which is most clearly shown in figure 3. The press plate 104 is configured for grabbing the grabbing arrangement 116 at an upper surface 111 of the press plate 104 to displace the grabbing arrangement 116.

[0098] The grabbing arrangement 116 is shown in details in figure 4, where it can be seen that the grabbing arrangement 116 comprises a grabbing frame 134 and a grabbing plate 130 with a top surface 132 and a bottom surface 133. The grabbing plate 130 is hinged to the grabbing frame 134 at the top surface 132 of the grabbing plate 130. The bottom surface 133 is extending into the compartment in the grabbing position as shown in figure 4. Thus, in the grabbing position, the grabbing plate 130 is in an angled position.

[0099] On the interior side of the compartment is a rail arrangement 124. The rail arrangement 124 comprises two rails positioned on each side of the grabbing arrangement 116. The rails guide the grabbing arrangement 116, when it is being moved vertically up and down in the activated position. The rail arrangement 124 may, moreover, provide that the grabbing arrangement 116 is not pulled away from the wall, i.e. the interior rear side of the compartment. The rail arrangement 124 may provide a trail between the wall and a part of the rail arrangement facing the compartment. The grabbing arrangement 116 extends into the trail and thus slides vertically in the trail between the rail and the rear wall 110a.

[0100] The baler also has a triggering arrangement 118 shown in figure 5 in an expanded view. The triggering arrangement 118 includes a release button 119 positioned on a frame 122 surrounding the opening 102 to the baler 100.

[0101] The release button 119 is positioned on a part of the frame 122 in contact with the lower door 108 when the lower door 108 is closed. When the lower door 108 is opened, the release button 119 is activated and when the lower door 108 is closed, the release button 119 is deactivated.

[0102] A flexible cable 120 seen in part in figures 2A-B connects the triggering arrangement 118 with the release button 119 and the activation member 114.

[0103] The triggering arrangement 118 is activated when the lower door 108 is opened whereby the release button 119 pops out thereby pulling the flexible cable 120 such that the activation member 114 is displaced and the extending member 115 projects into the compartment.

[0104] The flexible cable 120 may be a Bowden type cable, which transmits mechanical force or energy by the movement of an inner cable relative to a hollow outer cable housing. The housing is generally of composite construction, consisting of an inner lining, a longitudinally incompressible layer such as a helical winding or a sheaf of steel cable, and a protective outer covering.

[0105] When the extending members 115 project into the compartment 101, they push the grabbing arrangement 116 from an inactivated position extending along an interior side 110c of the compartment 101 to a grabbing position extending partly into the compartment 101. In figures 1, 3-4, the grabbing arrangement is shown in the grabbing position.

[0106] In figure 2A, the activation member 114 is in the inactive position, whereas figure 2B shows the activation member 114 is in the grabbing position, i.e. the activated position.

[0107] When the activation member 114 and grabbing arrangement 116 are in the grabbing position, the grabbing arrangement 116 is vertically displaceable in the compartment by means of the ram arrangement 103, which pulls the grabbing arrangement 116 from an initial predefined position P1 upwards to an upper position P2 as the press plate 105 is moved upwards. In figure 3, the press plate 104 and the grabbing arrangement 116 are seen at the upper position P2.

[0108] The grabbing arrangement 116 is connected to the bale ejector 112 such that a vertical movement of the grabbing arrangement 116 upwards from P1 to P2 activates the bale ejector 112 thereby ejecting a bale from the baler. This is obtained by having the first end 126 of the bale ejector 112 connected to a bottom end part 123 of the frame surrounding the opening into the compartment, and the second end 128 is connected to the grabbing arrangement 116.

[0109] The bale is ejected when the ram arrangement 103 moves the grabbing arrangement 116 from the first initial predefined position P1 to the upper position P2. After the bale is ejected, the ram arrangement 103 moves the grabbing arrangement 116 from the upper position P2 to the first initial predefined position P1 again. When the lower door 108 is closed and the triggering arrangement 118 is deactivated, the grabbing arrangement 116 is released back to the inactive state. The grabbing arrangement 116 is allowed to return to the initial inactivated position when the ram arrangement 103 moves downwards to a lower position P3 below that in the initial position P1.

[0110] Figure 6A shows the baler from the front and figure 6B shows the cut marked with the A-A lines in figure 6A. From the cut-through in figure 6B, the position of the bale ejector 112 in the deactivated position is clear-

ly visible. In figure 6B, the activation member 114 and the grabbing arrangement 116 are in an activated position as the extending members 115 on the activation member 114 are protruding into the compartment 101.

[0111] In figure 7a, the activating member 114 outside the compartment 101 is arranged in an inactivated state and the lower door (not illustrated) is arranged in a closed position. The extending members 115 on the activation member 114 for extending into the compartment 101, are thus arranged outside the compartment 101.

[0112] In figure 7b, the lower door (not illustrated) has been opened, and thus the trigger arrangement (not illustrated) is triggered, thereby pulling the cable/wire 120 due to the releasing of a resilient member such as a spring. This causes the activating member 114 to pivot at the hinge 138 so that the extending members 115 extend into the opening in the wall 110a, preferably the rear wall 110a of the vertical baler 100. This pushes the hinged member 130, such as a plate or a rod, of the grabbing arrangement 116 to the grabbing position as illustrated in figure 7b. The hinged member thus pivots inwardly towards the compartment 101 by means of the hinge 140 (see figure 7c where the hinge is marked). The bottom surface/edge 133 of the hinged member thus extends in an angle into the compartment so that the press plate 104 of the ram arrangement can grab the grabbing arrangement.

[0113] In figure 7c, the press plate 104 is moved upwards by drive means, causing the upper surface of the press plate to catch the hinged member 130. The hinged member slides along the top surface until the bottom edge/surface reaches the stop member 106. At this position, the hinged member 130 is arranged in an angled position, which preferably provides an angle A between 10° and 80°, such as between 25° and 65° between the hinged member and the wall along which the grabbing arrangement is intended to slide.

[0114] During this upwards, vertical movement by the press plate 104, the press plate may push the extending member(s) 115 of the activating member outwards, away from the compartment 101 as it passes the extending member(s) 115 during the vertical movement, as the extending member 115 in embodiments of the invention may comprise an inclining, lower edge allowing the press plate 104 to slide along the lower edge of the extending member 115 to push the activating member outwards, causing the activation member 114 to rotate around its hinge connection. This may provide a temporary compression or extension of a resilient member (not illustrated) such as a spring connected to the cable/wire 120.

[0115] The press plate 114 thus continues the upwards movement as illustrated in figure 7d, thereby pulling in the bale ejector 112 such as a flexible member, e.g. a strap, which at its second end 128 is connected to the grabbing arrangement 116 which is preferably arranged at the rear part of the vertical baler. Thereby, the bale (not illustrated) is ejected from the compartment 101.

[0116] In figure 7e, the bale (not illustrated) has been

ejected by the bale ejector 112, and the lower door (not illustrated) has been closed. The closing of the lower door causes the wire/cable 120 to push the hinged activation member 114 and thus the extending member/protrusion(s) 115 are moved out of the compartment 101 again to allow the grabbing arrangement to be arranged in the inactivated position.

[0117] During the downwards movement by the press plate 104, the grabbing arrangement 116 is returned to the predefined first position P1. When the grabbing arrangement 115 is near the first, predetermined position P1, the hinged member 130, such as a plate or a rod, of the grabbing arrangement 116 will, due to gravity, pivot back to the initial inactivated position to extend substantially vertically along/parallel to the rear wall 110a as illustrated in figure 7f. As illustrated in fig 7e and 7f, the hinged member 130 will thus slide along the upper surface of the press plate until it is free from the press plate 104 and thus by gravity return to the inactivated position.

[0118] The press plate 104 can thus now move freely in the compartment 101 to an upper position where waste can be filled into the compartment 101 through the opening at the upper door (not illustrated in figures 7a-7f), and in order to compact the waste by moving the press plate 104 downwards to compress the waste.

[0119] The hinged member 130 may in embodiments of the invention, in the inactivated state as illustrated in e.g. figs. 7a and 7f, be arranged to cover the opening in the rear wall 110a through which the extending member 115 is configured to extend to push the hinged member in grabbing position.

[0120] It is generally to be understood that a rail arrangement arranged at the surface of the rear wall 110a facing the compartment 101 in embodiments of the invention may be provided to guide and/or support the grabbing arrangement 116 during the vertical movement to activate the bale ejector, this is, however, not illustrated in figures 7a-7f in order to enhance simplicity and understanding of the drawings.

References

[0121]

100	vertical baler
101	compartment for containing waste
102	opening to the compartment
103	ram arrangement
104	press plate
105	stamp pressing the plate down
106	stop member
107	door for providing access to the compartment
108	lower door
109	upper door
110	interior side of the compartment
110a	rear side of the compartment
110b	front side of the compartment/rear side of the door 107

110c	left and right sides of the compartment
111	upper surface of the press plate
112	bale ejector, e.g. a flexible member such as one or more flexible straps
5 114	activation member
115	extending members on the activation member
116	grabbing arrangement
118	triggering arrangement
119	release button
10 120	flexible cable
122	frame surrounding the opening to the compartment
123	bottom end part of the frame
124	rail arrangement
15 126	first end of the bale ejector
128	second end of the bale ejector
130	grabbing plate
132	top surface of the grabbing plate
133	bottom surface of the grabbing plate
20 134	grabbing frame
136	protrusions for holding the compacted waste in position
138	hinge of the activation member
140	hinge of the grabbing arrangement

Claims

1. A vertical baler (100) for compacting waste such as e.g. cardboard or plastic, the baler (100) comprising:
 - a compartment (101) for containing the waste to be compacted, the compartment comprising interior sides (110);
 - an opening (102) to the compartment (101);
 - a ram arrangement (103) comprising a press plate (104) which is configured for moving vertically inside the compartment for compacting the waste;
 - a door (107) for providing access to the compartment;
 - a bale ejector (112);
 - an activation member (114) exterior to the compartment;
 - a grabbing arrangement (116) on one or more of the interior sides of the compartment, and
 - a triggering arrangement (118);

wherein by activation of the triggering arrangement (118), the activation member (114) is configured for displacing the grabbing arrangement (116) from an inactivated position to a grabbing position extending partly into the compartment;

wherein the grabbing arrangement (116) in the grabbing position is vertically displaceable in the compartment by means of the ram arrangement (103); wherein the grabbing arrangement (116) is connected to the bale ejector (112) such that a vertical move-

ment of the grabbing arrangement is configured to provide an activation of the bale ejector (112) thereby ejecting a bale from the vertical baler (100).

2. A vertical baler according to claim 1, wherein the grabbing arrangement (116) in the inactivated position is extending along an interior side of the compartment. 5
3. A vertical baler according to any preceding claim, wherein the bale ejector (112) is a flexible member such as one or more flexible straps. 10
4. A vertical baler according to any preceding claim, wherein a flexible cable (120), e.g. a Bowden type cable, connects the triggering arrangement (118) and the activation member (114). 15
5. A vertical baler according to any preceding claim, wherein the door for providing access to the compartment (101) comprises an upper door (109) and a lower door (108). 20
6. A vertical baler according to any preceding claim, wherein the triggering arrangement (118) comprises a release button (119) positioned on a frame (122) of the vertical baler surrounding the opening (102) to the compartment, and wherein the release button is in contact with the lower door such that when the lower door is opened, the release button is activated and when the lower door is closed, the release button is deactivated. 25 30
7. A vertical baler according to any preceding claim further comprising a rail arrangement (124) on the interior side of the compartment, for guiding the grabbing arrangement (116) vertically in the compartment (101) along a wall of the compartment, wherein the rail arrangement (124) preferably comprises two rails positioned on each side of the grabbing arrangement for guiding the grabbing arrangement (116) when being moved vertically up and down in the activated position. 35 40
8. A vertical baler according to any preceding claim, wherein the bale ejector at: 45
 - a first end (126) is connected to a bottom end part (123) at the front opening into the compartment, and 50
 - a second end (128) is connected to the grabbing arrangement (116) which is arranged at the rear part of the vertical baler.
9. A vertical baler according to any preceding claim, wherein the press plate (104) of the ram arrangement (103) is configured for grabbing the grabbing arrangement (116) at an upper surface (111) of the 55

press plate (104) to displace the grabbing arrangement (116).

10. A vertical baler according to any preceding claim, wherein the grabbing arrangement (116) comprises:
 - a hinged member, e.g. a grabbing plate (130), which is preferably hinged at a hinge connection at the upper part of the hinged member (130), wherein the lower part of the hinged member is configured to extend into the compartment in the grabbing position, and/or
 - a grabbing frame (134) and a grabbing plate (130) with a top surface (132) and a bottom surface (133), wherein the grabbing plate (130) is hinged to the grabbing frame (134) at the top part (132), and wherein the bottom surface (133) is configured to extend into the compartment in the grabbing position thereby being in an angled position, and/or
 - a grabbing frame (134) and a hinged grabbing member (130) with a top surface (132) and a bottom surface (133), wherein the hinged grabbing member (130) is hinged to the grabbing frame (134) at the top part (132), wherein bottom surface (133) is configured to extend into the compartment in the grabbing position thereby being in an angled position, and wherein said grabbing frame is configured to be guided vertically by means of a rail arrangement on the interior side of the compartment for guiding the grabbing arrangement (116) vertically in the compartment along a wall of the compartment.
11. A vertical baler according to any preceding claim, wherein the ram arrangement (103) comprises a stop member (106) for engaging with the grabbing arrangement (116).
12. A vertical baler according to any preceding claim, wherein the activation member (114) comprises one or more members arranged to extend into the compartment when displacing the grabbing arrangement, wherein the one or more extending members has/have inclining edges.
13. A vertical baler according to any preceding claim, wherein the releasing of a bale is provided mechanically.
14. Method for ejecting a bale from a vertical baler, the vertical baler comprising:
 - a compartment (101) for containing the waste to be compacted, the compartment comprising interior sides;

- an opening (102) to the compartment;
- a ram arrangement (103) comprising a press plate (104) which is configured for moving vertically inside the compartment for compacting the waste; 5
- a door (107) for providing access to the compartment;
- a bale ejector (112);
- an activation member (114) exterior to the compartment; 10
- a grabbing arrangement (116) on one or more of the interior sides of the compartment;
- a triggering arrangement (118);

the method comprising the steps of: 15

- opening the door in the vertical baler, whereby the triggering arrangement (118) activates the activation member (114) thereby displacing the grabbing arrangement (116) from an inactivated position extending along an interior side of the compartment to a grabbing position extending partly into said compartment; 20
- sliding the ram upwards whereby the grabbing arrangement (116) is vertically displaced upwards from a first initial predefined position (P1) inside the compartment thereby activating the bale ejector (112) connected to the grabbing arrangement so as to eject a bale from the vertical baler (100). 25 30

15. Method according to claim 14, wherein the ram arrangement (103):

- moves the grabbing arrangement (116) in the grabbing position from the first initial predefined position (P1) to an upper position (P2) in order to activate the bale ejector such as to eject a bale, and 35
- moves the grabbing arrangement (116) from the upper position (P2) to the first initial predefined position (P1) to allow a release of the grabbing arrangement back to the inactive state. 40

16. Method according to claim 14 or 15, wherein the ram arrangement moves to a position below the first initial predefined position to release the grabbing arrangement, and/or the triggering arrangement moves the activation member to an inactive state such that the grabbing arrangement is allowed to return to the initial inactivated position. 45 50

17. Use of a vertical baler according to any of the claims 1-13 for ejecting a bale according to the method of any of the claims 14-16. 55

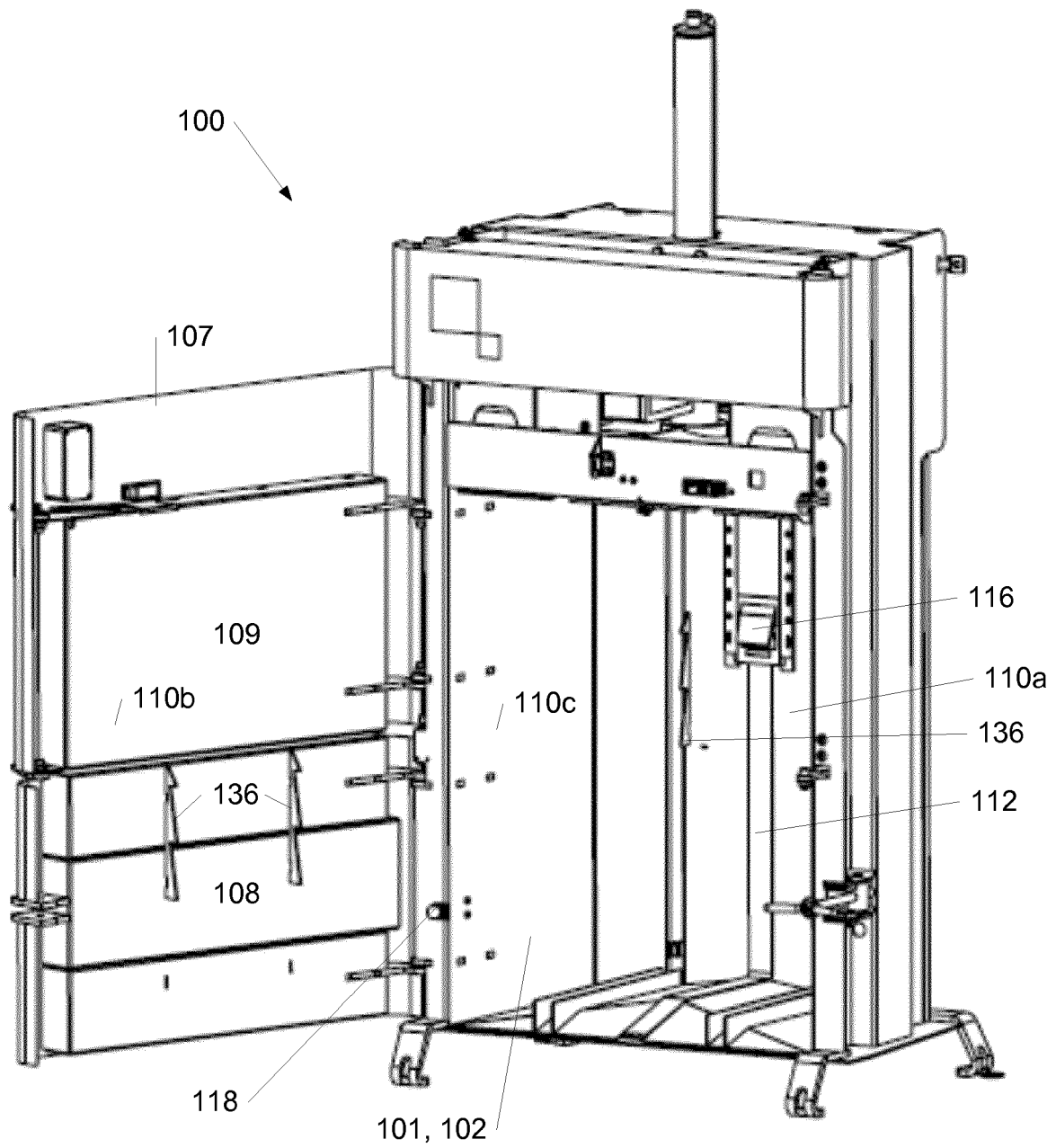


Fig. 1

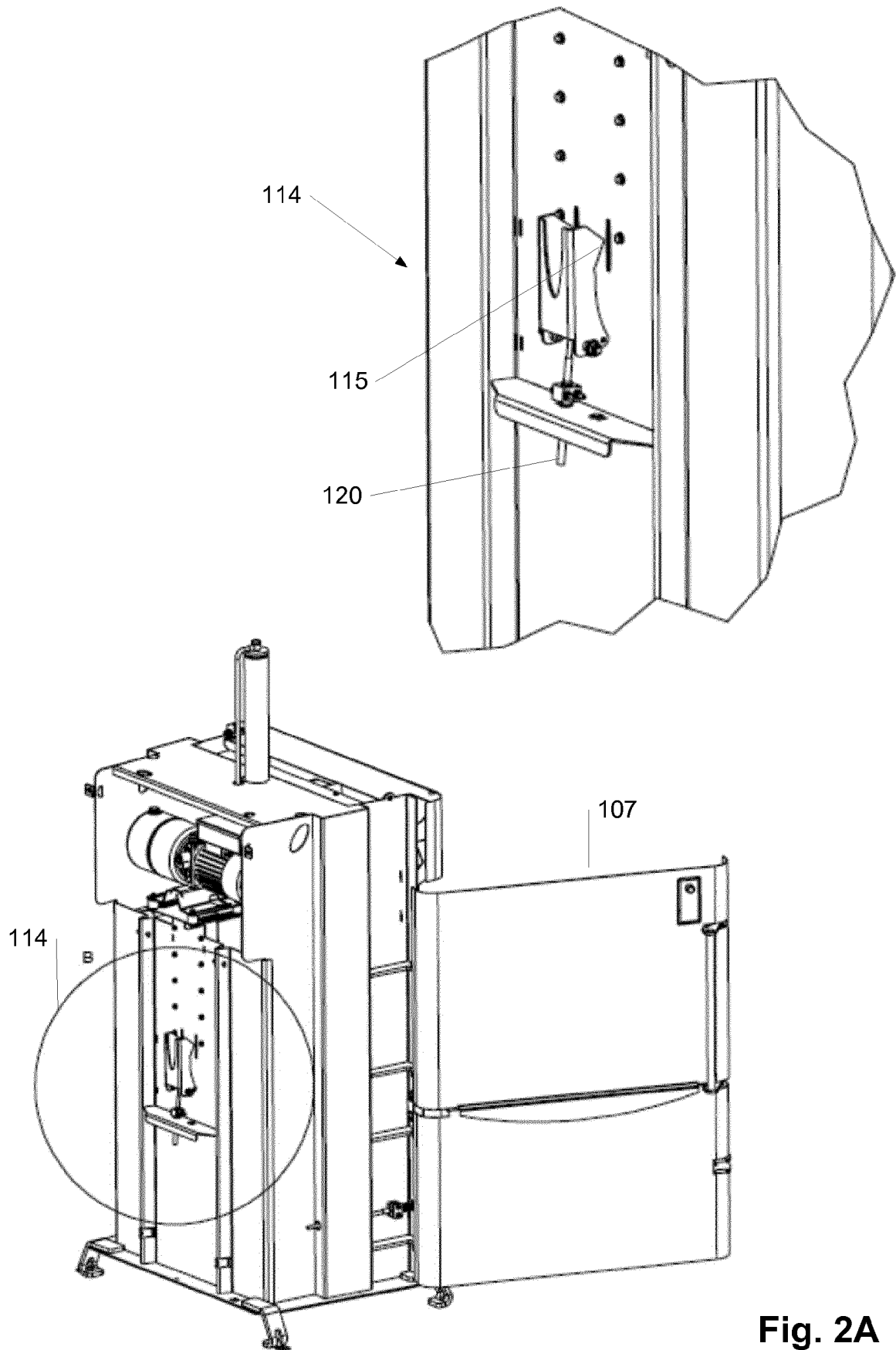


Fig. 2A

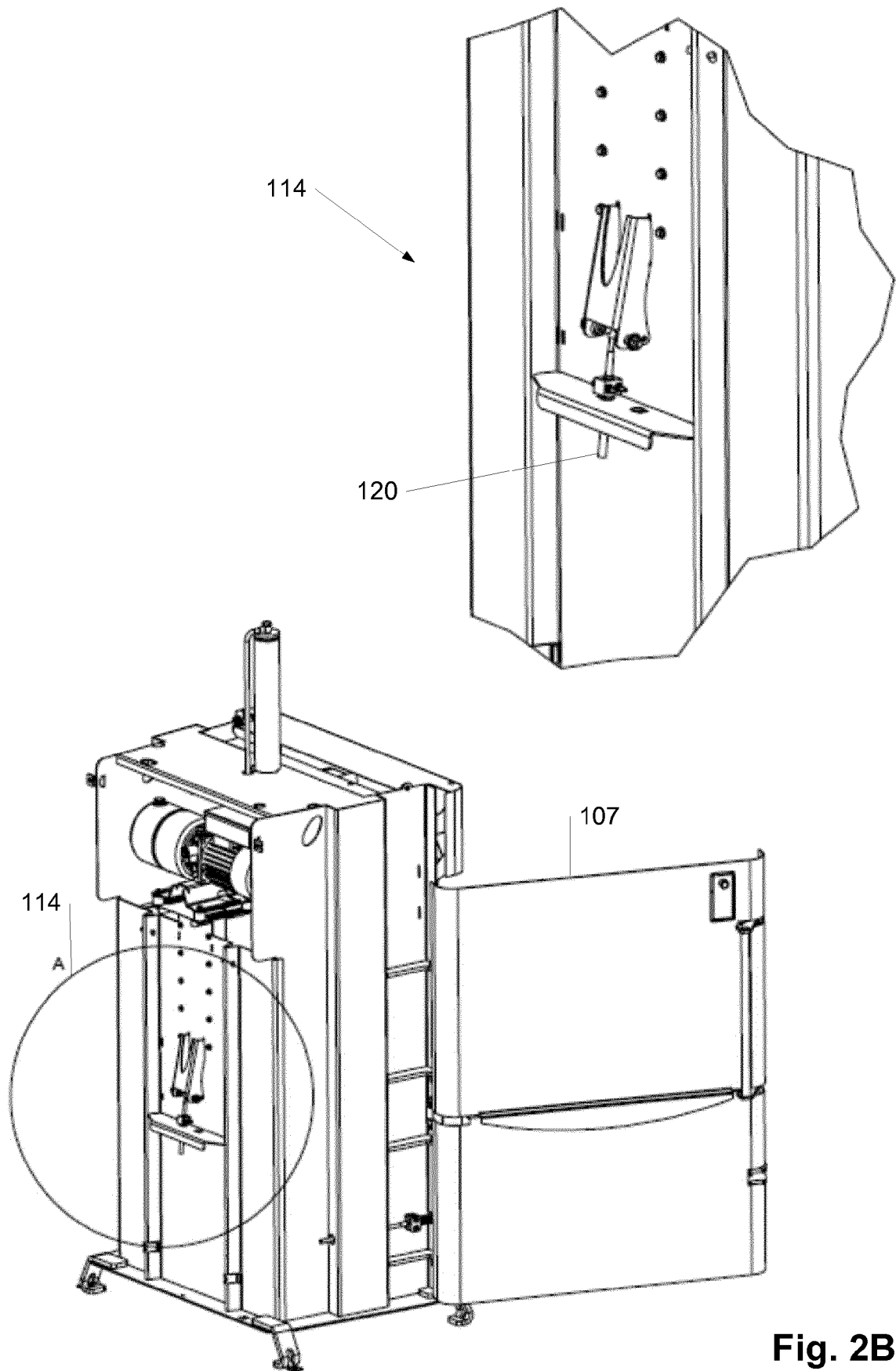


Fig. 2B

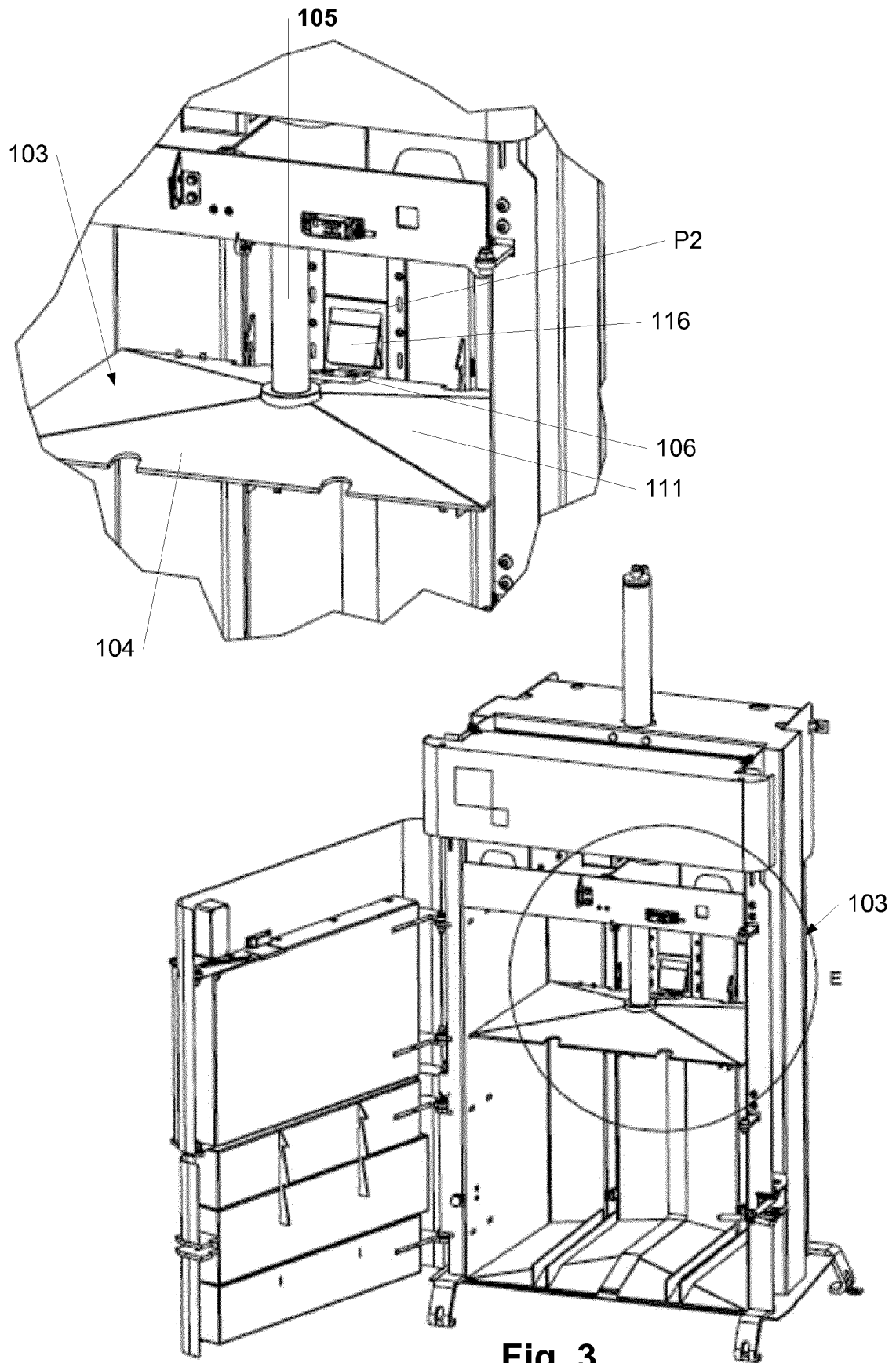


Fig. 3

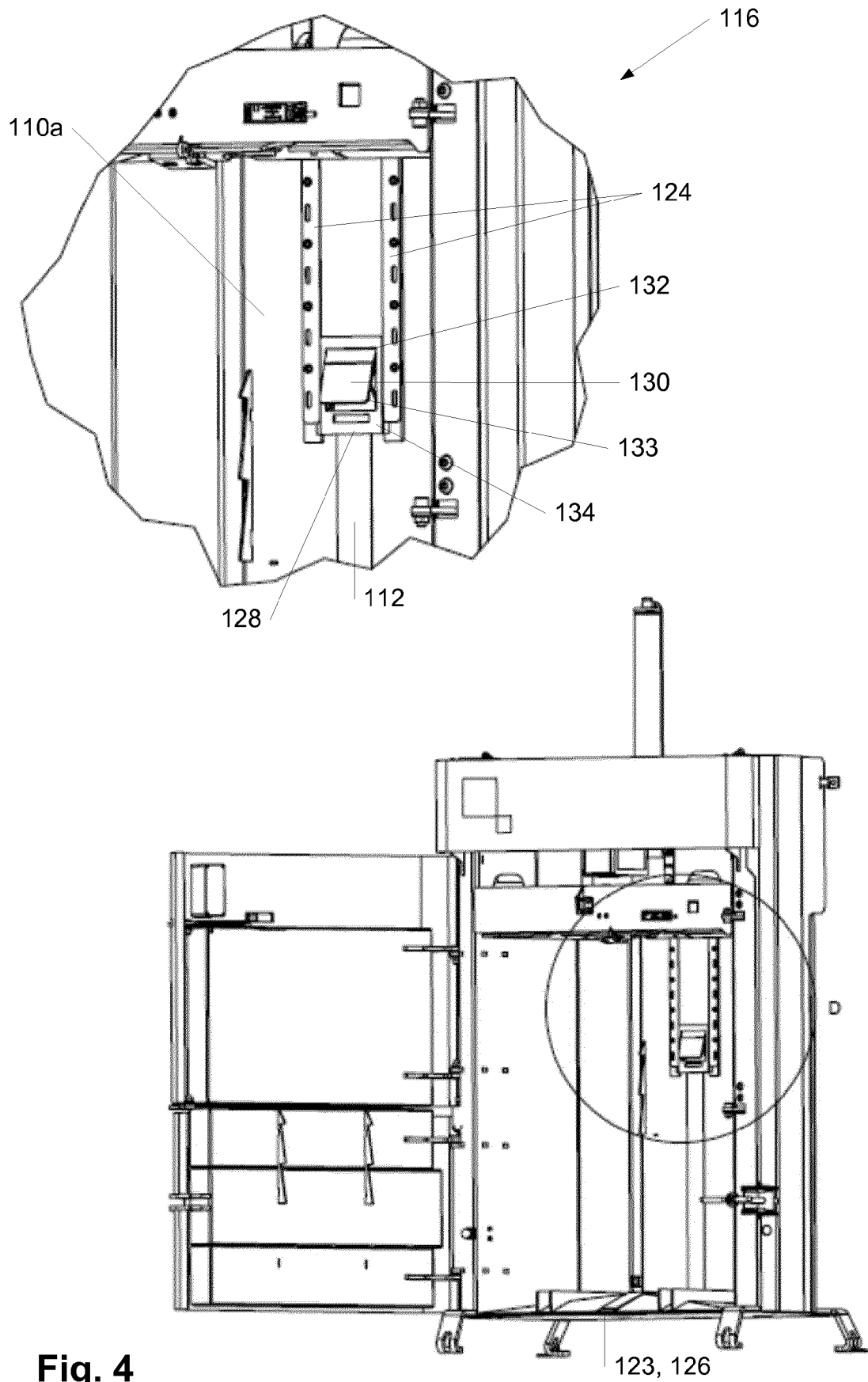


Fig. 4

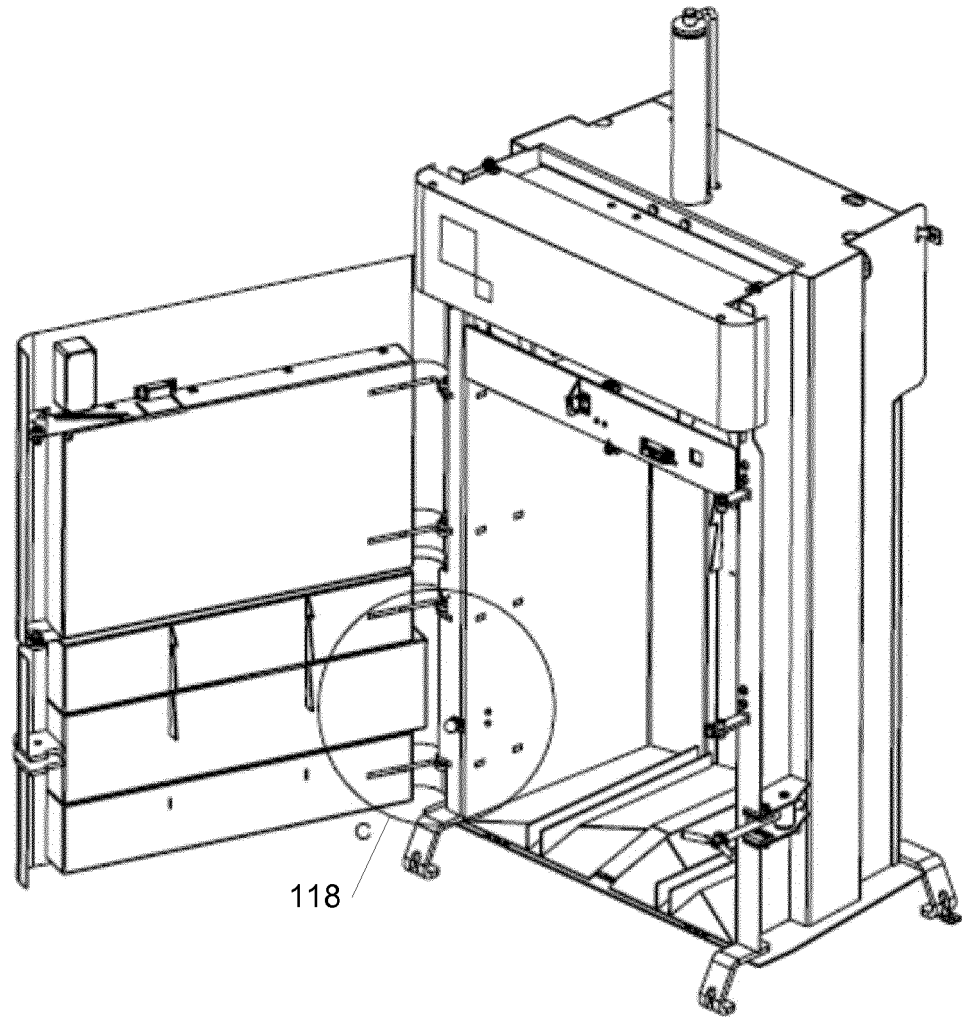
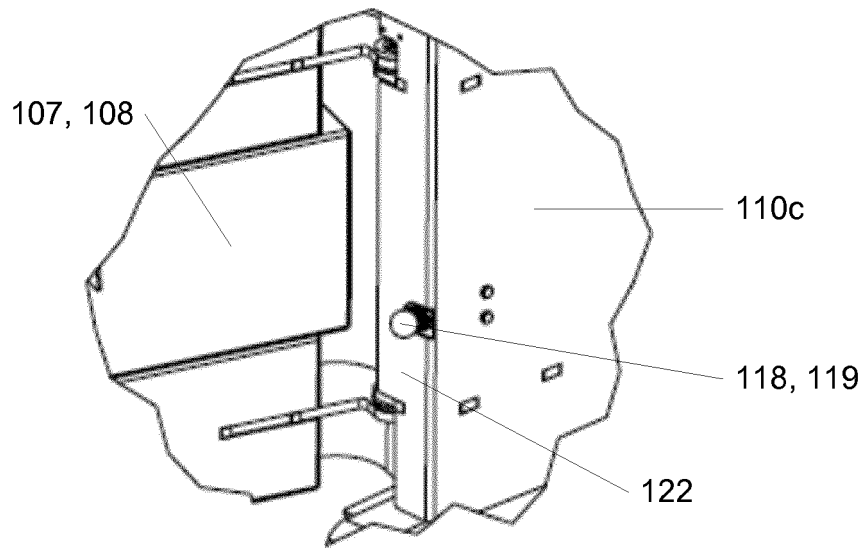


Fig. 5

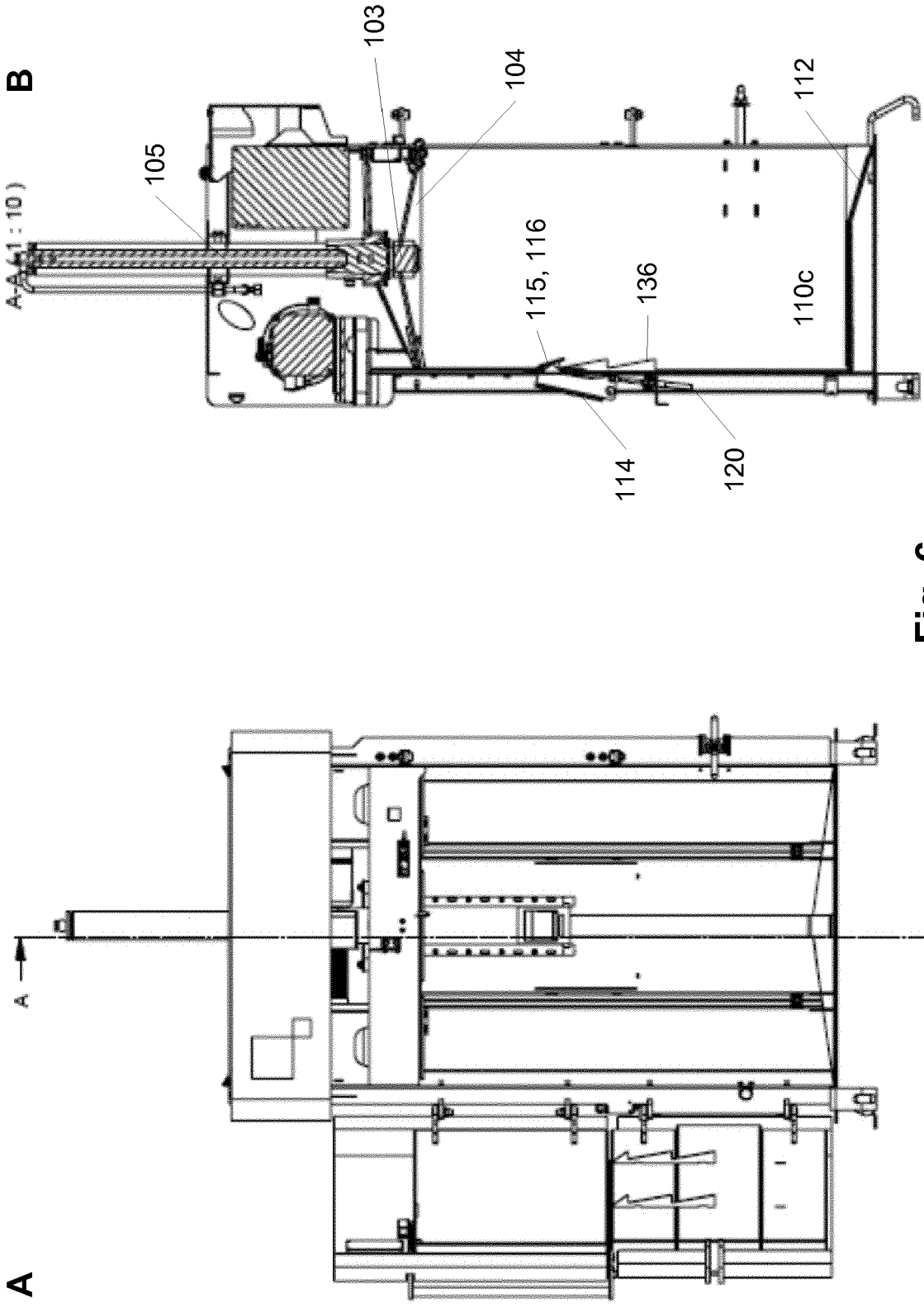
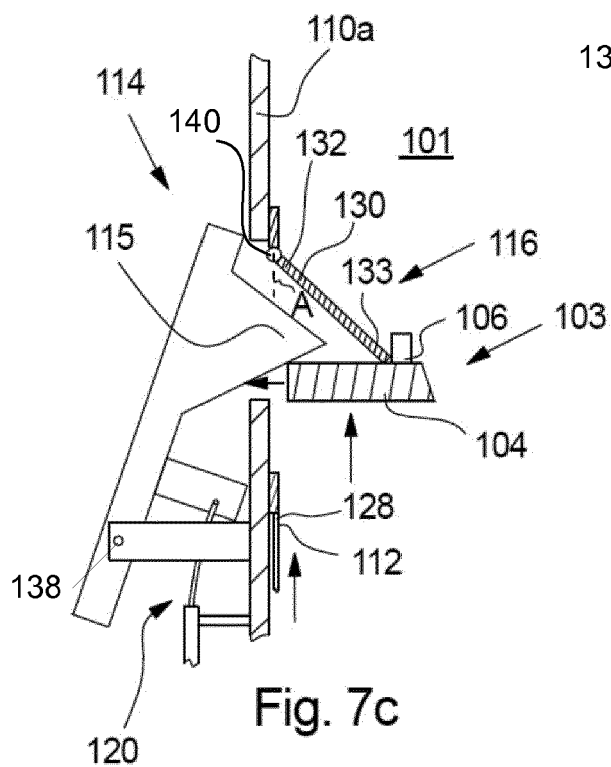
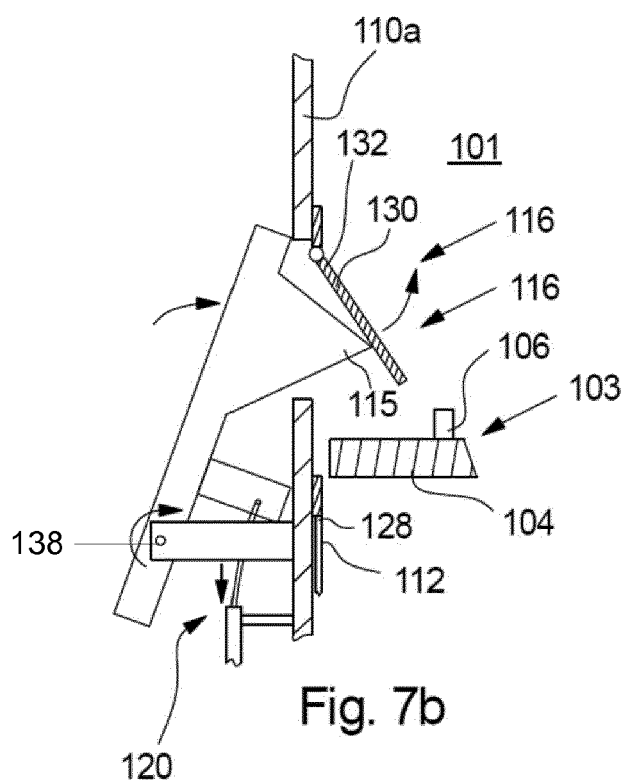
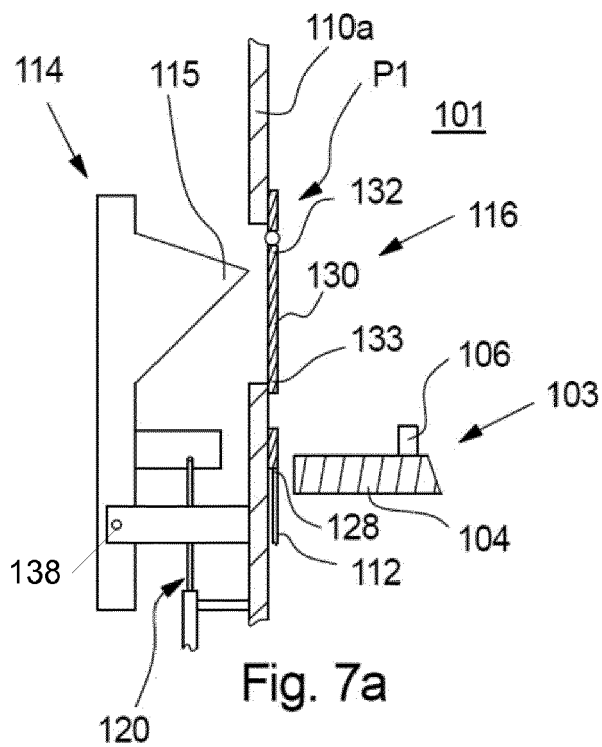


Fig. 6



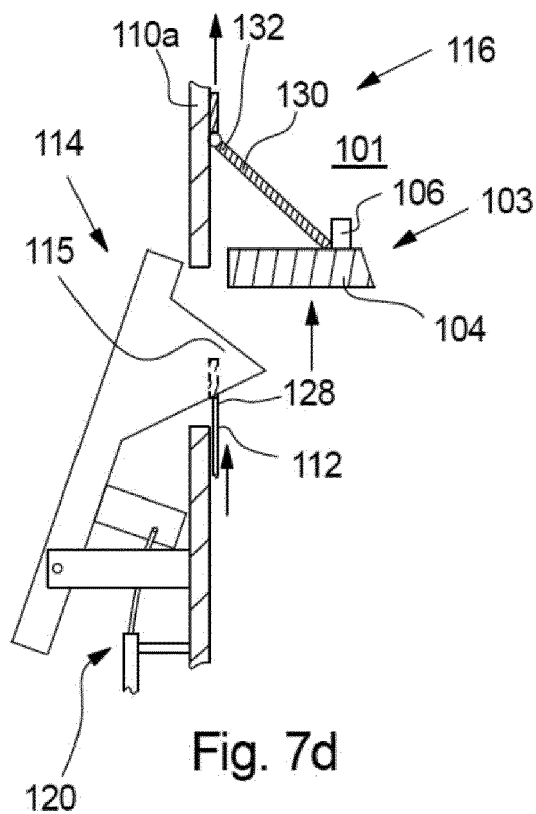


Fig. 7d

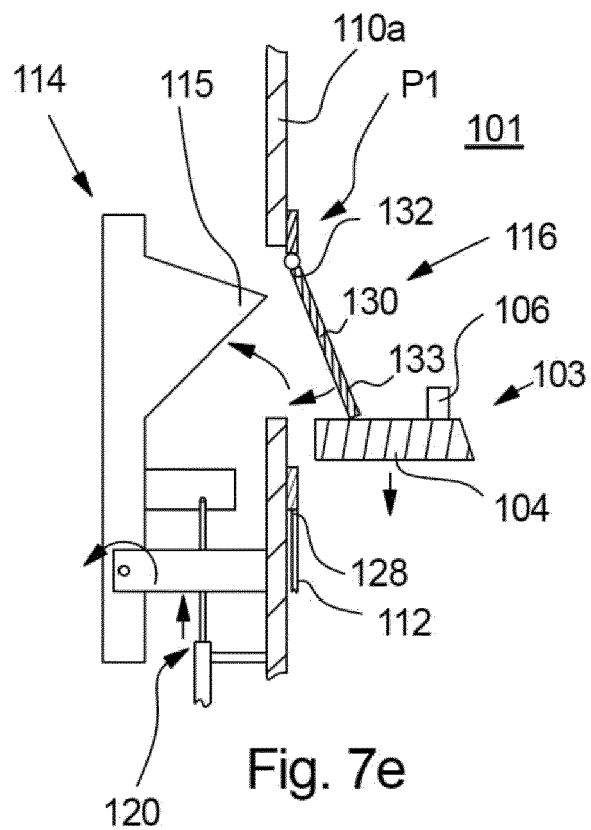


Fig. 7e

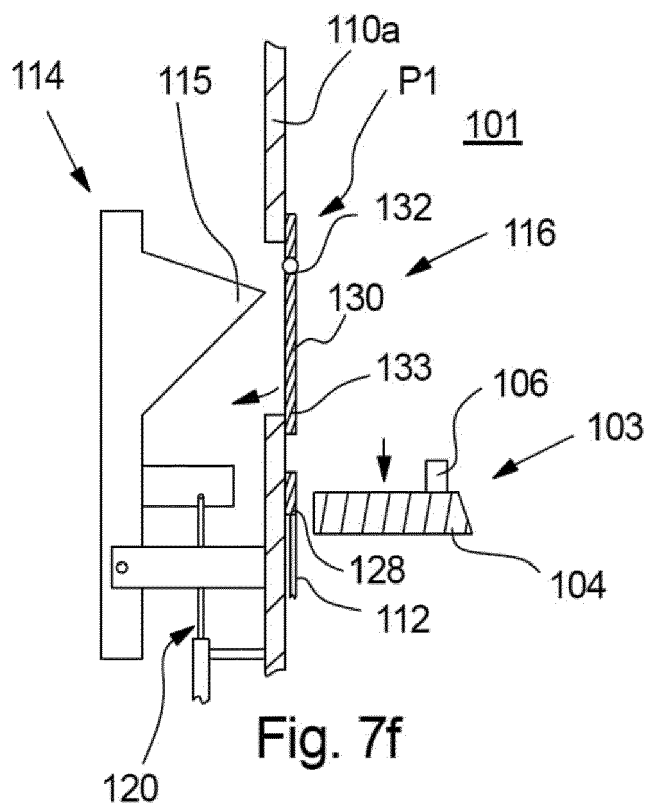


Fig. 7f



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 1462

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X	US 4 232 599 A (ULRICH JAMES A) 11 November 1980 (1980-11-11) * column 2, line 27 - column 7, line 44; figures 1-5 *	1-3,7-9, 11,13-17	INV. B30B9/30
X	US 5 044 271 A (ROBBINS JAMES K [US] ET AL) 3 September 1991 (1991-09-03) * column 2, line 28 - column 4, line 49; figures 1,2,4,5 *	1-3,5, 7-9, 13-17	
A	EP 2 565 024 A1 (ORWAK AB [SE]) 6 March 2013 (2013-03-06) * claims 1,12; figures 1a, 1b *	1,14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B30B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 November 2017	Examiner Herbreteau, D
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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09-11-2017

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EP 2565024	A1	06-03-2013	NONE	

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