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(54) **Title**: RECEIVING STATION AND METHOD FOR RECEIVING BULK MATERIAL

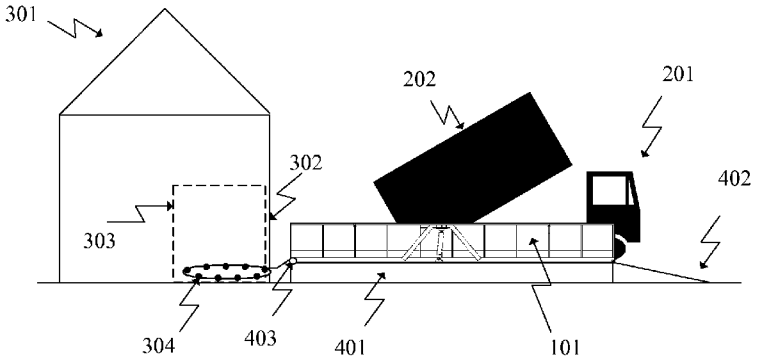

Fig 2

(57) **Abstract**: The present invention relates to a method and receiving station (101) for reception of bulk material. The present invention relates to a method for receiving a loading vehicle (201) in a receiving station (101), unloading bulk material in the receiving station (101) and temporarily storing the bulk material in the receiving station until the receiving station is tilted in order for the bulk material to be discharged for further processing. The present invention also relates to a receiving station (101) for receiving, storing and unloading bulk material.

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RECEIVING STATION AND METHOD FOR RECEIVING BULK MATERIAL

TECHNICAL FIELD

The present invention relates to the field of storing and shipping of e.g. provisions in loose bulk form and is directed to a method and a receiving station for loading, storing and unloading bulk material without damaging the material. The invention typically relates to discharge of e.g. potatoes or grain, at a reception station after harvest.

BACKGROUND

Today, there exist various ways of facilitating the process of unloading provisions such as potatoes or grain after harvest. Typically, the bulk is loaded onto a truck in the field, after which it is dumped into means for storage or further processing in a processing terminal.

Potatoes may be transported from the harvest to fraction sorting by a truck. The potatoes are then typically discharged onto e.g. a receiving hopper at the sorting station, by tipping the loading platform. The receiving hopper comprises a funnel where the potatoes are received and a loading band, which successively transports the potatoes further to e.g. fraction sorting. Receiving hoppers are commonly known within the art (e.g. the RH-series by GRIMME Gmbh), and are therefore not further explained. The discharging is done gradually, while the bulk is received by the loading band. At the same time the bulk needs to be taken care of on the other side of the loading band. The process typically needs to be supported by the staff at the processing terminal.

Grain transported from the field is typically discharged into an underground reception box, located in a barn. The capacity of the reception box is typically smaller than the capacity of the loading vehicle. Furthermore,

the grain needs to be ventilated. Therefore, the grain needs to be further moved from the reception box instantly, which is typically done by sucking the grain into another storage device, where it is dried and ventilated.

Maintenance and construction of the underground storage is difficult, as it is positioned underground. The capacity of the storage is often limited. When unloading the grain, the loading vehicle partly enters the barn. In order to fit the vehicle with a loading platform in a tipped position, the door and the barn needs to be very high.

Bulk material which is not processed immediately can be stored in ventilated boxes from point of harvest to destination. United States Patent US3893244 shows a container for receiving and retaining bulk material.

The existing methods for discharging bulk material at a processing terminal are inflexible, expensive and time consuming. Especially the terminal times, i.e. the time it takes for the loading vehicles to discharge its load, are long. Furthermore, the requirements on the buildings are high, as they have to be high enough to fit the loading vehicles. High buildings are complicated to construct and imply high heating costs. The buildings need to be open while unloading the bulk material, which cause further heat losses. Therefore, finding a way to improve the discharge process would be most welcome. In particular, there is a need to shorten terminal times for trucks and make the process more flexible.

SUMMARY OF THE INVENTION

With the above description in mind, then, an aspect of the present invention is to provide a method and a receiving station, which seeks to mitigate, alleviate, or eliminate one or more of the above-identified deficiencies in the art and disadvantages singly or in any combination.

One effect of the present invention is that it provides a method and a receiving station for shortening terminal times when discharging bulk material from a transport vehicle. Another effect is that it provides for flexible

discharge of bulk material. The invention is defined by the independent claims. Embodiments are set forth by the dependent claims and by the following description and the drawings.

More specifically the invention relates to a method for receiving bulk material comprising the steps of:

receiving a loading vehicle through an entrance into a receiving station further comprising two side walls, an exit, and a bottom; wherein said bottom comprises a support structure and a carriageway for carrying said loading vehicle, supported by said support structure;

loading said bulk material into said receiving station from said loading vehicle;

letting out said loading vehicle through said entrance;

temporary storing said bulk material in said receiving station; and

unloading said bulk material from said receiving station, using a tilting arrangement, by which the receiving station is tilted so that the bulk material flows out through the exit.

In one aspect of the invention it relates to a method for receiving bulk material, wherein said receiving station further comprises a roof, and wherein the method further comprises the step of opening said roof of said receiving station, before receiving said loading vehicle.

In another aspect of the invention it relates to a method for receiving bulk material, wherein the method further comprises the step of closing said roof after letting out said loading vehicle.

In one aspect of the invention it relates to a method for receiving bulk material, wherein the step of temporary storing said bulk material in said receiving station further comprises the step of:

ventilating said bulk material in said receiving station.

In one aspect of the invention it relates to a method for receiving bulk material, wherein the step of ventilating said bulk material in said receiving station further comprises the steps of:

letting air flow through an air flow port and air channels formed in said support structure along said bottom of said receiving station and

letting air flow through said air channels and said receiving station through perforated segments in said carriageway.

In another aspect of the invention it relates to a method for receiving bulk material, wherein the step of unloading said receiving station further comprises the step of unloading said bulk material onto a loading band.

In another aspect of the invention it relates to a method for receiving bulk material, wherein the step of ventilating said bulk material in said receiving station further comprises forcing air through the receiving station using a fan.

In another aspect of the invention it relates to a method for receiving bulk material, wherein the step of unloading said receiving station involves directing said bulk material through said exit using a funnel formed by two exit walls.

In another aspect of the invention it relates to a method for receiving bulk material, wherein said receiving station is jointly attached to a foundation.

In another aspect of the invention it relates to a method for receiving bulk material, wherein the step of tilting said receiving station further comprises elevating at least one part of said receiving station.

In another aspect of the invention it relates to a for receiving bulk material, wherein the step of unloading said receiving station further comprises tilting said receiving station a tilting angle, which is 20-70 degrees.

In another aspect of the invention it relates to receiving station for receiving bulk material comprising:

an entrance for receiving a loading vehicle;

two side walls;

a bottom comprising a support structure and a carriageway for carrying said loading vehicle, supported by said support structure;

an exit; and

a tilting arrangement that is arranged to tilt said receiving station, for unloading said bulk material so that it flows from said receiving station through said exit.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein the receiving station has an openable roof.

In another aspect of the invention it relates to a receiving station for receiving bulk material further comprising:

ventilation means for ventilating said bulk material in said receiving station.

In another aspect of the invention it relates to a receiving station for receiving bulk material wherein said ventilation means further comprises:

air channels formed in said support structure along said bottom;

an air flow port connected to said air channels for letting air flow through said air channels; and

perforated segments arranged in said carriageway, for letting air flow through said air channels and said receiving station.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein said receiving station is arranged for unloading said bulk material onto a loading band.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein said receiving station is stationary arranged next to a processing terminal, wherein said receiving station is connected to said processing terminal by means of a flexible connection.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein the air flow port is connected to a fan for forcing air through said receiving station.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein said support structure comprises a first layer of beams.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein the support structure further comprises a second layer of beams perpendicular to said first layer of beams.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein the exit is arranged with a funnel formed by two exit walls for directing said bulk material.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein the receiving station is jointly attached to a foundation.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein said tilting arrangement further comprises means for elevating at least one part of said receiving station.

In another aspect of the invention it relates to a receiving station for receiving bulk material, wherein said tilting arrangement comprises means for tilting said receiving station a tilting angle, which is 20-70 degrees.

Any of the features in the aspects of the present invention above may be combined in any suitable way.

One effect of the invention is that it provides for a receiving station which enables faster discharge of bulk material from e.g. a truck, as it has an entrance and a carriageway, where the truck can drive in and tip the bulk. The receiving station provides for an intermediate storage, where the complete load can be discharged autonomously. Thereby terminal times are

shortened and the loading vehicles are not delayed at the processing terminal more than necessary.

Another effect is that the receiving station provides for gradual discharge into means for further processing, independent of the loading vehicle, as it e.g. has an exit and a tilting arrangement for unloading the bulk material. Thereby, loading the receiving station can e.g. be done when the receiving station is closed and the discharge into means for further processing can be done at a later time, when the processing terminal is open.

Another effect of the invention is that it provides for a flexible receiving station, which can be moved to another processing terminal. Hence, if a processing terminal is shut down, the receiving station can be moved to another facility.

Another effect of the invention is that it provides for a receiving station which enables for built in ventilation or heating, as it has e.g. air channels and an air flow port. Thereby, the bulk material can be stored in the receiving station for a longer time, which enables flexible loading, .e.g. loading and processing does not have to be synchronised.

Another effect of the invention is that the receiving station can be located outside the processing terminal. Thereby, loading can be done when the processing terminal is closed and unstaffed.

Another effect of the invention is that it is compatible with different buildings independent of their size. Thereby, it can be located in connection with existing buildings, without major changes to the buildings.

Another effect of the invention is that the unloading does not put any requirements on the buildings of the processing terminal, since the unloading is performed in the receiving station. Hence, there is no need for buildings of the processing terminal to fit a loading vehicle having a tipped loading platform.

Another effect of one aspect of one aspect of the invention is that it provides for energy efficient unloading. The receiving station can be isolated and only needs to be opened for a short period of time when the bulk material is loaded in the receiving station. Thereby, preventing the bulk material from freezing is facilitated as only the receiving station needs to be heated, not an entire building.

Another effect of one aspect of the invention is that the receiving station can integrated in a processing terminal. Thereby, the air from the processing terminal can be used for heating the bulk material. Hence, energy cost for heating the bulk material is minimised.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and features of the present invention will appear from the following detailed description of some aspects of the invention, wherein some aspects of the invention will be described in more detail with reference to the accompanying drawings, in which:

Fig. 1 shows a loading vehicle with bulk material arriving at a processing terminal, which is equipped with a receiving station according to the invention.

Fig. 2 shows a loading vehicle loading bulk material in a receiving station according to the invention.

Fig. 3 shows a receiving station unloading bulk material into a processing terminal.

Fig. 4 shows the receiving station seen from above, when a truck has entered the receiving station.

Fig. 5 shows an exemplary view of a receiving station for receiving of bulk material.

Fig. 6 shows an exemplary view of a receiving station for receiving of bulk material, seen from the long side.

Fig. 7 shows the entrance of the receiving station.

Fig. 8 shows the exit of the receiving station.

Fig. 9 shows an exemplary view of the bottom of the receiving station seen from above.

Fig. 10 shows an exemplary view of the bottom of the receiving station seen from the short side of the receiving station.

Fig. 11 shows an exemplary view of a tilting arrangement.

Fig. 12 shows an exemplary view of an arrangement for opening the roof of a receiving station.

Fig. 13 shows an exemplary view of receiving station integrated in a processing terminal.

It should be added that the following description of the embodiments is for illustration purposes only and should not be interpreted as limiting the invention exclusively to these aspects.

DETAILED DESCRIPTION

The present description relates to a method and a receiving station for receiving bulk material, such as potatoes or grain. Embodiments of the present invention relate, in general, to the field of agriculture and, particularly, to potatoes or grain. However, it should be appreciated that the invention is as such equally applicable to other bulk material. Examples of such material are wood chip, pellets or coal.

However, for the sake of clarity and simplicity, most embodiments outlined in this specification are related to provisions.

Embodiments of the present invention will be described more fully hereinafter with reference to the accompanying drawings, in which 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. Like reference signs refer to like elements throughout.

In the following description it should be emphasised that the term comprising or comprises, when used in this description and in the appended claims to indicate included features, elements or steps, is in no way to be interpreted as excluding the presence of other features elements or steps than those expressly stated.

Exemplary embodiments of the invention will now be described with references made to the fig. 1–13.

Fig. 1 shows a loading vehicle 201 with bulk material arriving at a processing terminal 301, which is equipped with a receiving station 101 for receiving bulk material. The receiving station 101 is a stand-alone unit, which can be located next to, inside or independently of the processing terminal. In fig. 1 one short side of the receiving station 101 is arranged in connection to and facing an opening 302 on the processing terminal 301. The processing terminal 301 comprises receiving means 303, see fig. 2 and 3, arranged at the opening 302 to receive the bulk material. In this embodiment the receiving means 303 is a receiving hopper, including a loading band 304. The loading vehicle 201 may be a truck, a tractor or similar. The receiving station 101 is of such dimensions that the vehicle can drive into the receiving station 101, when the roof 180 and the other short side of the receiving station 101 are opened.

Fig. 2 shows the receiving station 101, the loading vehicle 201, the processing terminal 301 and a foundation 401. The receiving station 101 is positioned on the foundation 401. The receiving station 101 is movably connected to the foundation 401 with tilting hinges 403, at the short side, next to and facing the opening 302. A ramp 402 is arranged on the other short

side of the foundation 401. Furthermore, the loading vehicle 201 comprises a loading platform 202, loaded with bulk material.

In fig. 2 the roof 180, not shown in fig. 2, of the receiving station 101 has been opened in order to let the loading vehicle 201 enter the receiving station 101, by mounting the ramp 402. The loading vehicle 201 is discharging the bulk material from the loading vehicle 201 by tipping the loading platform 202. When the discharging is finalised the loading vehicle 201 leaves the receiving station 101 and the roof 180 is closed. The bulk material is then temporary stored in the receiving station 101.

Fig. 3 discloses the receiving station 101 and a tilting arrangement 103, when the load is discharged from the receiving station 101, through the opening 302, to the receiving means 303 of the processing terminal 301. The tilting arrangement 103 tilts the receiving station 101 in order to unload the bulk material from temporary storage in the receiving station 101 into the processing terminal 301. When the receiving station 101 is tilted, the bulk material flows into the receiving means 303. The tilting angle (α), between the foundation 401 and the receiving station, is adapted to the amount of bulk that the receiving means 303 can receive, without damaging the bulk material. The angle will be affected by the properties of the bulk material, such as type of material, humidity, temperature etc, affecting the viscosity of the bulk material and the flow while unloading. In this embodiment the tilting angle (α) is 45 degrees, which may be a suitable angle for e.g. potatoes. Preferably the tilting angle (α) should be more than 20 degrees or most preferably 30-60.

The receiving station 101 is now described with reference to fig. 4, 5 and 6. Fig. 4 discloses the receiving station 101 for receiving bulk material seen from above, when a truck 201 has entered the receiving station 101 via the ramp 402. Fig. 5 discloses the receiving station 101 for receiving of bulk material in 3D perspective and fig. 6 shows the receiving station 101 seen from the long side.

The receiving station 101 has a rectangular bottom 150, two side walls 104, a roof 180, an entrance 106, an exit 107 and a tilting arrangement 103. The lower edges of the side walls 104 are attached to each long side of the bottom 150. The roof 180 is jointly attached to the upper side of the side walls 104. The entrance 106 and the exit 107 are located on the short sides on opposite sides of the receiving station 101.

The entrance 106, shown in fig. 7, is formed by opening the entire short side. The entrance 106 is covered by two entrance doors 109, which are attached to each one of the side walls 104 by a hinge arrangement. The entrance 106 is adapted to let a loading vehicle 201 enter and leave the receiving station 101.

The exit 107, shown in fig. 8, is adapted to unload the bulk material from the receiving station 101. The exit 107 is located on the other short side, opposite the entrance 106. The exit 107 includes two exit walls 110, also shown in fig. 4. The exit walls 110 are stretching diagonally from the side wall 104 to the short side of the receiving station 101 forming a funnel pointing in the direction of the exit 107. Thereby, unloading bulk material from the receiving station 101 through the exit 107 to the receiving means 303 is facilitated. The exit 107 is covered by two jointly attached exit doors 113. Then, the receiving station 101 may be tilted in order to move the bulk material to the exit side of the receiving station 101, in order to make room for more bulk material. Then several loading vehicles may discharge their loads, before the unloading of the receiving station 101 is started.

Fig. 9 shows the bottom 150 of the receiving station 101, seen from the above, in more detail. Fig. 10 shows the bottom 150 seen from the short side.

The bottom 150 of the receiving station 101 comprises a support structure 151, a carriageway 152 and three air channels 155. The carriageway 152 is positioned on the support structure 151 and covers the upper side of the support structure 151 entirely.

The support structure 151 is adapted to carry the loading vehicle 201. Thereby a loading vehicle 201 can drive into the receiving station 101 in order to discharge bulk material into the receiving station 101. The support structure 151 comprises a first layer of horizontal beams 154 positioned under the carriageway 152, stretching along the long side of the receiving station 101. The support structure 151 further comprises a second layer of horizontal beams 157, placed under the first layer of support beams 154, stretching in a direction perpendicular to the direction of the first layer of beams 154. The support structure 151 provides a sturdy construction for carrying the loading vehicle 201.

The air channels 155 are positioned between some of the beams in the first layer of beams 154 of the support structure 151. Hence, the air channels 155 are delimited by the first layer of support beams 154, the carriageway 152 and a cover plate 158 covering the lower parts of the air channels 155. The beams 154 further have an opening 159 connecting the air channels 155 to the outside of the receiving station 101 via an air flow port 111.

The carriageway 152, placed on the support structure 151, comprises a number of perforated segments 153, stretching along the air channels 155, forming the upper delimiting side of the air channels 155. It also comprises a number of solid segments 156 covering the rest of the carriageway 152. The perforated segments 153 and the solid segments 156 together form an upper flat surface suitable for the loading vehicle 201 to drive on.

The air channels 155 enable air to flow into the receiving station 101 from the outside passing through the air flow port 111, the air channels 155 and the perforated segments 153 or in the opposite direction. The air flow port 111 may be connected to a fan 112, for blowing or sucking air through the ventilation means (111, 153, 155).

Fig. 11 shows the tilting arrangement 103, for tilting the receiving station 101 in more detail. The tilting arrangement 103 comprises two tilting

cylinders 130, a fastening arrangement 131 and joints (132, 133). The fastening arrangement 131 comprises two v-shaped reinforcing beams, which are positioned along the side walls 104, at the middle portion of the side wall 104, with the peak facing at the roof of the receiving station 101. Hence, the length of the retracted tilting cylinders 130 can fit between the foundation and the peak of the fastening arrangement 131, when the receiving station 101 is in a horizontal position. The position of the tilting arrangement 103 may be optimised based on the required length of the extended cylinder and the risk of damaging deflection. The ends of the beams are fastened to the bottom 150 of the receiving station 101. The tilting cylinders 130 are hydraulic cylinders positioned between the foundation 401 and the top of the fastening arrangement 131 outside each side wall of the receiving station 101. The joints (132, 133) are positioned at each end of the two tilting cylinders 130, so that the receiving station 101 can tilt when the tilting cylinders 130 are extended.

The roof 180 of the receiving station 101 is split along the top into two equal roof parts 181. Fig. 12 shows an exemplary view of one roof part 181 and an arrangement for opening the roof 180. Each roof part 181 is attached to one side wall 104 with two hinges 182. The hinges 182 are positioned, distanced apart, at the upper side of the side wall 104. Furthermore, each roof part 181 is attached to an opening arrangement comprising two hydraulic cylinders 183, and two joints 184, positioned inside the receiving station 101. The hydraulic cylinders 183 are covered by a protective case 185. Each of the pairs of hydraulic cylinders 183 is jointly arranged between the roof part 181, and the bottom 150 of the receiving station 101. Thereby, the roof 180 is opened when hydraulic cylinders 183 are extended and closed when the hydraulic cylinders 183 are retracted.

In one aspect of the invention, described in fig. 13, the receiving station 101 is integrated in the processing terminal 301. The receiving station 101 and the processing terminal 301 then form one unit, wherein the receiving station 101 is a tiltable part. The receiving station 101 is then

suitably connected to the house with a flexible connection 501, which forms an airtight connection between the receiving station 101 and the processing terminal 301. In fig. 13. the connection is a bellows. The connection between the receiving station 101 and the processing terminal 301 could be constructed in other ways. The connection between the receiving station 101 and the processing terminal 301 enables air to flow in a closed system from the processing terminal 301, via the air flow port 111, the air channels 155 and the perforated segments 153 through the bulk material in the receiving station 101 and back into the processing terminal via the flexible connection 501.

The receiving station 101 as described in fig. 1–13, provides for an improved method for receiving bulk material. The method involves the steps of loading the receiving station 101, storing the bulk material and unloading the bulk material for further processing. The method may also involve heating and ventilation of the bulk material.

In the first step the roof 180 and the entrance 106 of the receiving station 101 are opened in order to make room for the loading vehicle 201, using the opening arrangement shown in fig. 12. In the loading step the bulk material is loaded into the receiving station 101. The loading vehicle 201 enters the flat and solid bottom 150 of the receiving station 101, positioned on the foundation 401, through the entrance 106 via the ramp 402. The solid bottom 150 carries the weight of the loading vehicle 201 and the bulk material. When the loading vehicle 201 has entered the receiving station 101, the loading vehicle 201 unloads the bulk material into the receiving station 101, by tipping the loading platform 202. Thereby, the loading can be done autonomously without awaiting a reception line or similar for receiving the bulk material. The openable roof 180 enables a truck or other vehicle, which is higher than the receiving station 101, to drive into the receiving station 101. The openable roof also makes it possible for the loading vehicle 201 to tilt the loading platform 202, when positioned in the receiving station 101, without obstructing the tipped loading platform. After the receiving station 101 has

been loaded, the loading vehicle drives out via the ramp 402. Finally, the roof 180 and the entrance 106 are closed.

In the storage step the bulk material is stored in the receiving station 101. The air channels 155 enables for ventilating, heating, cooling and/or drying the bulk material. The air flows into the air channels 155, through the air flow port 111. The air channels may be connected to a fan 112 which blows air into the air channels. The air can then flow further into the receiving station 101 through the perforated segments 153.

In the unloading step the bulk material is unloaded from the receiving station 101. The tilting arrangement 103 shown in fig. 1, lifts the entrance side of the receiving station 101, by extending the tilting cylinders 131, which forces the tilting hinges 403 to move and the receiving station 101 is tilted. Then, the bulk material flows out through the exit 107. The receiving station 101 is positioned at the foundation 401, which enables placing the receiving means on a level lower than the exit 107 and thereby facilitating flexible unloading into a receiving means 303. The funnel shaped exit 107 guides the bulk material into the receiving means 303.

The method according to the invention provides for an improved method for receiving bulk material. The method provides for faster and more flexible unloading of bulk material from a loading vehicle 201. In the method a full load can be unloaded autonomously, as an intermediate storage step is introduced, by using the receiving station 101. The bulk material is prevented from damage during storage by the ventilation in the receiving station 101. The method makes it possible for several loading vehicles to unload their loads in a receiving station 101303, without unloading the receiving station in-between.

The receiving station 101 according to the invention has features which, when put together, provide for an improved method for unloading bulk material. The receiving station 101 both has support for carrying a loading vehicle 201 and for ventilating the bulk material. The invention enables faster

unloading of the bulk material, as it has an entrance 106 and a carriageway 152 for receiving the bulk material as well as an exit 107 and a tilting arrangement 103 for tipping the bulk material.

The foregoing has described the principles, preferred embodiments and modes of operation of the present invention. However, the invention should be regarded as illustrative rather than restrictive, and not as being limited to the particular embodiments discussed above. The different features of the various embodiments of the invention can be combined in other combinations than those explicitly described. It should therefore be appreciated that variations may be made in those embodiments by those skilled in the art without departing from the scope of the present invention as defined by the following claims.

In one aspect of the invention the bulk material is potatoes. Heating the potatoes to a temperature of about 8-10 degrees Celsius makes it more durable to damage during sorting. Potatoes are typically stored at a temperature of about 5 degrees Celsius. By providing a possibility of built-in heating, the heating step of the following processing may be skipped, as the heating can be done in the receiving station 101. The air flow port 111 and the fan 112 may also be used for drying the potatoes material before sorting. The fan 112 may be mobile. The fan 112 may also be built into the processing terminal 103 or into the receiving station 101. Heated air can be taken from the inside of the processing terminal 301, as shown in fig. 13.

In another aspect of the invention, the bottom 150 of the receiving station 101 is not of rectangular shape. In another aspect of the invention the receiving station 101 does not have a roof 180.

In another aspect of the invention the beams 154 may be located in any other direction along the bottom 150. The support structure 151 may also comprise one or several layers of beams, or any other solid support arrangement.

In another aspect of the invention the perforated segments 153 may extend beyond the air channels 155, or the air channels 155 are not completely covered by the perforated segments 153.

In another aspect of the invention, the receiving station 101 is placed inside a building.

In another aspect of the invention the entrance 106 and the exit 107 are not positioned on opposite sides of the receiving station 101.

In another aspect of the invention the entrance 106 and the exit 107 are covered by one or more doors. In yet another aspect of the invention the entrance 106 and the exit are not covered by any doors.

In another aspect of the invention the tilting arrangement 103 can be used to shake or vibrate the container in order to speed up or control the flow of the material while unloading. In another aspect of the invention the tilting arrangement 103 can be positioned at one end of the side wall 104.

In yet another aspect of the invention the receiving station 101 is tilted in another direction, e.g. elevating one of the long sides 104 or a corner.

CLAIMS

1. A method for receiving bulk material comprising the steps of:

receiving a loading vehicle (201) through an entrance (106) into a receiving station (101) further comprising two side walls (104), an exit (107), and a bottom (150); wherein said bottom (150) comprises a support structure (151) and a carriageway (152) for carrying said loading vehicle (201), supported by said support structure (151);

loading said bulk material into said receiving station (101) from said loading vehicle (201);

letting out said loading vehicle (201) through said entrance (106);

temporary storing said bulk material in said receiving station (101); and

unloading said bulk material from said receiving station (101), using a tilting arrangement (103), by which the receiving station (101) is tilted so that the bulk material flows out through the exit (107).

2. A method for receiving bulk material according to claim 1, wherein said receiving station (101) further comprises a roof (108), and wherein the method further comprises the step of opening said roof (180) of said receiving station (101), before receiving said loading vehicle (201).

3. A method for receiving bulk material according to claim 2, wherein the method further comprises the step of closing said roof (180) after letting out said loading vehicle (201).

4. A method for receiving bulk material according to any of the preceding claims, wherein the step of temporary storing said bulk material in said receiving station (101) further comprises the step of:

ventilating said bulk material in said receiving station (101).

5. A method for receiving bulk material according to claim 4, wherein the

step of ventilating said bulk material in said receiving station (101) further comprises the steps of:

letting air flow through an air flow port (111) and air channels (155) formed in said support structure (151) along said bottom (150) of said receiving station(101); and

letting air flow through said air channels (155) and said receiving station (101) through perforated segments (153) in said carriageway (152).

6. A method for receiving bulk material according to any of the preceding claims, wherein the step of unloading said receiving station (101) further comprises the step of unloading said bulk material onto a loading band (304).

7. A method for receiving bulk material according to any of the claims 4–6, wherein the step of ventilating said bulk material in said receiving station (101) further comprises forcing air through the receiving station (101) using a fan (112).

8. A method for receiving bulk material according to any of the preceding claims, wherein the step of unloading said receiving station (101) involves directing said bulk material through said exit (107) using a funnel formed by two exit walls (110).

9. A method for receiving bulk material according to any of the preceding claims, wherein said receiving station (101) is jointly attached to a foundation (401).

10. A method for receiving bulk material according to any of the preceding claims, wherein the step of tilting said receiving station further comprises elevating at least one part of said receiving station (101).

11. A method for receiving bulk material according to any of the preceding claims, wherein the step of unloading said receiving station (101) further comprises

tilting said receiving station (101) a tilting angle (α), which is 20-70 degrees.

12. A receiving station (101) for receiving bulk material comprising:

an entrance (106) for receiving a loading vehicle (201);

two side walls (104);

a bottom (150) comprising a support structure (151) and a carriageway (152) for carrying said loading vehicle (201), supported by said support structure (151);

an exit (107); and

a tilting arrangement (103) that is arranged to tilt said receiving station (101), for unloading said bulk material so that it flows from said receiving station (101) through said exit (107).

13. A receiving station (101) for receiving bulk material according to claim 12, wherein the receiving station (101) has an openable roof (180).

14. A receiving station (101) for receiving bulk material according to any of the claims 12-13 further comprising:

ventilation means for ventilating said bulk material in said receiving station (101).

15. A receiving station (101) for receiving bulk material according to claim 14 wherein said ventilation means further comprises:

air channels (155) formed in said support structure along said bottom (150);

an air flow port (111) connected to said air channels (155) for letting air flow through said air channels (155); and

perforated segments (153) arranged in said carriageway (152), for letting air flow through said air channels (155) and said receiving station (101).

16. A receiving station (101) for receiving bulk material according to any of the claims 12-15, wherein said receiving station (101) is arranged for unloading said bulk material onto a loading band (304).

17. A receiving station (101) for receiving bulk material according to any of the claims 12-16, wherein said receiving station (101) is stationary arranged next to a processing terminal (301), wherein said receiving station (101) is connected to said processing terminal (301) by means of a flexible connection (501).

18. A receiving station (101) for receiving bulk material according to any of the claims 15-17, wherein the air flow port (111) is connected to a fan (112) for forcing air through said receiving station (101).

19. A receiving station (101) for receiving bulk material according to any of the claims 12-18, wherein said support structure (151) comprises a first layer of beams (154).

20. A receiving station (101) for receiving bulk material according to claim 19, wherein the support structure (151) further comprises a second layer of beams (157) perpendicular to said first layer of beams (154).

21. A receiving station (101) for receiving bulk material according to any of the claims 12-20, wherein the exit (107) is arranged with a funnel formed by two exit walls (110) for directing said bulk material.

22. A receiving station (101) for receiving bulk material according to any of the claims 12-21, wherein the receiving station is jointly attached to a foundation (401).

23. A receiving station (101) for receiving bulk material according to any of the claims 12-22, wherein said tilting arrangement (103) further comprises means for elevating at least one part of said receiving station (101).

24. A receiving station (101) for receiving bulk material according to any of

the claims 12-23, wherein said tilting arrangement (103) comprises means for tilting said receiving station (101) an tilting angle (α), which is 20-70 degrees.

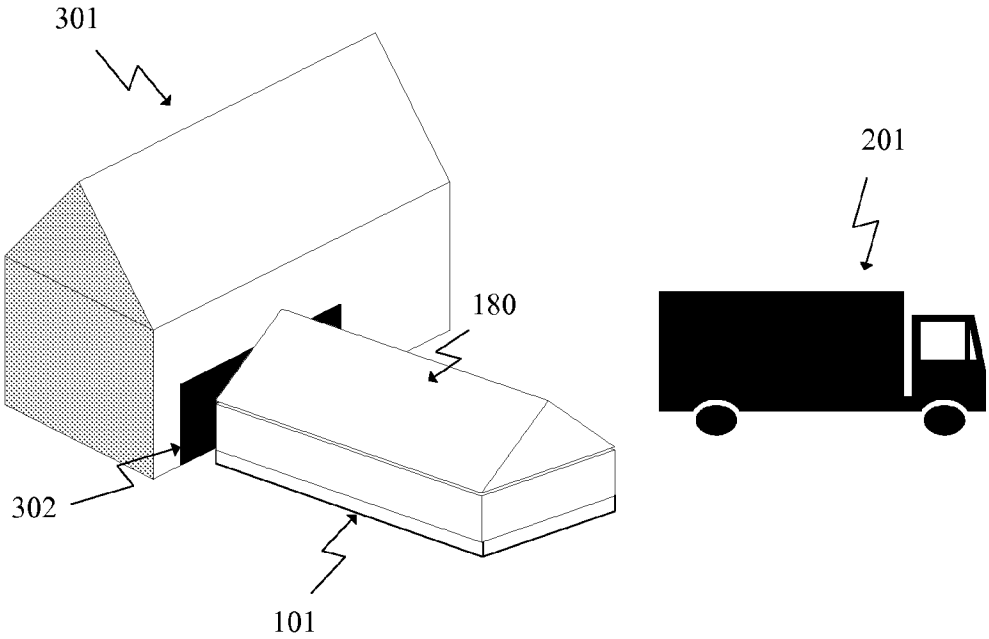

Fig. 1

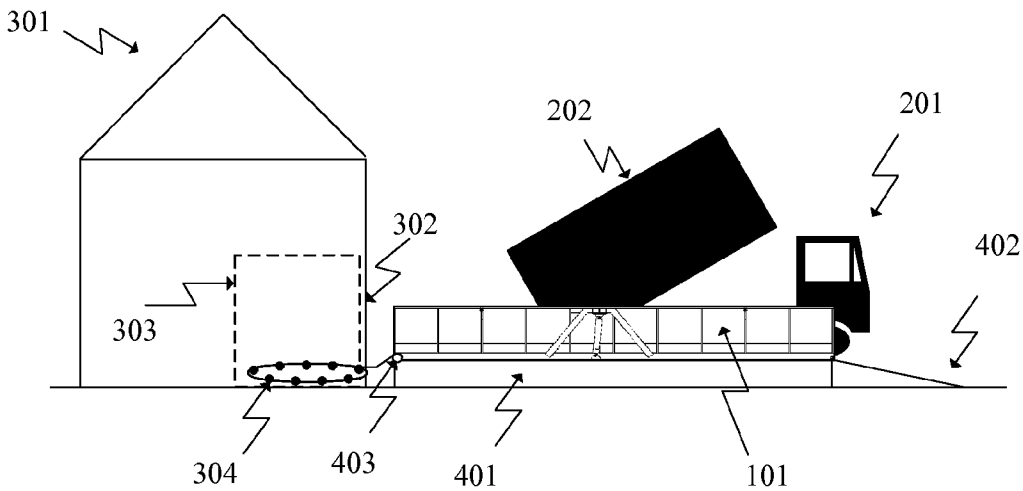

Fig 2

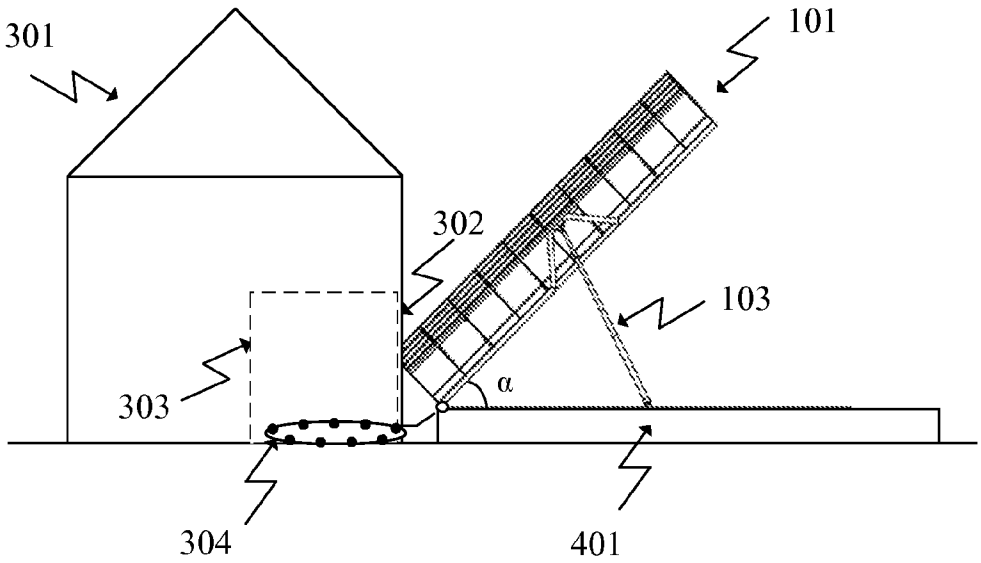

Fig 3.

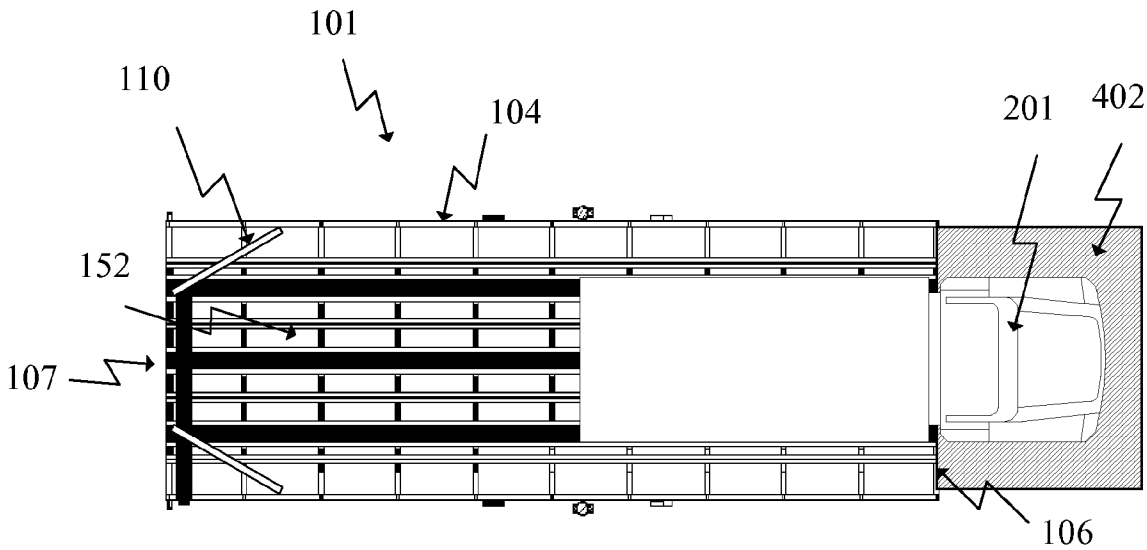

Fig 4.

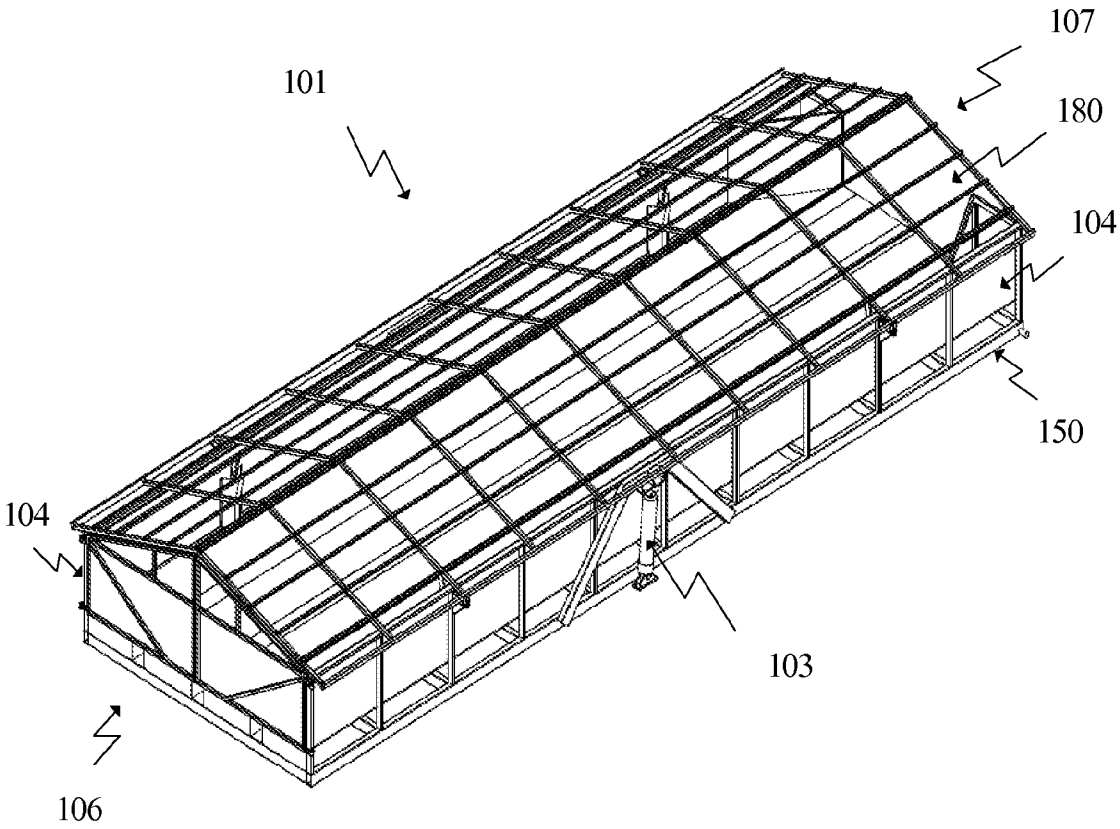

Fig. 5

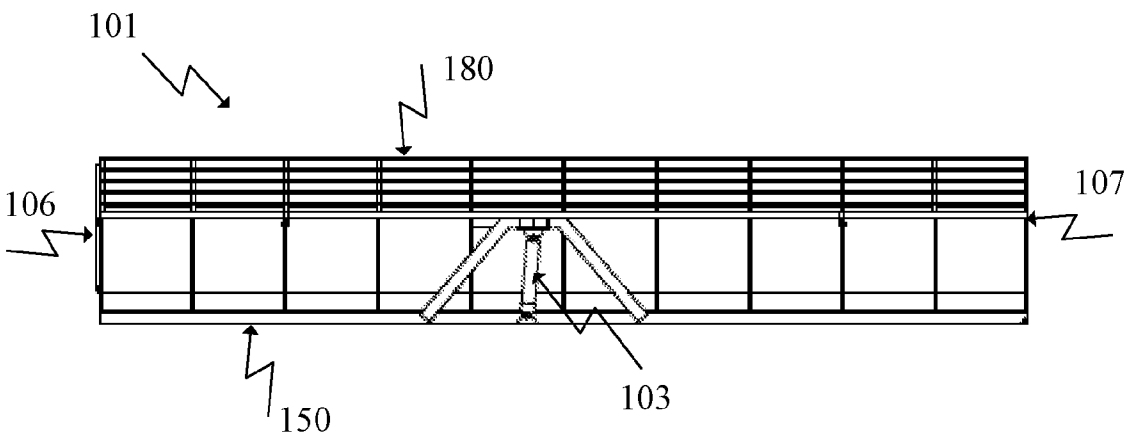

Fig. 6

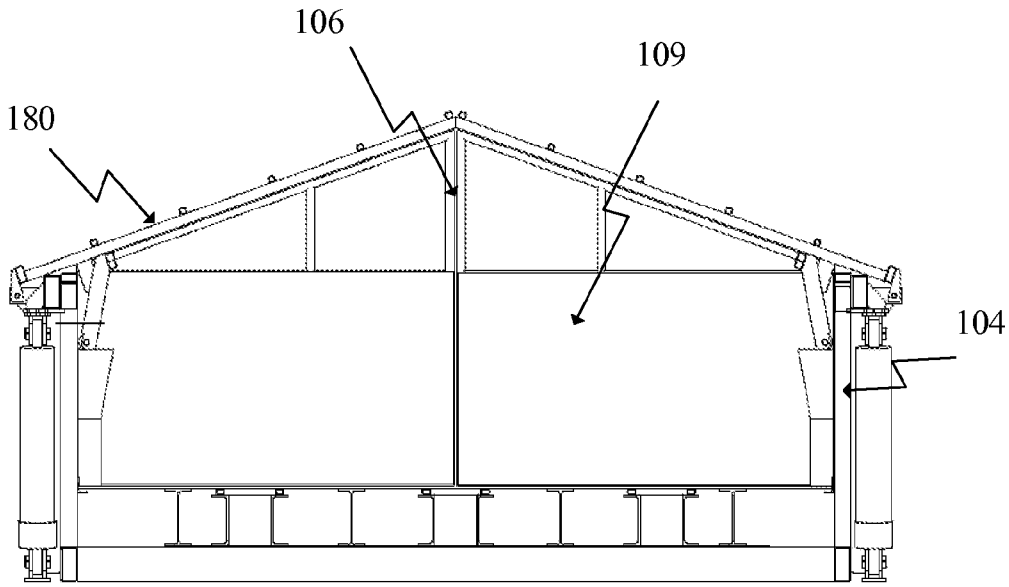

Fig. 7

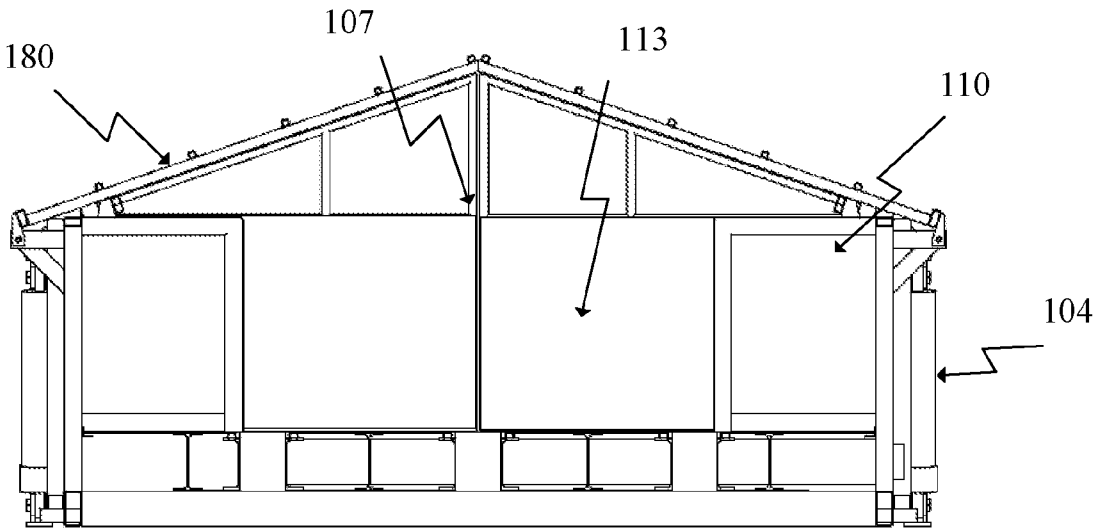

Fig. 8

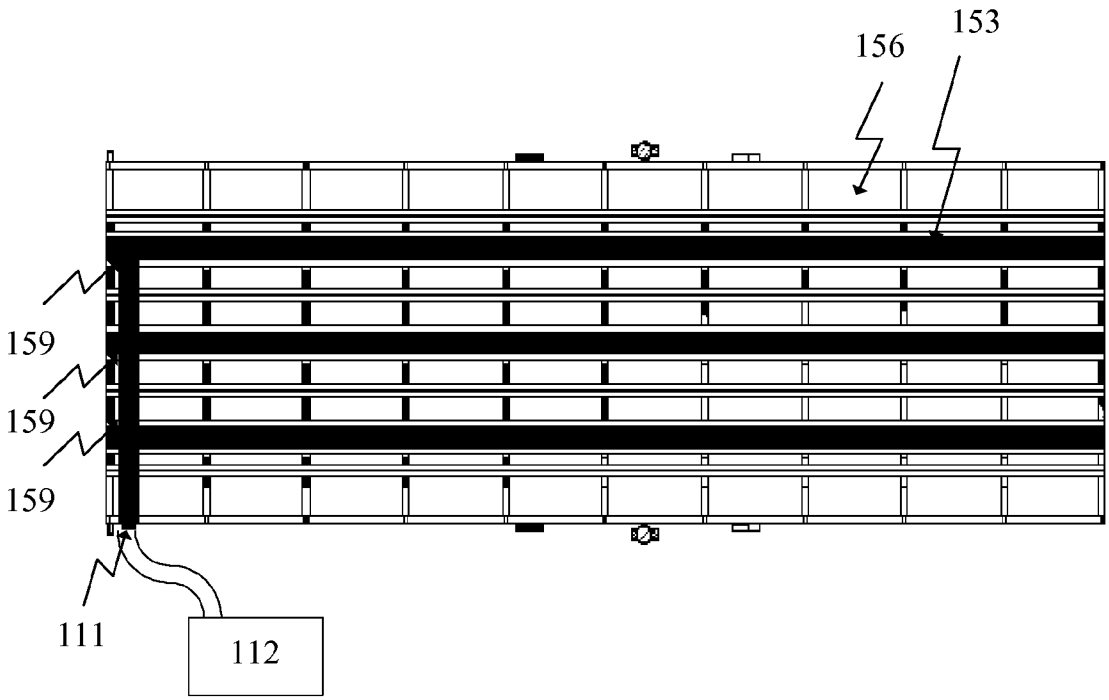

Fig. 9

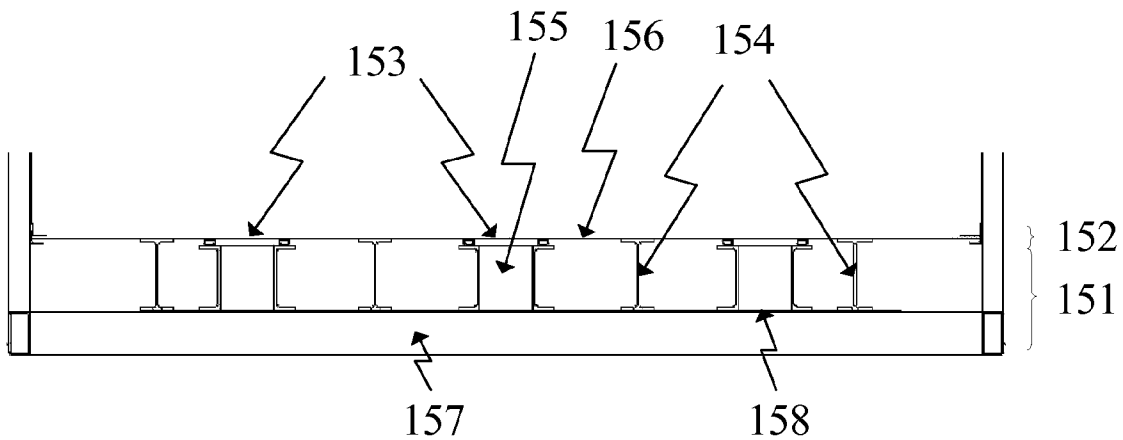

Fig. 10

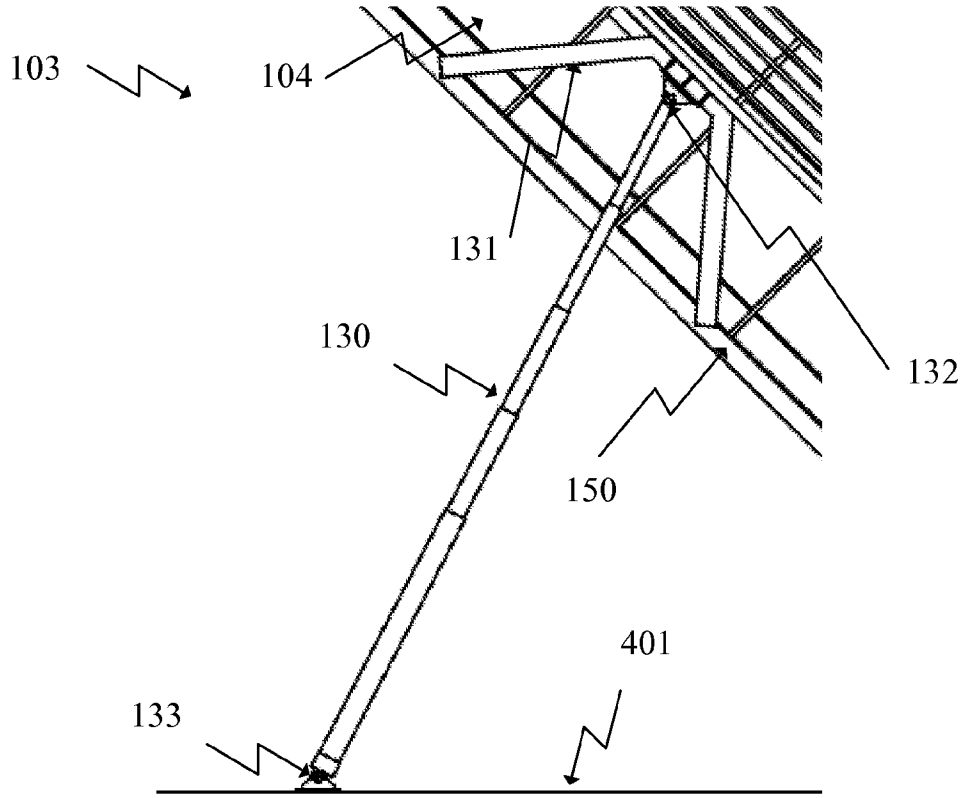

Fig. 11

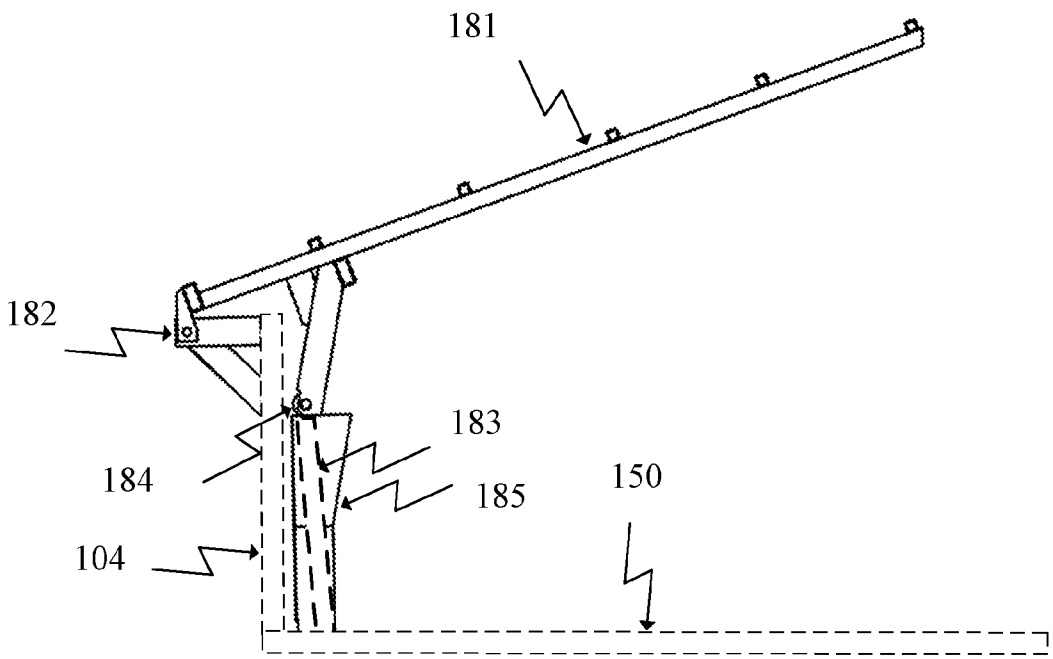

Fig. 12

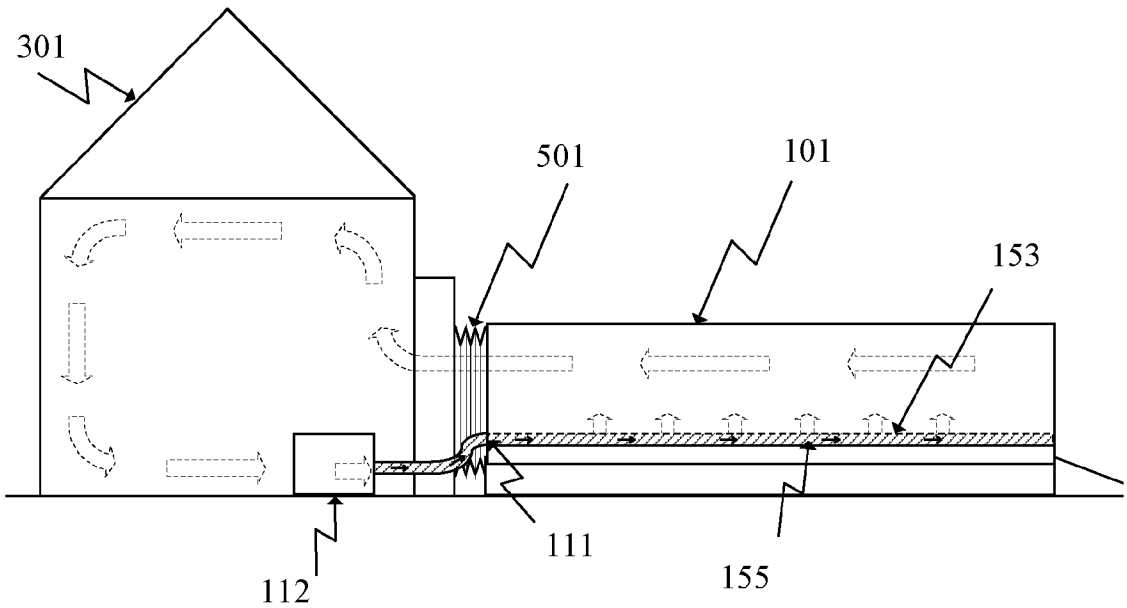

Fig. 13

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/055056

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65G47/19 B65G67/24
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB 2 342 092 A (ARC LTD [GB]; HANSON QUARRY PRODUCTS EUROP L [GB]) 5 April 2000 (2000-04-05) page 5, line 13 - page 8, line 27 figures 1-4	1-3, 8-13, 21-24 4,14
X	US 4 669 674 A (OLDENGOTT MICHAEL [DE] ET AL) 2 June 1987 (1987-06-02) column 3, line 43 - column 5, line 28 figures 1A-4	1,6, 8-12,16, 19,21-24
Y A	GB 1 401 424 A (BENTALL CO LTD E H) 16 July 1975 (1975-07-16) page 1, column 1, line 9 - line 80 figures 1-3	4,14 5,7,15

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 August 2010	09/08/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Papatheofrastou, M

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/055056

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 298 05 854 U1 (ROCHOLL JUERGEN [DE]) 29 April 1999 (1999-04-29) page 4, line 11 - line 16 figure 1 -----	11,24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/055056

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2342092 A	05-04-2000	AU 5753399 A WO 0018667 A1	17-04-2000 06-04-2000
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