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(54) CONTAINER AND CONTAINER UNLOADING METHOD

(57) The present invention relates to containers for the transportation and storage of loose loads, which comply with international standard ISO 1496 and its Russian national equivalent, and also to methods for unloading same. A container includes a frame with fittings, side walls, end walls, and a bottom in the lower part of the container, via which unloading is performed. Disposed in the lower part of the container is at least one longitudinal beam which runs parallel to the side walls and substantially along the entire length of the container. The bottom is configured in the form of at least one shutter pivotally fastened in the lower part of the container. The container is provided with locking members for locking the at least one shutter in a closed position. The at least one shutter comprises support platforms capable of interacting with the locking members in order to lock the at least one shutter in a closed position. A method for unloading the above container comprises raising the shutters, bringing the locking members out of engagement with the support platforms, and opening the at least one shutter, thus unloading the container. The technical result is that of providing reliable locking in a transport position, and also of simplifying and expediting the unloading of a container, while maintaining a high ratio between the space occupied by a container and the volume of the load therein.

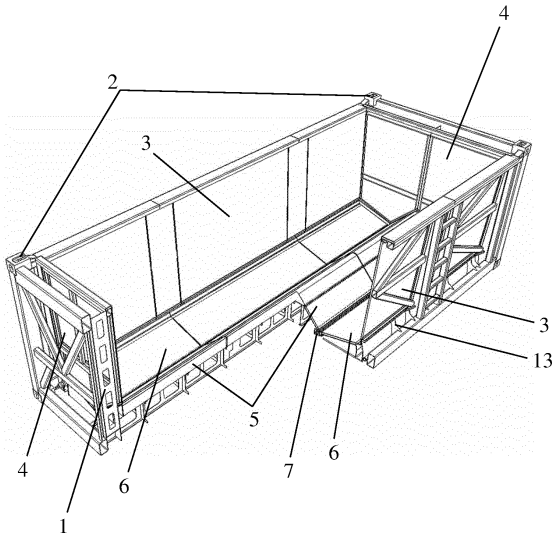

Fig. 1

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Description

[0001] This invention relates to methods and devices for transportation and storage of cargoes, in particular to containers for transportation and storage of bulk cargoes, which comply with ISO Standards of 1496 series and its Russian national equivalent, as well as to methods for unloading them.

[0002] A great number of various containers for transportation and storage of bulk cargoes are known in the art. As a rule, a container comprises a frame with corner fittings, side walls, end walls, and a bottom in the lower part of the container. Additionally, a container may comprise a top cover with or without hatches, either removable or fixed. Such a container can be unloaded through the top opening or through one of the side walls that may be opened. For unloading, a container is tilted or rotated by means of special mechanisms, e.g., spreaders. In the case of unloading through the top, loading/unloading mechanisms may be also used.

[0003] Unloading a container by tilting or rotating it or by means of a loading/unloading mechanism requires usage of complex special-purpose equipment and, moreover, may be rather time-consuming.

[0004] Hopper cars are known that are used for transporting cargoes, including bulk ones. Such cars are unloaded through several hatches installed in the car bottom. A hopper car is unloaded at a special-purpose section of a railway, and unloading itself is rather time-consuming which is conditioned by the design of hatches. Furthermore, even temporary storage of a bulk cargo in a hopper car is unreasonable from the point of relation between a space occupied by such a car and a cargo volume.

[0005] So, there is a task of developing such a design of a container, in particular for transportation and storage of bulk cargoes, which would enable to use a container space efficiently during transportation and storage as well as perform unloading simply and quickly.

[0006] The technical result of the invention is reliable locking, simpler and more speedy unloading of a container, while maintaining a high ratio between a space occupied by a container and a volume of a cargo contained therein.

[0007] The set task is solved and the technical effect is achieved by a container comprising a frame with corner fittings, side walls, end walls, and a bottom in the lower part of the container, through which it is unloaded. Further, the lower part of the container is provided with at least one longitudinal beam running parallel to the side walls and substantially along the entire length of the container. The bottom is made in the form of at least one door hinged in the lower part of the container substantially along its longer side.

[0008] The container is provided with locking members to lock said at least one door in a closed position. Said at least one door comprises support platforms configured to interact with the locking members in order to lock the at least one door in a closed position.

[0009] Making the bottom in the form of at least one door that can be reliably locked in a closed position and easily opened by means of the locking members and the support platforms enables to unload the container through a wide opening practically corresponding to the area of the at least one door, without using complex special-purpose equipment to tilt or rotate the container. This reduces time for unloading the container significantly, while maintaining its useful space.

[0010] Additionally, the container may comprise a top cover with or without hatches for loading. The cover may be made removable or fixed.

[0011] Said at least one door may be hinged either to the frame, or to the at least one longitudinal beam. In particular, if two doors are used, they may be hinged each to the corresponding side of the frame for opening in the direction downward from the longitudinal beam. Alternatively, these two doors may be fastened to the longitudinal beam for opening downward from the frame, each on its side.

[0012] Preferably, the locking members are made in the form of a rod supported by the frame or the longitudinal beam and arranged thereon with their first (or lower) thrust ends, the rod being made capable of rotating around its axis running parallel to at least one door (or the longitudinal beam, or the side wall). The support platforms may be made in the form of L-shaped plates. Then it would be reasonable that the second (or upper, or loose) thrust ends are disposed in the corners of L-shaped plates in the closed position of the doors. All this enables to reliably lock and hold the doors in the closed position.

[0013] These L-shaped plates may be mounted so that the second thrust ends are blocked against movement in a closed position of the at least one door. When the at least one door is slightly raised from the closed position, the second thrust ends may be moved from the corners of the L-shaped plates, enabling to open the at least one door. This ensures simple and quick unblocking of the thrust ends following by opening the doors.

[0014] Preferably, at least one door is provided with catches to control its movement. These catches may be controlled manually or with the use of corresponding means to accelerate opening the doors and their subsequent return to the closed position.

[0015] The set task is solved and the stated technical effect is achieved also by the proposed method for unloading the above container comprising a frame with corner fittings, side walls, end walls, a bottom in the lower part of the container, the bottom is made in the form of at least one door hinged in the lower part of the container and provided with support platforms and locking members of said at least one door to lock it in a closed position by interacting with the support platforms. According to the claimed method, in order to open the doors and unload the container, the doors are slightly raised to unlock the locking members of said at least one door to move

it, the locking members are disengaged from the support platforms, and the at least one door is opened, thus unloading the container.

[0016] Below, the invention will be described in more detail with reference to the accompanying drawings showing possible embodiments of the claimed container and the unloading method.

Figure 1 shows a partial section view of the container.

Figure 2 shows a door.

Figure 3 shows an embodiment of the locking member.

Figure 4 shows the stages of unblocking the thrust ends for movement in a partial view from one end of the container.

Figure 5 shows the process of opening a door to unload the container in a partial view from one end of the container.

[0017] The container (Figure 1) for transportation and storage of bulk cargoes comprises the frame (1) with the corner fittings (2), the side walls (3), the end walls (4), and the bottom in the lower part of the container through which unloading is performed.

[0018] The container may be further provided with a top cover (not shown in the drawings) with or without hatches for loading. This cover may be made either removable, or fixed.

[0019] At least one longitudinal beam (5) is disposed in the lower part of the container, which runs parallel to the side walls (3) and substantially along the entire length of the container. Thus, Figure 1 shows a container embodiment with one beam (5), but more beams may be also used, e.g., two beams (5).

[0020] The longitudinal beam (5) may be made in the form of a space truss in order to provide for the required stiffness to the container.

[0021] The bottom is made in the form of at least one door (6) hinged in the lower part of the container. Figure 1 shows a container embodiment with two doors (6), each being arranged between the beam (5) and the respective side wall (3) and the respective side of the frame (1).

[0022] A person skilled in the art will understand that, for example, if two beams (5) are present, one door (6) arranged between these two beams (5) may be used. The beams (5) may either adjoin the respective sides of the frame (1), or not adjoin the respective sides of the frame (1), and in the latter case two more doors (6) may be additionally disposed between the beams (5) and the respective sides of the frame (1), so the total number of the doors (6) is three.

[0023] The doors (6) are hinged, e.g., by means of ball joints (7), either to the beam (5), or to the respective side of the frame (1). In the first case shown in Figure 1, the doors (6) may rotate around the axes running near the beam (5) and open for unloading on the side of the frame (1). In the case of hinging the doors (6) on the respective sides of the frame (1) (this container embodiment is not shown in the drawings), the opening is located nearer to the beam (5).

[0024] The door (6) comprises the support platforms (8) for locking the door (6) in a closed position. In one particular embodiment of the invention, the support platform (8) may be an L-shaped plate (shown in Figures 4, 5) or a similar structure having at least one corner which purpose will be explained below.

[0025] Furthermore, the door (6) may be provided with catches (9) (see Figure 2) for controlling its opening and closing.

[0026] The container is provided with locking members (10) for locking the doors (6) in a closed position.

[0027] In one particular embodiment of the invention, the locking members (10) are made in the form of a rod (11) and mounted thereon with their first (or lower) thrust ends (12), as shown in Figure 3. The rod (11) may rotate around its axis running parallel to the door (6) in brackets secured to the frame (1). When the rod (11) rotates, the second (or upper, or loose) thrust ends (12) describe an arc of circle.

[0028] Locations of the above L-shaped plates may be selected so that the second thrust ends (12) enter the corners of the L-shaped plates, as is shown, e.g., in Figure 4a. Preferably, the thrust end (12) is blocked against movement in the location, as shown in Figure 4a, of the second thrust end (12) in the corner of the support platform (8) made in the form of a L-shaped plate. This position corresponds to the closed door (6) and blocks the door(6) against opening. If an attempt is made to rotate the rod (11) clockwise (according to Figure 4a) for the purpose of bringing the second thrust end (12) out of engagement with the L-shaped plate, an imaginary arc of circle described by the second thrust end (12) in such rotation will cross the inner surface of the L-shaped plate, which is in contact with this second end, and, correspondingly, prevent the second thrust end (12) from moving. This is how the thrust end (12) and, correspondingly, the locking member (10) are blocked in the closed position of the door (6). The weight of the door (6) ensures holding of the thrust end (12); and the heavier a cargo is in the container, the more reliably the door (6) is locked.

[0029] In order to release the second thrust end (12) for giving it the possibility of moving and, thus, open the door (6), it is necessary to slightly raise the door (6), as is shown in Figure 4b. When the door (6) is raised slightly, a clearance is formed between the inner surface of the L-shaped plate being in contact with the second thrust end (12) and, actually, this second end. This clearance may be small, e.g., in the range from 2 to 4 mm, but it should be sufficient for all the thrust ends (12) of the respective locking member (10) to pass freely when unblocking its movement and subsequent opening of the door (6). Greater values of the clearance will require to

raise the door (6) higher which is, generally speaking, unreasonable.

[0030] Then, it is possible to start rotating the rod (11) (Figures 4, 5) clockwise, thus rotating the second thrust end (12) and gradually bringing it out of engagement with the support platform (8), as it is shown in Figure 4c.

[0031] Further rotation of the rod (11) results in that the second thrust end (12) goes out of the area of engagement with the support platform (Figure 5a) completely, and the door (6) opens downward under the action of its own weight and a cargo weight (Figure 5b).

[0032] An exact number of the thrust ends (12) for each locking member (10) is not limited, but, preferably, is in the range from two to eight, most preferably from four to six. On the one side, a small number of thrust ends (12) may result in an increased load on the area of the door (6) between two neighboring thrust ends (12). On the other side, if a number of the thrust ends (12) is too great, the structure of the locking member (10) will become more complex.

[0033] A person skilled in the art will understand from the above description that a number of the doors (6) may be varied, e.g., from one to three; and the doors (6) may be hinged to the beam (5) and the frame (1).

[0034] Thus, this invention enables to unload the container in a simple and quick way, practically without negative influence on its space, reliably lock the doors, precluding their spontaneous opening when the container is in operation and being transported.

Claims

1. A container for transportation and storage of bulk cargoes, comprising:
   a frame with corner fittings, side walls, end walls, and a bottom in the lower part of the container through which unloading is performed; at least one longitudinal beam running parallel to the side walls and substantially along the entire length of the container is disposed in the lower part of the container; the bottom is made in the form of at least one door hinged in the lower part of the container; the container is provided with locking members for locking the at least one door in a closed position; and the at least one door comprises support platforms capable of interacting with the locking members to lock the at least one door in the closed position.

2. The container according to Claim 1, wherein the at least one door is hinged to the frame.

3. The container according to Claim 1, wherein the at least one door is hinged to the at least one longitudinal beam.

4. The container according to Claim 1, wherein the locking members are made in the form of a rod and thrusts mounted thereon with their first ends, the rod being configured to rotate around its axis running parallel to the at least one door.

5. The container according to Claim 4, wherein the support platforms are made in the form of L-shaped plates.

6. The container according to Claim 5, wherein, in the closed position of the at least one door, the second thrust ends are disposed practically in the corners of the L-shaped plates.

7. The container according to Claim 6, wherein the L-shaped plates are mounted so that the second thrust ends are blocked against movement in the closed position of the at least one door.

8. The container according to Claim 6 or 7, wherein the L-shaped plates are mounted so that the second thrust ends are unblocked for movement when the at least one door in the closed position is slightly raised.

9. The container according to Claim 1, wherein the at least one door is provided with catches for controlling its movement.

10. A method for unloading a container for transportation and storage of bulk cargoes, comprising a frame with corner fittings, side walls, end walls, a bottom in the lower part of the container, the bottom being made in the form of at least one door hinged in the lower part of the container and provided with support platforms, and locking members of the at least one door for locking it in a closed position after interacting with the support platforms, according to which, in order to open the doors and unload of the container:
    the doors are slightly raised, thus unblocking the locking members of the at least one door for movement; the locking members are brought out of engagement with the support platforms; and the at least one door is opened, thus unloading the container.

Amended claims under Art. 19.1 PCT

1. A container for transportation and storage of bulk cargoes, comprising:

   a frame with corner fittings,
   side walls,
   end walls, and
   a bottom in the lower part of the container, through which unloading is performed,
   wherein
   a longitudinal beam running parallel to the side walls and substantially along the entire length

of the container is disposed in the lower part of the container,
the bottom is made in the form of two doors hinged in the lower part of the container and disposed on both sides of the longitudinal beam, and the container is provided with locking members to hold the doors in a closed position, and each door comprises support platforms capable of interacting with the locking members for locking the door in the closed position.

2. The container according to Claim 1, wherein the doors are hinged to the frame.

3. The container according to Claim 1, wherein the doors are hinged to the longitudinal beam.

4. The container according to Claim 1, wherein the locking members are made in the form of a rod and thrusts mounted thereon with their first ends, the rod being configured to rotate around its axis running parallel to the respective door.

5. The container according to Claim 4, wherein the support platforms are made in the form of L-shaped plates.

6. The container according to Claim 5, wherein, when the door is in the closed position, the second thrust ends are disposed practically in the corners of the L-shaped plates.

7. The container according to Claim 6, wherein the L-shaped plates are mounted so that the second thrust ends are blocked against movement when the door is in the closed position.

8. The container according to Claim 6 or 7, wherein the L-shaped plates are mounted so that the second thrust ends are unblocked for movement when the door in the closed position is slightly raised.

9. The container according to Claim 1, wherein each door is provided with catches for controlling its movement.

10. A method for unloading a container for transportation and storage of bulk cargoes, comprising a frame with corner fittings, side walls, longitudinal beam running parallel to the side walls and substantially along the entire length of the container, end walls, a bottom in the lower part of the container, the bottom is made in the form of two doors hinged in the lower part of the container and provided with support platforms, and door locking members for locking them in a closed position after interacting with the support platforms, according to which, in order to open the doors and unload the container:

the doors are slightly raised, thus unblocking the locking members for movement; the locking members are brought out of engagement with the support platforms; and the doors are opened, thus unloading the container.

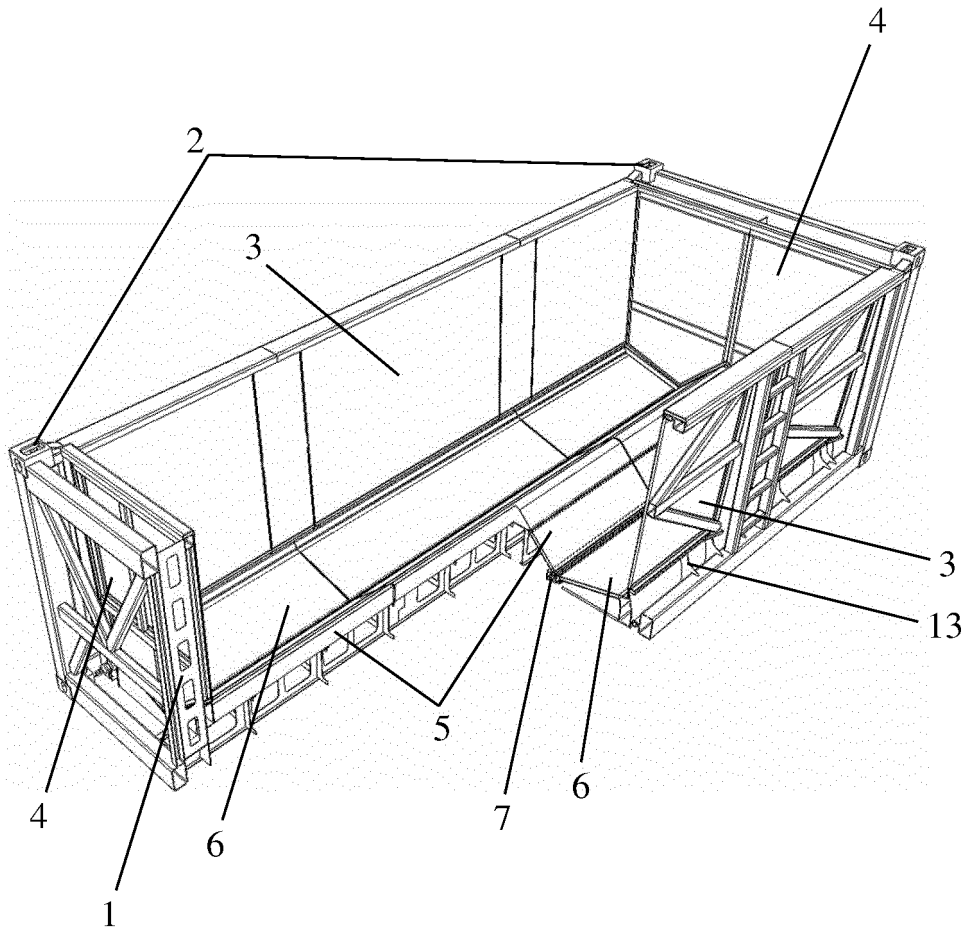

Fig. 1

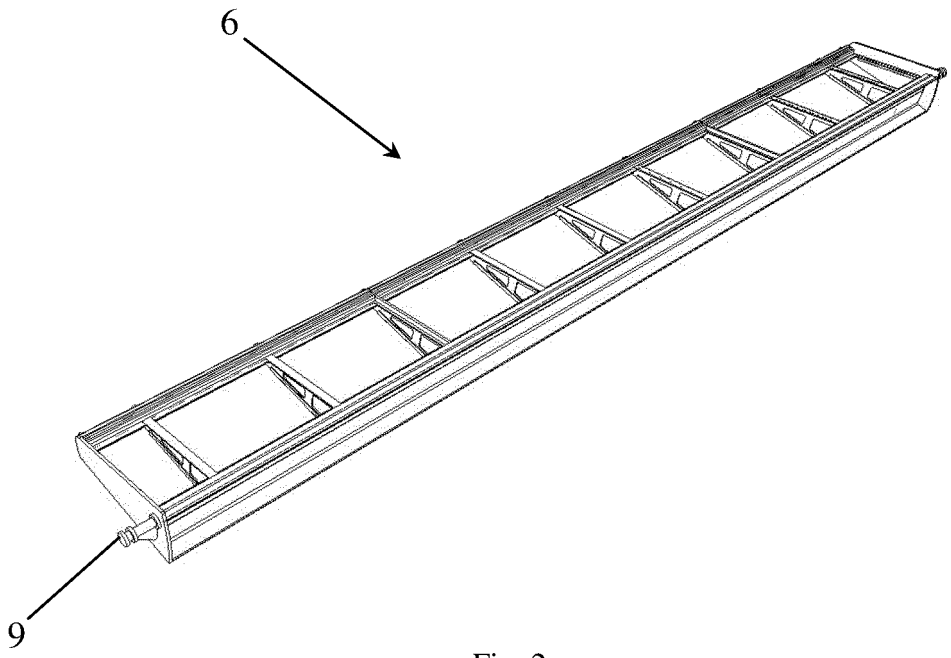

Fig. 2

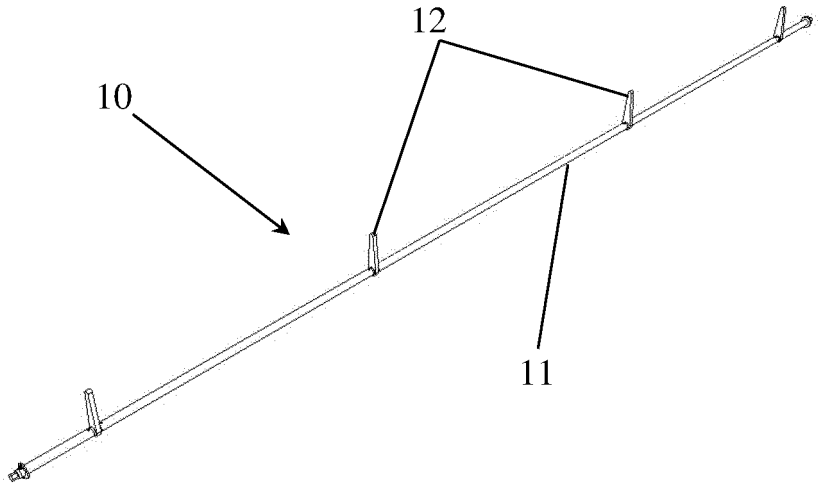

Fig. 3

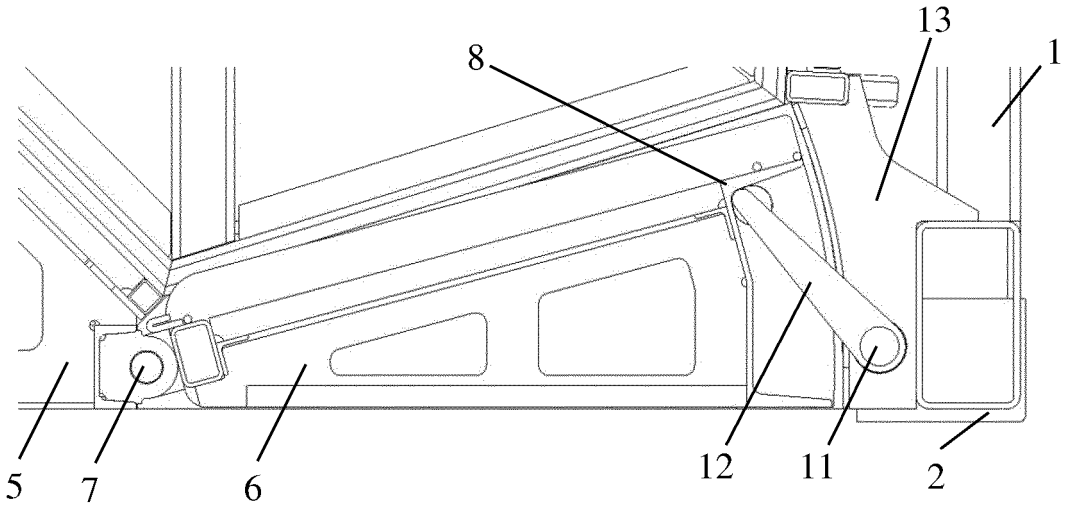

Fig. 4a

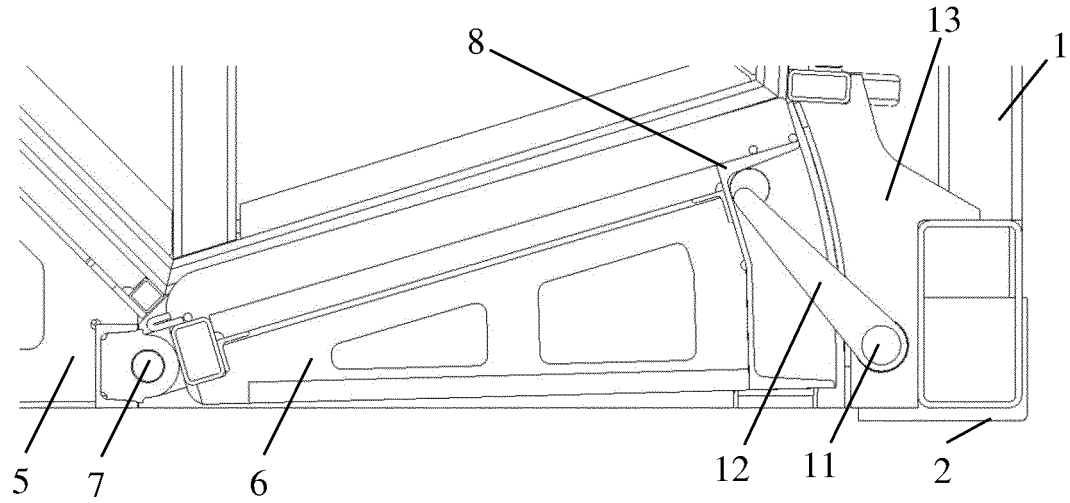

Fig. 4b

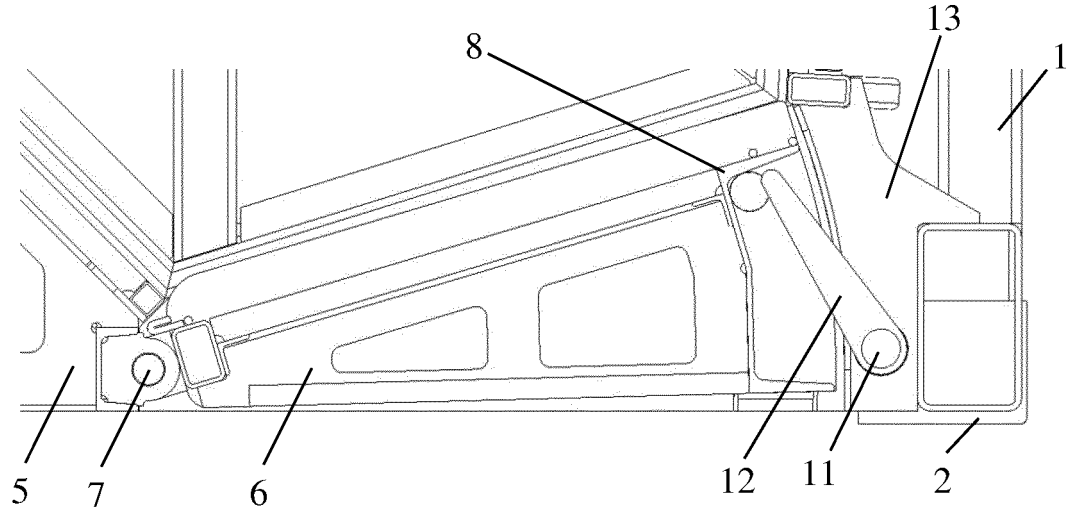

Fig. 4c

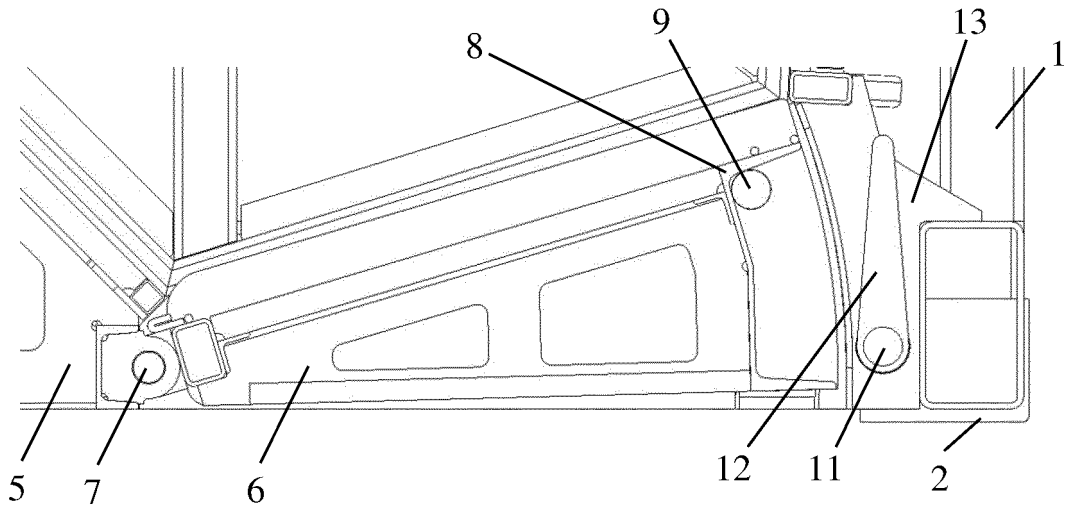

Fig. 5a

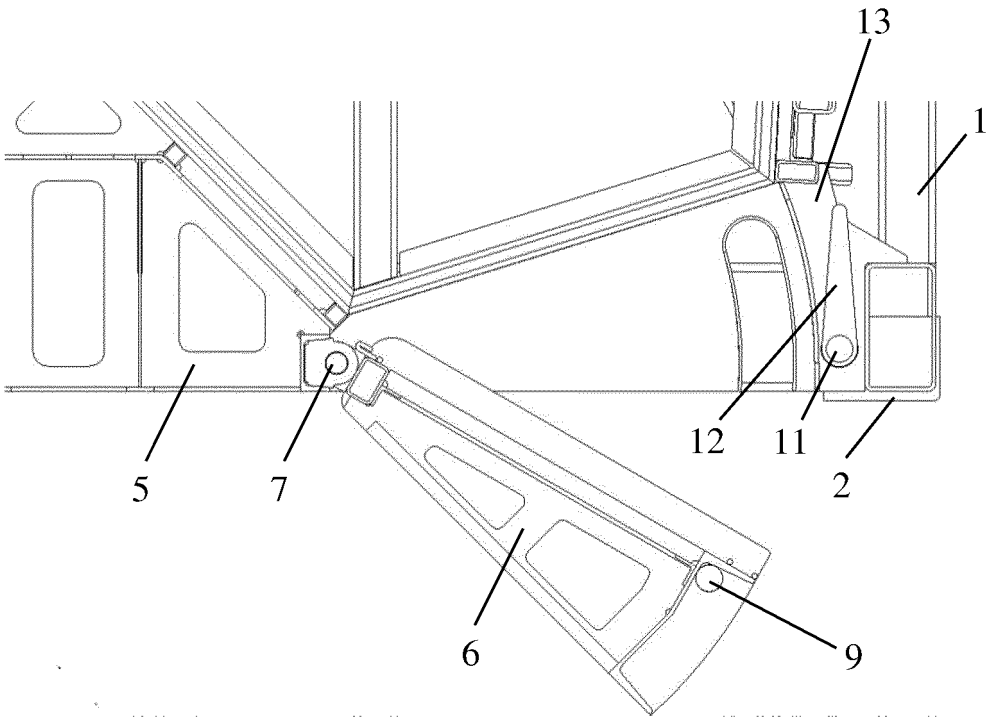

Fig. 5b

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2017/000711

A. CLASSIFICATION OF SUBJECT MATTER

B65D 88/54 (2006.01) B65D 88/28 (2006.01)

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)

B65D 88/00, 88/54, 88/28, 90/00, B61D 7/26, 7/02

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 practicable, search terms used)

PatSearch (RUPTO internal), Esp@cenet, PAJ, USPTO, Information Retrieval System of FIPS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 5436136 B2 (PACIFIC SCIENCE SO LTD) 05.03.2014, fig. 1-5A, paragraphs [0001] - [0005], [0009], [0024] - [0030], [0032], [0037]	1, 3 2, 4-10
Y	WO 1981/001819 A1 (LUOSSAVAARA-KURINAVAARA AV et al.) 09.07.1981, fig. 2, 3, 5, abstract	2
Y	US 2015/0114253 A1 (NATIONAL STEEL CAR LIMITED) 30.04.2015, fig. 3a, 3b, 3d, paragraphs [0086], [0087]	4-8
Y	CN 206395233 U (DATANG ENVIRONMENT IND GROUP CO LTD) 11.08.2017, fig. 1, 3, p. 7, paragraph [0034] - p. 8, paragraph [0051]	8-10

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 May 2018 (29.05.2018)	14 June 2018 (14.06.2018)
Name and mailing address of the ISA/ Facsimile No.	Authorized officer Telephone No.

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