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(54) **Container for transportation of bulk materials**

(57) The present invention belongs to the field of containers for storage and transportation of different materials, more precisely to the field of containers for transportation of bulk materials, which allow simple emptying. The bottom of the container is composed from two rectangular sides, which are fixed in an angled position and thereby form a wedged shape. On lateral sides the container has two doors (1.1), which occupy approximately 1/2 of the height of the container side and are rotatably mounted on an upper edge, so that the hinges allow rotation around a longitudinal axis (1.2). The doors (1.1) are locked with a mechanism (1.3) that is installed under the doors (1.1).

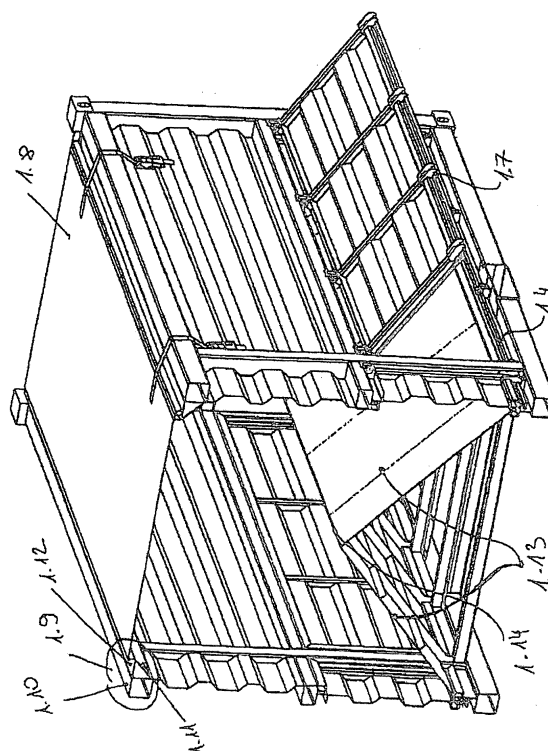


Fig. 3

Description

[0001] The present invention belongs to the field of containers for storage and transportation of different materials, more precisely to the field of containers for transportation of bulk materials, which allow simple emptying.

[0002] The technical problem, which is solved by the present invention, is the constructional design of a container for transportation of bulk materials that will allow simple emptying from the front side as well as the lateral side. From the technical point of view transportation of bulk materials represents a bigger problem than transportation of liquids or materials in units. The transportation mode of bulk materials depends mostly on the state of the material, which is being transported and on the transportation distance (length of transport). When transporting bulk materials it is important to consider the state of the material, for example material temperature, specific weight, angle of repose, angle of spatula, stickiness, granulation, grain shape, granularity, possibility of electrical charging, toxicity, radioactivity, abrasion, humidity, hygroscopicity, flammability, smell, compressibility, corrosiveness and similar characteristics. Transportation distances can vary, from few metres to hundreds of kilometres.

[0003] The aim and purpose of the present invention is the constructional design of a container, which will allow several different methods of emptying. These include emptying from the front side, gravitational emptying and emptying with an overturn for 180°. The container should be equivalent to standard containers used in international transport in rail and ship transport. The characteristics of such containers are disclosed with standards in ISO series 1496-1 to 6 and in corresponding standards for individual parts of containers, as well as in special international regulations, for example in the CSC (International convention for safe containers, 1972, 2012 Edition). The main advantage of such container is that suppliers or sellers of bulk materials as well as owners of such containers have no limitations in their choices to whom they can sell their bulk materials depending on the emptying technology available at buyer's storage or deposit place.

[0004] Several different containers for transportation of bulk materials are known. Containers can be loaded by discharging of the material from a silo, by loading of the material with auxiliary conveyor belts, vibrational feeders, screw conveyors, by loading of the material with construction machinery, etc. Container emptying depends on materials, which are being transported, as well as on technological options at the final location. It is common that these options are more limited in comparison to technological options at the loading site. Emptying of containers loaded with bulk materials can be accomplished by different methods. The first method is that a container without lateral openings and with an opened roof is simply overturned for 180° with the help of a device and the container is emptied. The second method is that a container with openings is overturned around the trans-

verse or longitudinal axis thereby accomplishing container emptying. The third method is to use the potential energy of the material inside the container, which allows automatic emptying of the container.

[0005] The essence of the container for transportation of bulk materials according to the invention is that the basic framework is made from hollow section profiles having appropriate dimensions, wherein the openings are closed with doors or corrugated sheet metal. The bottom of the container is composed from two rectangular sides, which are fixed in an angled position and thereby form a wedged shape. The cross section of the bottom is triangularly shaped. On lateral sides the container has two doors, which occupy approximately ½ of the height of the container side and are rotatably mounted on the upper edge, so that the hinges allow rotation around the longitudinal horizontal axis. The doors are locked with a mechanism that is installed under the doors.

[0006] For a further understanding of the container for transportation of bulk materials according to the invention, reference should be made to the following detailed disclosure, taken in conjunction with the accompanying figures, which show:

Figure 1 The container according to the invention

Figure 2 The detailed view of doors with the mechanism

Figure 3 The cross-section of the container

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[0007] The container for transportation of bulk materials has on both lateral sides two doors / 1.1, which occupy approximately ½ of the height of the container side and are rotatably mounted on the upper edge so that the hinges allow rotation around the horizontal longitudinal axis 1.2. The doors 1.1 are locked with a mechanism 1.3, which is installed under the doors. Main parts of the mechanism 1.3 are a rod 1.4, a hook 1.5 and an actuation handle 1.6 with a safety lock. The doors 1.1 are pushed into a closed position by the actuation handle 1.6 and a driven hook 1.5, which is placed behind the rod 1.7 on the doors. The roof of the container is closed with a rolled tarpaulin 1.8, which protects against ingress of water or impurities, as well as prevents the dusting of the material during transportation. The design of the upper edge 1.9 of the container enables complete emptying of the container in case the emptying method is rotation around the longitudinal axis for 180°. The upper edge 1.9 of the container consists of hollow section profiles 1.10, inclined sheet metal 1.11 and horizontal sheet metal with a raised edge 1.12. The inclined sheet metal 1.11 prevents the retention of the material after emptying. The horizontal sheet metal with a raised edge 1.12 enables the tarpaulin 1.8 to seal the container from ingress of water. The main characteristic of the container is its bottom 1.13, which is composed from two rectangular sides, which are fixed in an angled position and thereby form a wedged shape with an apex 1.14. Bottom 1.13 is intended for gravita-

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tional emptying of the container, which is performed so that the doors 1.1 with mechanism 1.3 are opened on the both sides of the container resulting in an emptied container. An important characteristic for this method is the mechanism 1.3 for door 1.1 opening, as the doors are driven by a handle 1.6 from a place, where operator is safe and on a remote location from the material flow. The shape of the hook 1.5 of the mechanism 1.3 prevents automatic door opening and the mechanism 1.3 is not forced into automatic opening, therefore a relatively small force is required to open it, since the operator has to overcome only the friction in the rod bearings 1.4.

[0008] The container has standard ISO dimensions. The basic framework is made of hollow section profiles with appropriate dimensions. The container according to the invention enables universal container emptying, which allows easier logistics that is independent from the emptying technology at the endpoint of the transport. This brings competitive advantage in the field of transport and sale of bulk materials. In addition, opening of the container is safe for the user, since it is prevented that a human being would be near the material flow.

Claims

1. A container for transportation of bulk materials, **characterized in that** the bottom is composed from two rectangular sides, which are fixed in an angled position and thereby form a wedged shape with an apex (1.14); that the container has on both lateral sides two doors (1.1), which occupy approximately $\frac{1}{2}$ of the height of container side and are rotatably mounted on the upper edge so that the hinges allow rotation around the longitudinal axis (1.2); that the doors (1.1) are locked with a mechanism (1.3), which is installed under the doors; that the main parts of the mechanism (1.3) are a rod (1.4), a hook (1.5) and an actuation handle (1.6) with a safety lock; that the doors (1.1) are pushed into a closed position by the actuation handle (1.6) and a driven hook (1.5), which is placed behind the rod (1.7) on the doors.
2. The container for transportation of bulk materials according to claim 1, **characterized in that** the upper edge (1.9) of the container is composed of hollow section profiles (1.10), inclined sheet metal (1.11) and horizontal sheet metal with a raised edge (1.12); that the inclined sheet metal (1.11) prevents retention of the material after emptying; that the horizontal sheet metal with a raised edge (1.12) enables the tarpaulin (1.8) to seal the container from ingress of water.
3. The container for transportation of bulk materials according to claims 1 and 2, **characterized in that** during container emptying the doors (1.1) are opened with the mechanism (1.3) on both sides of the con-

tainer; that the mechanism (1.3) is driven with a handle (1.6) from a place, where the operator is safe and on a remote location from the material flow.

4. The container for transportation of bulk materials according to claims 1, 2 and 3, **characterized in that** the hook (1.5) of the mechanism (1.3) prevents automatic opening of the door (1.1).

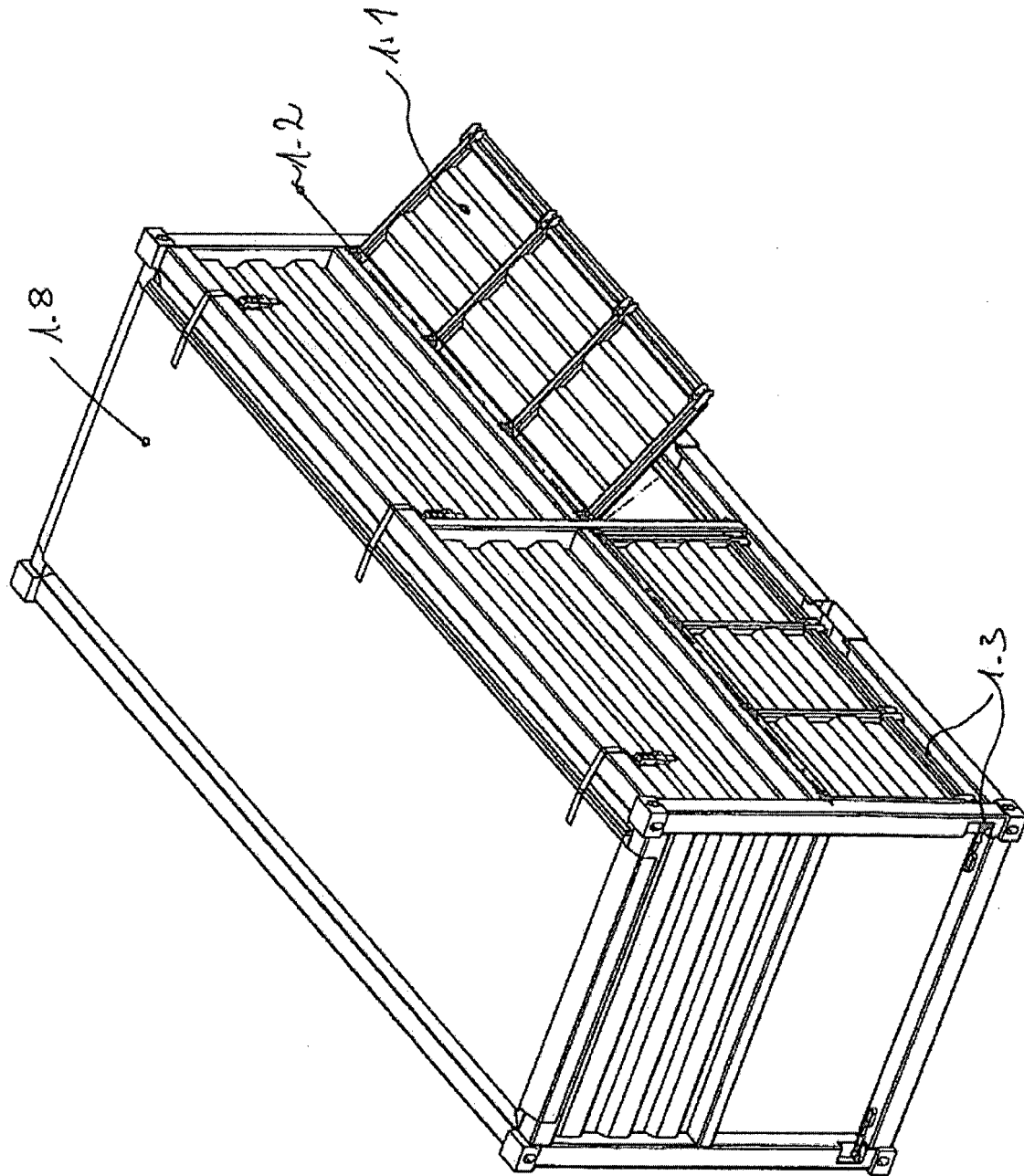


Fig. 1

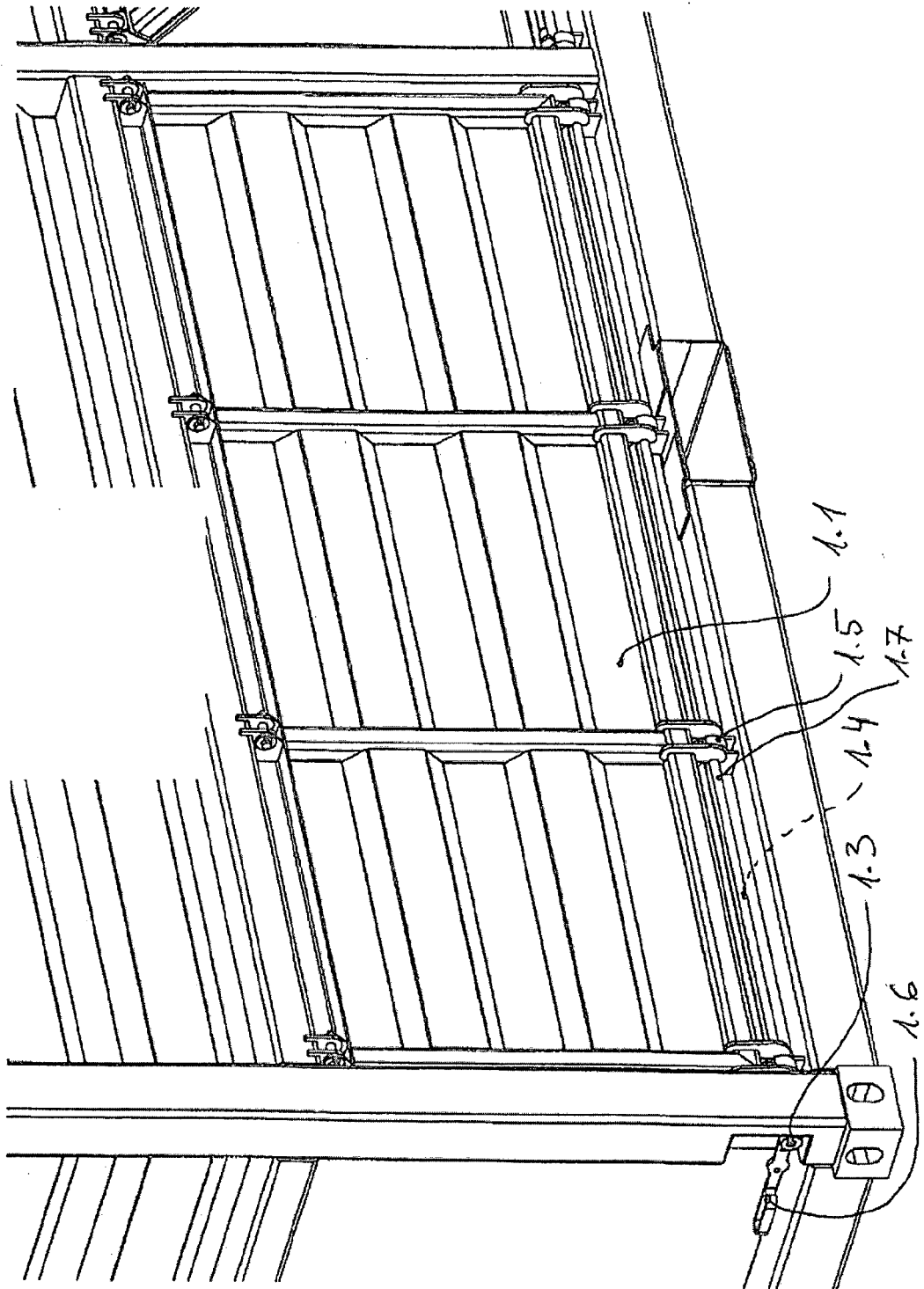


Fig.2

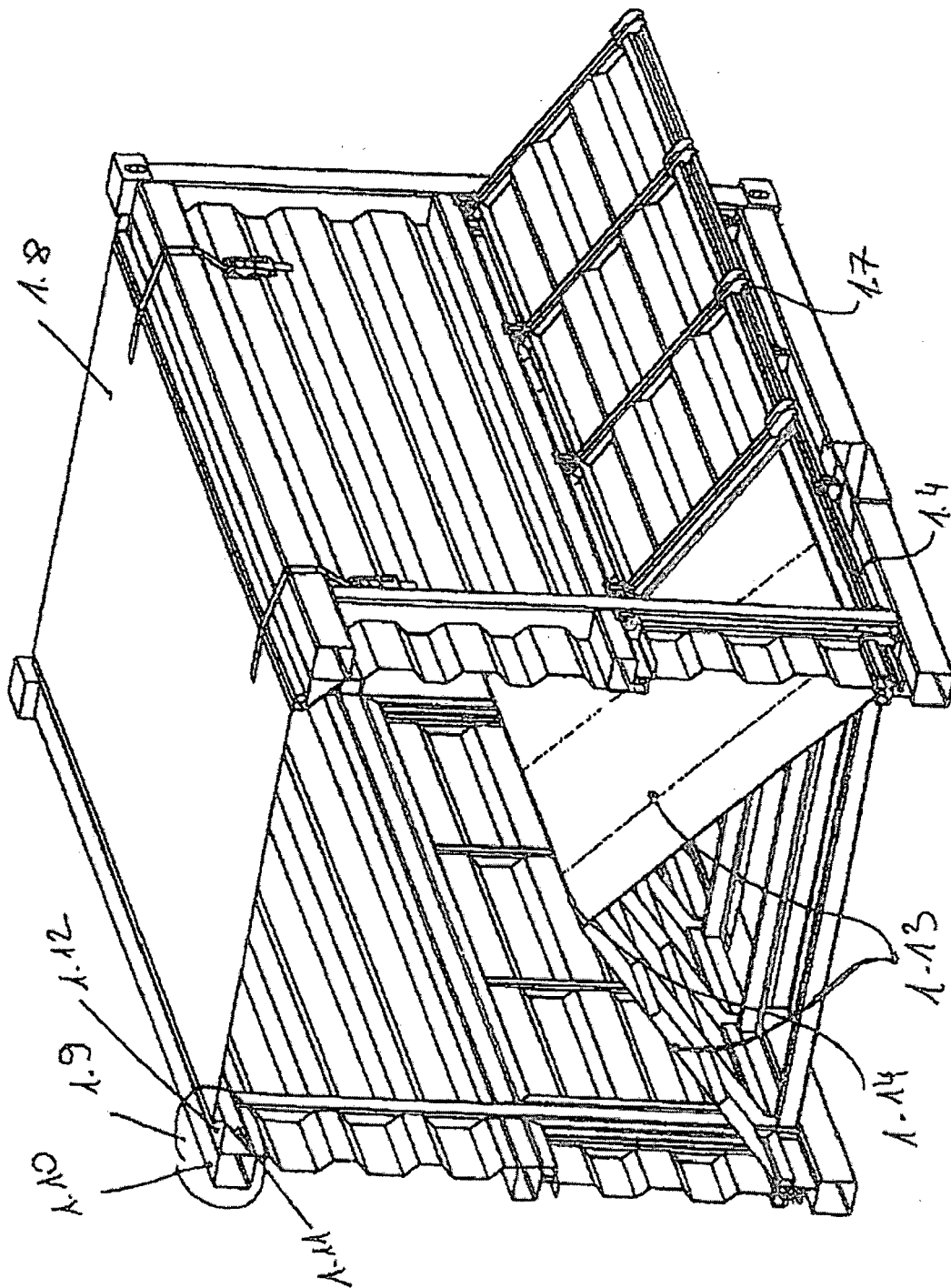


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 3605

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 January 2015	Examiner Piolat, Olivier
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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 14 18 3605

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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30-01-2015

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Non-patent literature cited in the description

- International convention for safe containers. 2012, 1972 [0003]