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(54) **Method and device for handling bulk material**

(57) Method wherein a conveyor belt (3) advances (arrow A) across a container train (1) and pours bulk material onto a bridging conveyor belt (4) above said container train and moving with said belt (3), wherein

the operation of said bridging conveyor belt (4) is controlled such that it prevents that bulk material falls between two adjacent containers (1) if said conveyor belt (3) pours bulk material above the gap (12) between said adjacent containers (1).

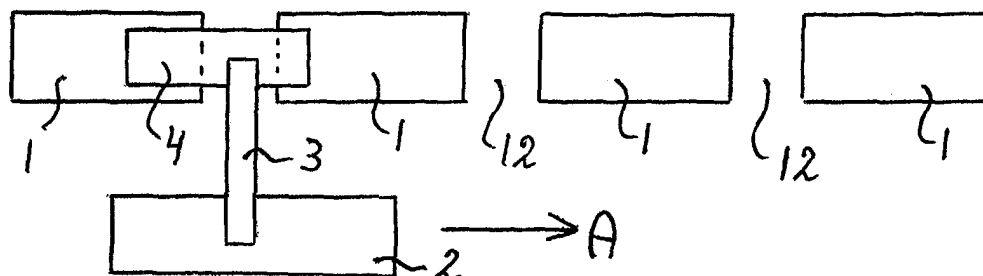


Fig. 1

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Description

[0001] Although the invention is illustrated by way of processing the bed of ballast of a railway track, it will be appreciated that the field of application is broader. The bulk material can be solid but also fluid.

[0002] When a bed of ballast is renewed, an apparatus riding along the railway track, such as a chain digger, removes ballast material (loose rock or similar bulk material) from below the rail and pours it into a wagon through a lifting conveyor belt. In connection therewith e.g. 200 l/s bulk material becomes available.

[0003] The object of the invention is versatile. It is e.g. concerned with one or more of the following aspects: ensuring of the operational continuity of the chain digger or such bulk material handling appliance; avoiding spoiling of bulk material; increasing the storage capacity for bulk material.

[0004] Therefor a method is provided wherein bulk material is dispensed from a dispensing location (preferably with the aid of gravity) into a plurality of succeeding (e.g. riding) containers (container train) having (e.g. at least substantially equal) mutual distances, wherein said dispensing location and the containers mutually move such that the dispensing location either is (alternatingly) present above a container or a space between two containers or dispenses bulk material directly into a container or a space between two containers, and wherein use is made of a horizontally displaceable bridging element which is located within the track of the bulk material between the dispensing location and the container and receives the bulk material originating from the dispensing location which at least comes in a space between two containers, and brings it into a container.

[0005] The invention is also concerned with a method wherein a device is moved over a plurality of successive wagons, possibly having a mutual (e.g. substantially equal) space and possibly moving, e.g. riding, along a railway track, and also the device to be used with said method. This method can be part of the method indicated in the above paragraph.

[0006] According to a further development, the bridging element contains one or more of the following:

- longitudinally moving or riding relative to the container train;
- a length substantially more (e.g. at least twice) the distance between two adjacent containers;
- conveyor-, buffer-, and/or pouring means to (temporarily) store bulk material and/or to pour it into a desired container (e.g. by being able to pour through the one or opposite longitudinal end;
- a conveyor belt of which the (active) top part at least substantially extends parallel to the container train, wherein said conveyor belt can preferably be driven in to one or opposite direction, for which preferably an (electric) motor with changable direction of rotation is used;

- movably supported by the container train;
- a side guide engaging the container train;
- able to independently convey bulk material in a desired (lengthwise) direction;
- able to independently convey bulk material in the desired one or opposite (lengthwise) direction;
- at least the bulk material conveying surface (e.g. top part) of the longitudinal conveyor end thereof is provided at a higher level than the top of the containers;
- appliances to, resting on the containers, move between two adjacent containers wherein its orientation is substantially unchanged;
- an own propulsion;
- when the dispensing location passes a gap between containers, the bridging element advances (almost) as fast as, (substantially) faster or slower than or opposite to the dispensing location and/or the container train;
- as soon as its longitudinal end from which the bulk material is poured in a container starts passing a gap, pouring from said side is ended until after said side has passed said gap, wherein in the mean time e.g. pouring is carried out from the opposite longitudinal end.

[0007] Furthermore, the embodiment based on the invention can contain the following:

- the work is carried out with two parallel railway tracks, wherein the bed of ballast of the one railway track is processed and the container train is present at the adjacent railway track;
- the container train advances with a speed (almost) equal to or (substantially) faster or slower than or opposite to the speed of the dispensing location;
- the dispensing location is provided by the longitudinal end of the conveyor extending from the chain digger or such device.

[0008] The enclosed drawing illustrates a preferred embodiment. Fig. 1 shows a top view, fig. 2 shows a side view and fig. 3 shows a sectional front view.

[0009] Fig. 1 shows a train with wagons, each with two shafts, designed as relatively shallow trays 1 with open top. At the adjacent railway track there is in the direction of arrow A advancing (walking speed) chain digger 2, taking up the gravel of the bed of ballast there below and upward feeding it with the aid of the conveyor belt 3 towards a broad distance above the top of the trays 1, to pour the bulk material 10 therein. To assure continuous action of the digger 2, wherein the conveyor 3 continuously feeds bulk material, use is made of a bridging element, hereafter called "auxiliary cart" 4.

[0010] As fig. 2 and 3 show, the auxiliary cart 4 stands movably onto the opposite longitudinal top edges 8 of the trays 1, receives the bulk material coming from the conveyor 3 thereabove and pours it in a tray 1 therebelow.

[0011] The auxiliary cart 4 contains pneumatic tires at both sides, the ultimate front and back 5 whereof are at a slightly higher level, such that a possible level difference between the top of two succeeding trays 1 can be bridged more easy. The mutual distance, location and number of wheels 6 is designed such that the cart 4 maintains a stable position when riding from the one tray 1 to the next and bridging the gap 12 between two trays 1. Preferably the distance between two wheels 6 at least equals the distance between two trays 1.

[0012] Below the supporting surface of the wheels 6 the cart 4 has rollers 7 with vertical rotation shaft, rolling along the outer side of the trays 1 to provide a side guide.

[0013] The conveyor belt 9 of the cart 4 endlessly extends around rollers 11. One of the rollers 11 is actively driven to turn either to the right or the left. According to an embodiment the rotating direction is changed just before the cart begins to pass a gap 12, such that the feeding of bulk material 10 from that moment takes place from the opposite longitudinal end en no bulk material is poured into the gap 12. After the cart 4 has bridged the gap, and before the cart completes the passage of the gap, the rotating direction becomes as usual, such that the material is poured into the next tray 1. It is feasible to stop the conveyor belt 9 when passing a gap 12 such that in that case the cart serves as bulk material buffer.

[0014] Thus the cart 4 "walks" along with the chain digger 2 past all trays 1. Depending on the working speed of the digger 2 and the volume capacity of the trays 1, trays 1 and hor 2 can advance with different speeds, possibly in opposite directions.

[0015] In stead the cart continuously receives the bulk material, it is e.g. also possible that the cart is merely kept below the conveyor 3 during bridging of the gap 12.

[0016] In stead of a conveyor belt 9 or other means positively propelling the bulk material the cart can e.g. be provided with a stationary slide gutter, the inclination of which is possibly adjustable, e.g. to be (almost) horizontal when passing a gap such that bulk material does not slide therefrom by gravity force, such that the gutter is then active as if it was a bulk material buffer, and thereafter to be (further) inclined such that bulk material slides therefrom.

[0017] According to an alternative the cart has an undercarriage with tracks such that going from the one to the next tray 1 is improved.

[0018] Also further variants belong to the invention. E.g. the cart can be further provided with fixed side guides at both longitudinal ends (e.g. at a level below the rollers 7) with a "seeking" edge, to further assure a reliable transfer onto the next wagon. The active part of the conveyor belt 9 can be bulged, see fig. 3, to contain the bulk material better.

Claims

1. Method wherein a device advances across a container train, possibly receiving bulk material and pouring it in the container train.
2. Method according to claim 1, wherein bulk material is dispensed from a dispensing location (preferably with the aid of gravity) into a plurality of succeeding (e.g. riding) containers (container train) having (e.g. at least substantially equal) mutual distances, wherein said dispensing location and the containers mutually move such that the dispensing location either is (alternatingly) present above a container or a space between two containers or dispenses bulk material directly into a container or a space between two containers, and wherein use is made of a horizontally displaceable bridging element which is located within the track of the bulk material between the dispensing location and the container and receives the bulk material originating from the dispensing location which at least comes in an space between two containers, and brings it into a container.
3. Method according to claim 1 or 2, wherein the bridging part contains the following:
 - longitudinally moving or riding relative to the container train;
 - a length substantially more (e.g. at least twice) the distance between two adjacent containers;
 - conveyor-, buffer-, and/or pouring means to (temporarily) store bulk material and/or to pour it into a desired container (e.g. by being able to pour through the one or opposite longitudinal end;
 - a conveyor belt of which the (active) top part at least substantially extends parallel to the container train, wherein said conveyor belt can preferably be driven in to one or opposite direction, for which preferably an (electric) motor with changable direction of rotation is used;
 - movably supported by the container train;
 - a side guide engaging the container train;
 - able to independently convey bulk material in a desired (lengthwise) direction;
 - able to independently convey bulk material in the desired one or opposite (lengthwise) direction;
 - at least the bulk material conveying surface (e.g. top part) of the longitudinal conveyor end thereof is provided at a higher level than the top of the containers;
 - appliances to, resting on the containers, move between two adjacent containers wherein its orientation is substantially unchanged;
 - an own propulsion;

- when the dispensing location passes a gap between containers, the bridging element advances (almost) as fast as, (substantially) faster or slower than or opposite to the dispensing location and/or the container train; 5
- as soon as its longitudinal end from which the bulk material is poured in a container starts passing a gap, pouring from said side is ended until after said side has passed said gap, wherein in the mean time e.g. pouring is carried out from the opposite longitudinal end. 10

4. Method according to any of the preceding claims, wherein:

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- the work is carried out with two parallel railway tracks, wherein the bed of ballast of the one railway track is processed and the container train is present at the adjacent railway track;
- the container train advances with a speed (almost) equal to or (substantially) faster or slower than or opposite to the speed of the dispensing location; 20
- the dispensing location is provided by the longitudinal end of the conveyor extending from the chain digger or such device. 25

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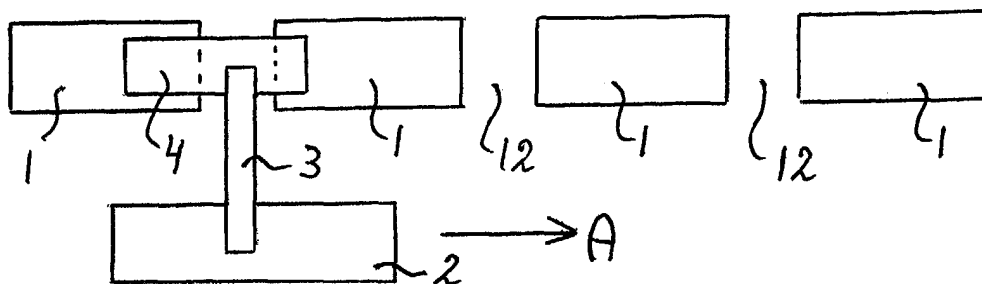


Fig. 1

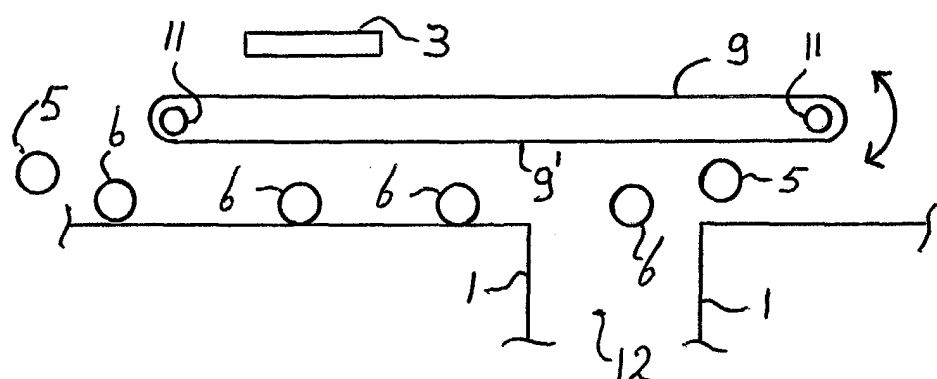


Fig. 2

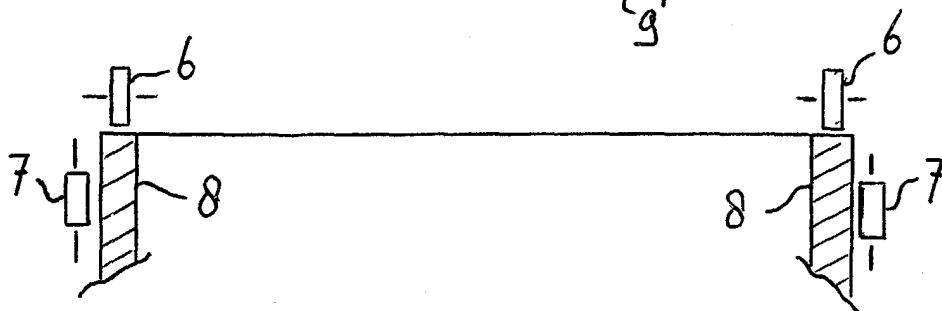
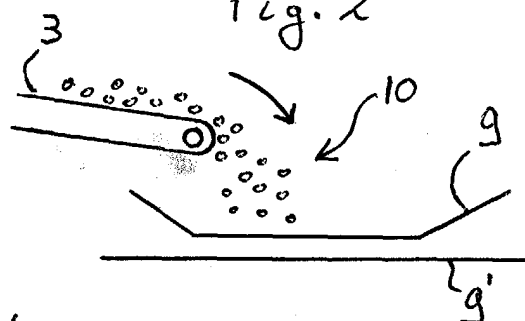


Fig. 3