[0004]

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SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005]

From the viewpoints of storage and transportation of the flex container bag filled with a powder particle material, it has recently been demanded to further improve the handling property in addition to further increasing the filling rate of the powder particle material filling the flex container bag.

[0006]

Embodiments of the present invention provide a filling apparatus and a filing method for a powder particle material, each capable of further improving the handling property of the flex container bag filled with the powder particle material.

MEANS FOR SOLVING PROBLEMS

[0007]

Aspects of the filling apparatus and the filling method for a powder particle material of this invention are configured as follows.

[0008]

According to a first aspect of this invention, there is provided a filling apparatus for a powder particle material including a powder particle material supplying device that supplies the powder particle material to a flex container bag, a lifting device that lifts up the flex container bag arranged on a floor surface or a base bed therefrom, and a control device that is operable to control the lifting device to execute a tapping process that includes a lifting operation of lifting up the flex container bag filled with the powder particle material by the powder particle material supplying device using the lifting device to cause the flex container bag to be distant from the floor surface or the base bed and a dropping operation of dropping the flex container bag by releasing the lifting by the lifting device to cause the flex container bag to collide with the floor surface or the base bed, wherein the

powder particle material supply device comprises an expandable part that forms a passage in communication with the flex container bag, the expandable part being releasably connected with an opening of the flex container and being expandable and contractible in an up and down direct.

[0009]

According to a second aspect of this invention, there is provided a filling method for a powder particle material including a powder particle material filling step of filling the flex container bag with the powder particle material by supplying the powder particle material to the flex container bag by a powder particle material supplying device, the powder particle material supplying device includes an expandable part that forms a passage in communication with the flex container bag, and a tapping step of executing a lifting operation of lifting up the flex container bag filled with the powder particle material by a lifting device to cause the flex container bag to be distant from the floor surface or the base bed thereabove and a dropping operation of dropping the flex container bag by releasing the lifting by the lifting operation by the lifting device to cause the flex container bag to collide with the floor surface or the base bed, wherein the expandable part is releasably connected with an opening of the flex container and is expandable and contractible in an up and down direct.

[0009a]

According to a third aspect of the present invention, there is provided a storage method for flex container bags including stacking on the flex container bags each other in a vertical direction in two or more tiers, each of the flex container bags being filled with a powder particle material in a filling amount of 500 kg to 1,500 kg using the above filling method for a powder particle material.

EFFECT OF THE INVENTION

[0010]

According to the filling apparatus and the filling method for a powder particle material as per embodiments of this invention, the handling property of the flex container bag

CLAIMS

1. A filling apparatus for a powder particle material, comprising:

a powder particle material supplying device that supplies the powder particle material to a flexible container bag (hereinafter, referred to as "flex container bag");

a lifting device that lifts up the flex container bag arranged on a floor surface or a base bed; and

a control device that is operable to control the lifting device to execute a tapping process including a lifting operation of lifting up the flex container bag filled with the powder particle material by the powder particle material supplying device by the lifting device to cause the flex container bag to be distant from the floor surface or the base bed thereabove and a dropping operation of dropping the flex container bag by releasing the lifting by the lifting device to cause the flex container bag to collide with the floor surface or the base bed,

wherein the powder particle material supply device comprises an expandable part that forms a passage in communication with the flex container bag, the expandable part being releasably connected with an opening of the flex container and being expandable and contractible in an up and down direct.

2. The filling apparatus for a powder particle material according to claim 1, wherein

the lifting device comprises:

a lifting member that releasably engages with an upper portion of the flex container bag; and

an elevating and lowering device that elevates and lowers the lifting member, wherein

the elevating and lowering device comprises a lifting releasing function of causing the flex container bag lifted through the lifting member to substantially freely fall.

3. The filling apparatus for a powder particle material according to claim 1 or 2, wherein

the control device is operable to control the lifting device to execute the tapping process such that the flex container bag is lifted up to a height of at least 80 mm or higher from the floor surface or the base bed by the lifting operation and the dropping operation is thereafter executed.

4. A filling method for a powder particle material, comprising:

a powder particle material filling step of filling a flexible container bag (hereinafter, referred to as "flex container bag") with the powder particle material by supplying the powder particle material to the flex container bag by a powder particle material supplying device, the powder particle material supplying device includes an expandable part that forms a passage in communication with the flex container bag; and

a tapping step of executing a lifting operation of lifting up the flex container bag filled with the powder particle material by a lifting device to cause the flex container bag to be distant from a floor surface or a base bed thereabove and a dropping operation of dropping the flex container bag by releasing the lifting by the lifting operation by the lifting device to cause the flex container bag to collide with the floor surface or the base bed,

wherein the expandable part is releasably connected with an opening of the flex container and is expandable and contractible in an up and down direct.

5. The filling method for a powder particle material according to claim 4, wherein

in the tapping step, the lifting operation is executed by elevating the lifting member that releasably engages with an upper portion of the flex container bag, and

the dropping operation is executed by releasing the lifting by the lifting member to cause the flex container bag to substantially freely fall.

6. The filling method for a powder particle material according to claim 4 or 5, wherein

in the tapping step, the flex container bag is lifted up to a height of at least 80 mm or higher from the floor surface or the base bed by the lifting operation and the dropping operation for the flex container bag is thereafter executed.

7. A storage method for flex container bags, comprising:

stacking on the flex container bags each other in a vertical direction in two or more tiers, each of the flex container bags being filled with a powder particle material in a filling amount of 500 kg to 1,500 kg using the filling method for a powder particle material according to any one of claims 4 to 6.