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(54) **Filling device for big bag type sacks**

(57) There is provided a filling device (1) suitable to fill big bag type sacks (10) comprising a container (2) suitable to contain a big bag type sack (10) and to maintain it in an open position, a suction system (3), suitable

to maintain a pressure below the ambient pressure inside the big bag type sack (10), and a collection system (4), in fluid connection with the big bag type sack (10), suitable to convey substances into the big bag type sack (10).

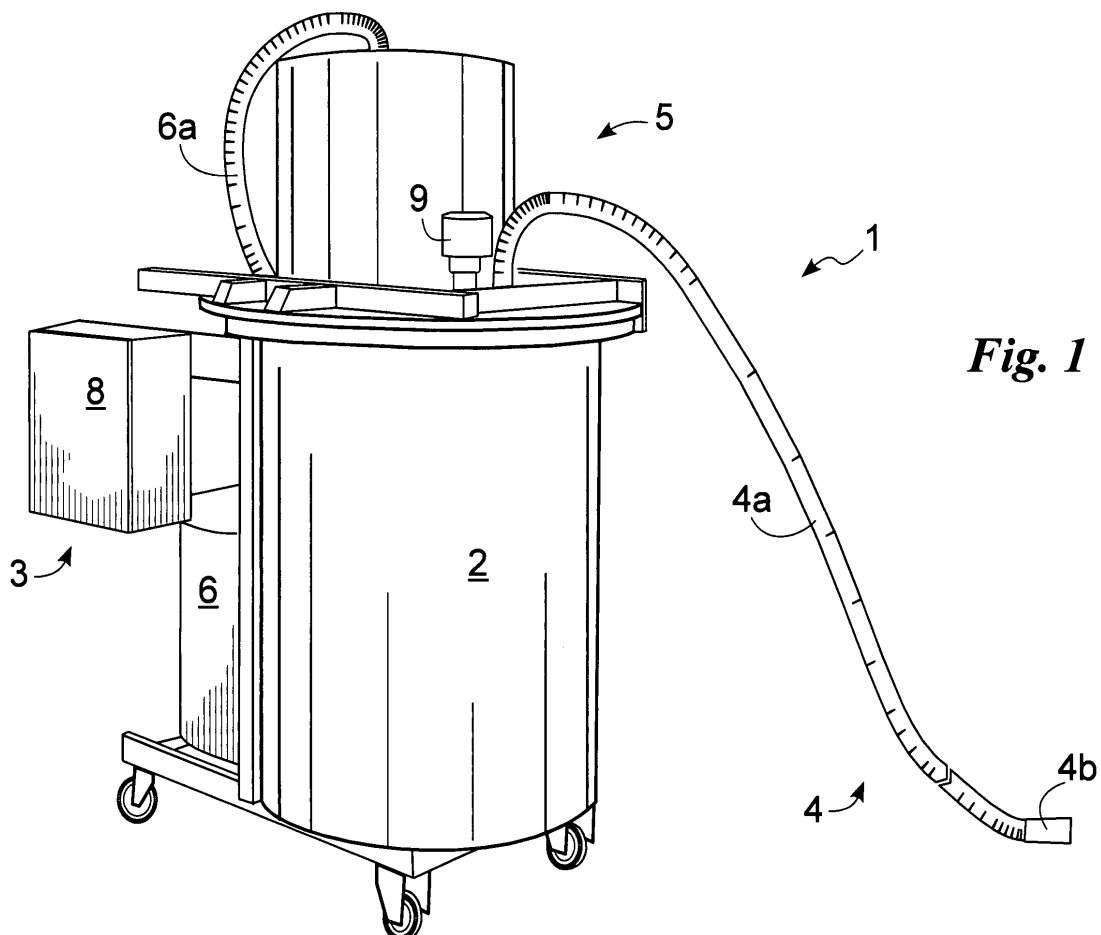


Fig. 1

Description

[0001] The present invention relates to a filling device for Big Bag type sacks, of the type specified in the preamble of claim 1.

[0002] There are currently known sacks of the Big Bag type, also called bulk bags, super sacks or otherwise known with the English acronym FICB (Flexible Intermediate Bulk Containers).

[0003] These bags are realized by flexible containers of large dimensions suitable to transport and store various substances and in particular substances in powder or particle form, such as sand, fertilizers, polymer granules or powder paints.

[0004] Big bag type sacks today realize a standard in various sectors and the laws of many countries oblige operators in these sectors to utilize said bags for reasons of environmental pollution.

[0005] They are made of polymer material, in particular woven polyethylene or polypropylene.

[0006] Big bag type sacks generally have a parallelepiped shape, base dimensions of approximately 110 cm by 110 cm and a height between 100 cm and 200 cm. Their capacity is normally of approximately 1000 kg, but bags of larger and smaller dimensions also exist.

[0007] Big bag type sacks also comprise a plurality of handles suitable to lift and transport these bags. Normally, they have four handles which allow the bag to be transported by a specific fork lift truck or to be disposed on specific structures.

[0008] The prior art has some important drawbacks.

[0009] In fact, filling of big bag type sacks is slow and laborious due to their flexibility and large capacity, in particular when the products to be placed in these bags are stored on the ground or in the environment, rather than on specific conveying systems.

[0010] It is in fact necessary to maintain the big bag in an open position and simultaneously fill it manually.

[0011] This situation occurs in particular in industries utilizing powder paints or the like. These powder paints are in fact deposited on the product to be painted by means of specific sprayers, but a part thereof falls onto the ground and must be collected and placed in a specific big bag using shovels and the like.

[0012] In this situation the technical aim underlying the present invention is to devise a filling device for big bag type sacks capable of substantially overcoming the aforesaid drawbacks.

[0013] Within said technical aim, an important object of the invention is to obtain a filling device for big bag type sacks suitable to allow a rapid operation to collect products even when these are stored on the ground.

[0014] The technical aim and the objects specified are attained by a filling device of Big-Bag type sacks as claimed in the appended claim 1.

[0015] Preferred embodiments are highlighted in the sub-claims.

[0016] Further features and advantages of the inven-

tion are better explained below in the detailed description of a preferred embodiment of the invention, with reference to the attached drawings, wherein

5 **Fig. 1** shows a perspective view of the device according to the invention;

Fig. 2 shows a detail of the device according to the invention;

10 **Fig. 3** shows a further detail of the device according to the invention. With reference to the aforesaid figures, the filling device according to the invention is indicated as a whole with the number **1**.

15 **[0017]** It comprises, briefly, a container **2**, suitable to contain and to maintain in an open position a big bag type sack **10**, hereinafter simply called big bag 10, a suction system **3**, suitable to maintain a pressure below the ambient pressure inside the big bag 10, and a collection system **4**, in fluid connection with the container 2, suitable to collect substances by pneumatic vacuum pressure and convey them into big bags 10.

20 **[0018]** The container 2 is preferably realized by a cylindrical container having a capacity between 300 liters and 2000 liters; in particular two different models are provided, a first having a capacity in the vicinity of 500 liters and a second having a capacity in the vicinity of 940 liters. The container 2 thus has base measurements between 1 m and 2 m and a height between 1.5 m and 3 m.

25 **[0019]** It is appropriately made of sheet metal having a high thickness, in particular steel sheet having a thickness of between 2 mm and 4 mm, and more preferably in the vicinity of 3 mm.

30 **[0020]** The container 2 comprises an open upper face **2a** delimited by an upper edge **2b** onto which the big bag 10 is fastened.

35 **[0021]** In particular, the edge delimiting the opening of the big bag 10 is fastened to the upper edge 2b so as to maintain the big bag 10 in the open position, as mentioned above.

40 **[0022]** For the purpose of fastening the big bag 10, the upper edge 2b comprises specific hooks **2c** for the handles **10a** of the big bag 10 and specific elastic elements **2d** for the edges of the big bag 10.

45 **[0023]** The walls and the base of the big bag 10 are instead resting against the inside walls and the base of the container 2.

[0024] The container 2 also comprises a specific lid **5** suitable to close the upper face 2a and to maintain it pneumatically sealed.

50 **[0025]** This lid 5 thus comprises a specific gasket **5a** and is preferable made of steel sheet.

[0026] It then comprises elastic opening means **5b**, realized by two elastic elements, preferably two air springs, each exerting a maximum force between 400 N and 700 N. This elastic means 5b has the function of facilitating opening of the lid 5.

55 **[0027]** The lid 5 is also connected, in fluid connection, with the suction system 3 and the collection system 4.

[0028] In particular, the suction system 3 is realized by a suction motor 6 connected, by means of a specific suction duct 6a, to the lid 5.

[0029] Preferably, the suction motor 6 is realized by an electric turbine with side channel having a maximum air flow rate between 200 m³/hour and 400 m³/hour and preferably in the vicinity of 330 m³/hour and producing a maximum vacuum pressure greater than 200 mbar, preferably between 250 and 300 mbar, and having a power in the vicinity of 4 kW at electrical voltages in the vicinity of 380 V.

[0030] A filter apparatus 7 is also appropriately provided between the duct 6a and the container 2.

[0031] Said filter apparatus 7 is preferably realized by a prefilter 7a, preferably made of non-stick fabric and suitable to retain substantially 90% of the particles sucked up, and by a subsequent antistatic filter 7b, preferably a cartridge filter made of aluminum-coated polyester.

[0032] A specific cylindrical housing 5c is preferably realized inside the lid 5 for the purpose of containing the filter apparatus 7.

[0033] The suction system 3 is also preferably regulated by specific control means 8, realized by an electrical control board including at least one master switch to switch the suction system 3 on and off, a mushroom button switch for emergency shutdown, and any other switches.

[0034] The suction system 3 is appropriately connected to the electrical network by means of specific and known electrical cables comprising an electrical grounding connection.

[0035] The suction system 3 also appropriately comprises further grounding connections suitable to prevent electrostatic sparks from forming inside the container 2, which could, in some cases, cause explosions of the substances contained therein.

[0036] These further grounding connections are preferably realized by a chain connected to the suction system 3 and by a suitable metal clamp connectable to grounding elements or to specific grounds.

[0037] The collection system 4 is also connected to the lid 5, as previously specified.

[0038] This collection system 4 is substantially constituted by a flexible tube 4a in fluid connection with the inside of the big bag 10 and with a suction mouth 4b suitable to suck up the substances to be placed in the big bag 10. Finally, the device 1 comprises means 9 for monitoring the level of filling of the big bag 10.

[0039] These are preferably realized by a specific rotating blade also disposed on the lid 5 and entering the container 2 by a depth of a few centimeters. This rotating blade stops moving if the substances with which the big bag 10 is filled are level therewith. It is thus capable of indicate that said big bag 10 has been filled.

[0040] Moreover, the monitoring means 9 are preferably connected to the control means 8 through an electrical connection.

[0041] Finally, the device 1 comprises handling means, automatic or manual, such as wheels disposed on the base of the container 2.

[0042] Operation of the filling device 1, the structure of which is described above, is as follows.

[0043] The filling device 1 is positioned in proximity of the substances to be placed in the big bag 10, and in particular the suction mouth 4b is positioned in the vicinity of said substances.

[0044] The suction system 3 is then activated through the specific control means 8.

[0045] The suction motor 6 then sucks the air from the inside of the big bag 10, appropriately filtering dusts and other substances through the filter 7, and consequently creates a vacuum pressure inside the container 2 and in particular inside the big bag 10.

[0046] As previously described, this vacuum pressure is preferably between 250 mbar and 300 mbar.

[0047] The collection system 4, in fluid communication with the big bag 10, and in communication with the outside, then sucks up any substances from the outside and places them inside said big bag 10, due to the difference in pressure between the ambient pressure, coinciding in almost all cases with the atmospheric pressure, and the pressure inside the big bag 10.

[0048] When the big bag 10 has been filled, the monitoring means 9 indicate this condition through the control means 8.

[0049] At this point the filled big bag 10 must be removed and substituted with a new big bag 10.

[0050] The operation to unload the big bag 10 can be realized by means of a specific fork lift truck connected to the handles 10a, which are preferably four in number.

[0051] The invention achieves important advantages.

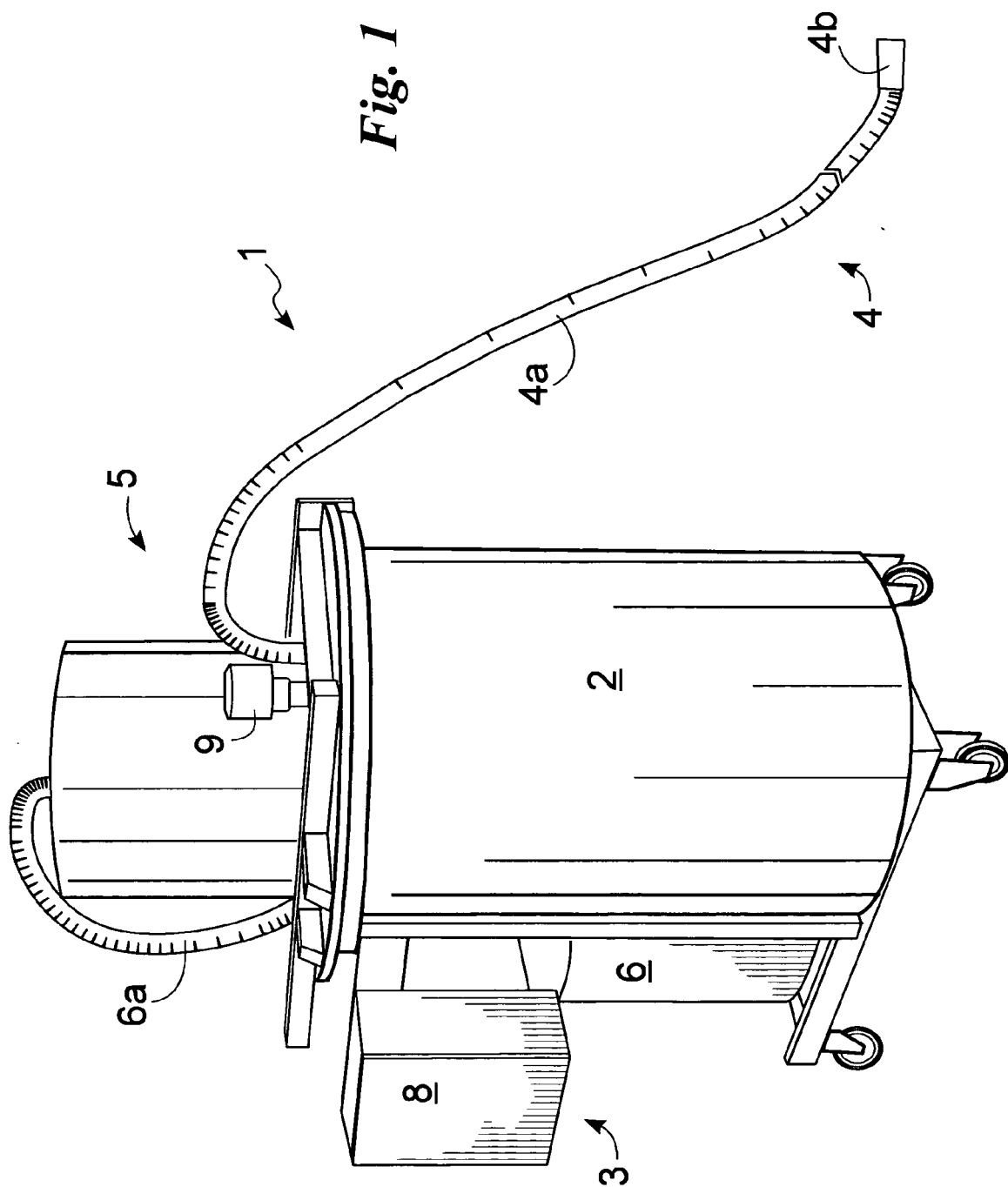
[0052] In fact the big bag 10 is filled easily and quickly by means of the device 1. Moreover, the device 1 is also safe from any sparks due to the presence of the specific grounding connections previously described and of the antistatic filter 7b. Otherwise, sparks and possible explosion of the substances contained could occur, in particular if these are realized by powder paint.

[0053] The invention is susceptible to variants falling within the inventive concept. All details can be replaced by equivalent elements and the materials, shapes and dimensions can be any.

Claims

1. Filling device (1) of big bag type sacks (10), **characterized in that** it comprises a container (2) suitable to contain a big bag type sack (10) and to maintain it in an open position, - a suction system (3), suitable to maintain a pressure below the ambient pressure inside said big bag type sack (10), and a collection system (4), in fluid connection with said big bag type sack (10), suitable to convey substances into a big bag type sack (10).

2. Device according to one or more of the previous claims, wherein the container (2) comprises an upper face (2a) delimited by an upper edge (2b) onto which said big bag type sack (10) is substantially fastened by means of hooks (2c) suitable to support handles (10a) of said big bag type sack (10). 5
3. Device according to one or more of the previous claims, wherein the container (2) comprises an upper face (2a) delimited by an upper edge (2b) onto which the edge delimiting the opening of said big bag type sack (10) is substantially fastened by means of elastic sealing elements (2d). 10
4. Device according to claims 2 or 3, comprising a lid (5) suitable to pneumatically close said upper face (2a), and comprising elastic opening means (5b) suitable to facilitate opening of said lid (5). 15
5. Device according to one or more of the previous claims, wherein said suction system (3) comprises a suction motor (6) comprising a suction duct (6a) connected to said lid (5) and in fluid communication with said big bag type sack (10). 20
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6. Device according to claim 5, wherein said suction motor (6) is realized by an electric turbine with side channel suitable to produce a maximum air flow rate between 200 m³/hour and 400 m³/hour and a maximum vacuum pressure greater than 200 mbar. 30
7. Device according to claim 5, wherein a filter apparatus (7), realized by a prefilter (7a) and by a subsequent antistatic filter (7b) is provided between said suction duct (6a) and said container (2). 35
8. Device according to claim 7, wherein said prefilter (7a) is made of non-stick fabric and said antistatic filter (7b) is a cartridge filter made of aluminum-coated polyester. 40
9. Device according to one or more of the previous claims, wherein said suction system (3) comprises a plurality of grounding connections suitable to prevent electrostatic sparks from forming inside said container (2). 45
10. Device according to one or more of the previous claims, wherein said container (2) is cylindrical and made of sheet metal having a thickness between 2 mm and 4 mm. 50
11. Device according to one or more of the previous claims, comprising means (9) for monitoring the level of filling of said big bag type sack (10), comprising a rotating blade inserted in the upper part of said container (2) suitable to indicate exhaustion of the capacity of said big bag type sack (10). 55



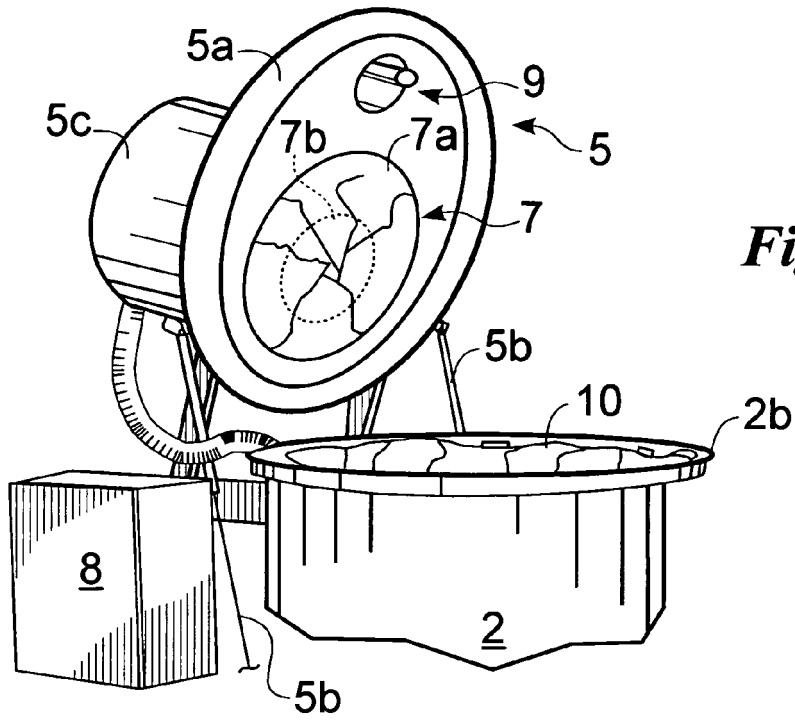


Fig. 2

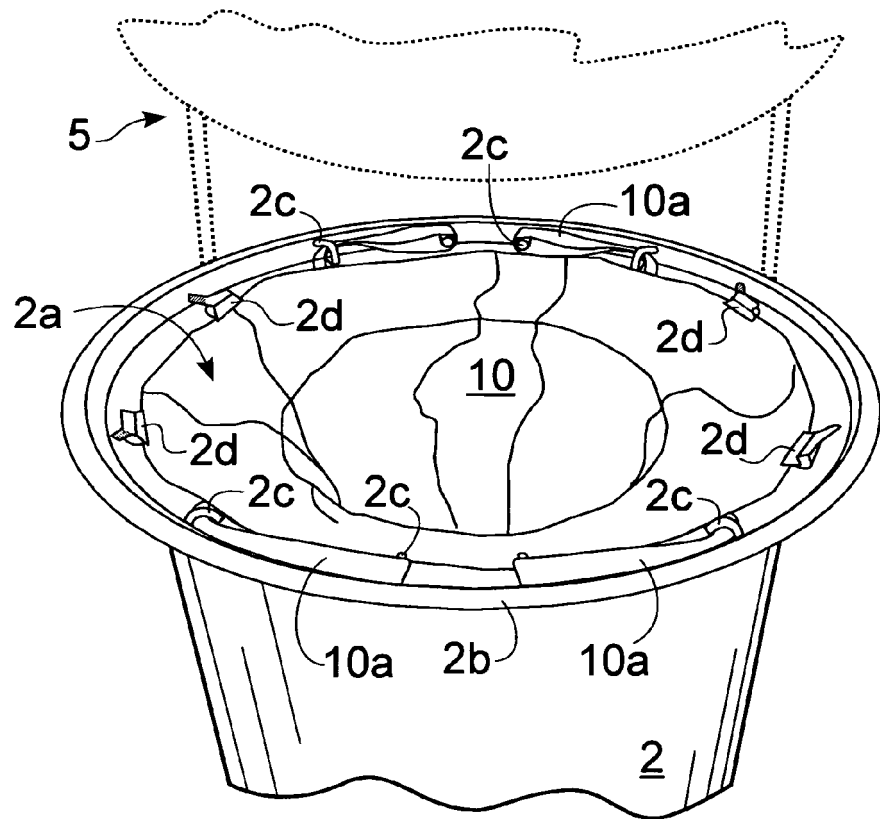


Fig. 3



European Patent
Office

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Application Number
EP 07 42 5456

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Place of search Munich		Date of completion of the search 2 January 2008	Examiner Schelle, Joseph
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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