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(54) **Mouth for granulates with automatic closing and stirring system**

(57) A mouth (1) for granulates with automatic closing and stirring system comprising a hopper (2) having an outlet pipe (3) engageable to the draining container, a movable blade (4) located inside, in the passageway of a granular product, and a closing lid (11); where said mouth (1) **is characterized in that** the lower end of the blade (4) is connected with a pneumatic actuator (6) through a connection mechanism (8, 9, 10, 8', 9', 10').

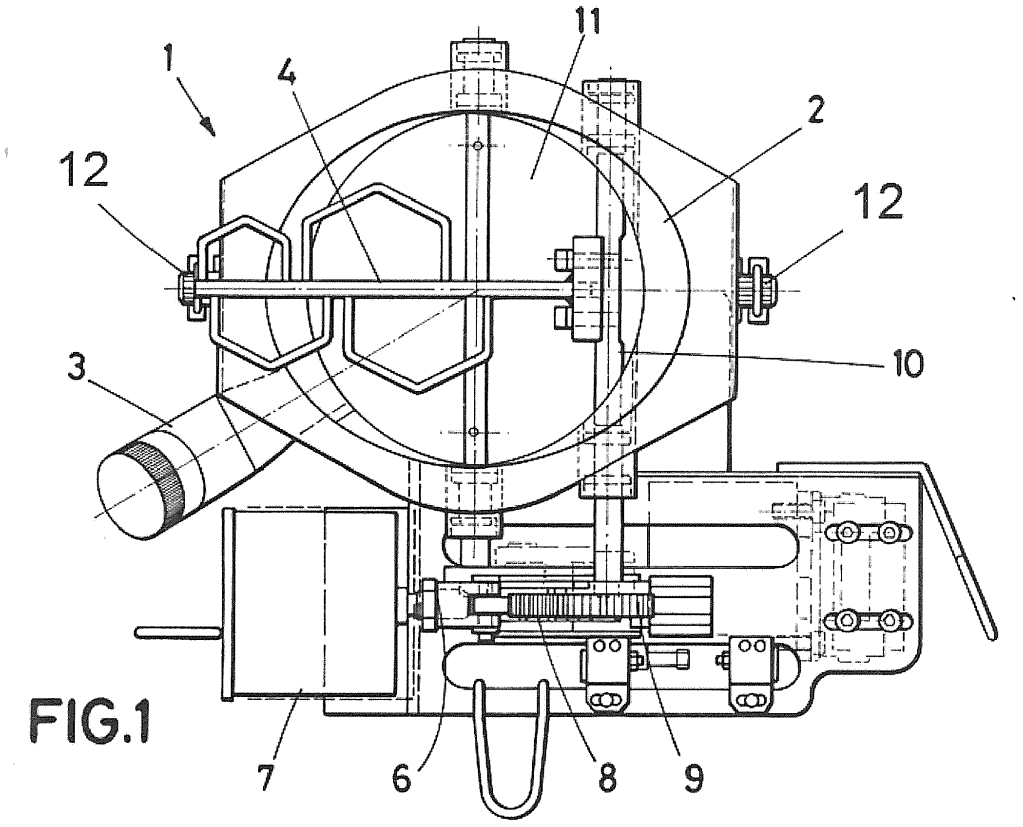

FIG.1

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Description

Object of the invention

[0001] The object of the present invention is a mouth for channeling of granulates with an automatic closing and stirring system to prevent lumps, so that any product buildup can be broken and preventing blockages without the need for manual intervention of any operator.

[0002] The field of application of the invention falls within the logistics sector and more specifically in the field of the equipment, machines and devices for loading and unloading systems, particularly granular solid goods in sea containers to silos.

State of the art

[0003] As it is known today, to facilitate transportation in containers and unloading in silos of granular solid goods, with different grain sizes, containers, known as liner, which usually encompass all the capacity of a container, are used.

[0004] The liner is a great bag with certain features for filling, closing, clamping and opening for draining that is introduced into shipping containers.

[0005] Once transported, for their unloading in the final container, the granulates packed in the aforementioned container liner, are dropped under gravity, by tilting the trailer on which is the container, into the mouth of a rotary valve that, with the contribution of pressurized air, push it through tubes towards the container, usually silos.

[0006] The mouth, to which the goods fall, is intended to channel the granular product inside of the rotary valve and, at the same time, has a system for breaking any small lump or clogging which, currently, is manual, as well as the dropping gate of the product.

[0007] The problem is that such manual system implies that it is the driver or operator that is making the unloading who is manipulating the closing lever, while the container is swinging on the trailer, with the entire unloading system in full operation.

[0008] This need, obviously, implies a risk situation for the operator who is carried out the discharge, an object of the present invention being the development of a new type of mouth that complies with the same purpose than the nowadays ones, but where the stirring of the product is carried out automatically, in such a way that while the unloading is taking place, the responsible operator will not have to handle manually the mouth and can wait the completion of the discharge away from the container that swings, eliminating any risk of security.

Description of the invention

[0009] In order to solve the technical problems reflected in the state of the art, the mouth for granulates with automatic closing and stirring system, object of the present invention, proposes a mouth for granulates with automatic closing and stirring system comprising a hopper having an outlet pipe engageable to the draining container, a movable blade located inside, in the passageway of a granular product, and a closing lid. The mouth, at the lower end of the blade is connected with a pneumatic actuator through a connection mechanism, two particular embodiments of which are described.

[0010] In a first embodiment of the invention, the connection mechanism comprises a gear rack connected to the pneumatic actuator to which is coupled a pinion, axle of which in turn is rigidly joined to the lower end of the blade inside the hopper.

[0011] In this first practical embodiment, the closing lid is linked to a second pneumatic actuator and configured to adjust the flow rate in the hopper. Both the first pneumatic actuator and the second pneumatic cylinder are compact double acting cylinders of 100 mm in diameter.

[0012] In a second embodiment of the invention, the connection mechanism comprises a connecting rod coupled to a first axle which in turn is connected to a second axle rigidly joined to the lower end of the blade located inside the hopper. In this embodiment the pneumatic actuator is a compact double acting cylinder of 100 mm in diameter, connected with a double solenoid valve.

[0013] In both practical embodiments, the pneumatic actuator and the connection mechanism are located on a housing adjacent to the hopper. Moreover, the hopper is attached at the liner outlet, since both have the same shape and dimensions, through a plurality of lateral anchorages configured to prevent access through its top and bottom during the operation of the hopper.

[0014] Throughout the description and claims, the word "comprises" and its variations are not intended to exclude other technical features, additives, components or steps. For those skilled in the art, other objects, advantages and characteristics of the invention will emerge in part from the description and in part from the practice of the invention. The following examples and drawings are provided by way of illustration, and are not intended to be limiting of the present invention. Furthermore, the present invention covers all the possible combinations of particular and preferred embodiments herein indicated.

Brief description of the drawings

[0015] Described very briefly hereinafter are a series of drawings that help to better understand the invention and which are expressly related to an embodiment of said invention that is presented as a non-limiting example thereof.

Fig. 1 It shows a top plan view of a practical embodiment of the mouth object of the present invention;

Fig. 2 It shows a first side elevation view of the mouth shown in Fig. 1, in a first extreme position of the blade driven by a pneumatic cylinder;

Fig. 3 It shows a second side elevation view of the mouth shown in Fig. 1, in a second extreme position of the blade driven by a pneumatic cylinder;

Fig. 4 It shows a top plan view of a second practical embodiment of the mouth object of the present invention;

Fig. 5 It shows a first side elevation view of the mouth shown in Fig. 4, in a first extreme position of the blade driven by a pneumatic cylinder; and

Fig. 6 It shows a second side elevation view of the mouth shown in Fig. 4, in a second extreme position of the blade driven by a pneumatic cylinder.

Detailed explanation of an embodiment of the invention

[0016] In Figs. 1 to 3 is shown a first practical embodiment of the present invention. Thus, as seen in such Figs. 1 to 3, the mouth (1) concerned is configured from a hopper (2) that is coupled, by its top to the liner outlet to which is intended, and by the bottom, by an outlet pipe (3) to the draining container. The liner is not illustrated in Figs. 1 to 3.

[0017] The hopper (2) presents the particular feature of having inside a movable blade (4) that is configured to strike the granular product passing through the hopper (2) in gravity emptying operations of the liner, in order to break the lumps or clods that could be formed and for whose actuation said blade (4) is linked to a pneumatic mechanism located on a housing (5) placed adjacent to the hopper (2).

[0018] Said mechanism comprises at least a double acting cylinder (6), with two ends of stroke and that is fed by a valve (7), preferable a double solenoid valve. This cylinder (6) moves a gear rack (8) engaged to a pinion (9) the axle (10) of which is in turn rigidly joined to the lower end of the blade (4) inside the hopper (2).

[0019] In parallel, the hopper (2) has a lid (11) that closes said hopper (2) on the underside to allow or not the flow of product. This lid (11) is associated to a second cylinder (13) of the pneumatic mechanism situated laterally, and with the same characteristics as the first cylinder (6), said second cylinder (13) being associated, by a connecting rod (14) to a support as a second axle on which said lid (11) swings, so that the gradual actuation of said cylinder (13) causes the gradual opening of the lid (11) to allow more or less flow of product, and close it automatically.

[0020] Finally, it should be note that the hopper (2) is attached to the liner through a plurality of lateral anchorages (12) provided for this purpose, the hopper (2) being arranged so that is not accessible in operation through its top and bottom.

[0021] In Figs. 4 to 6 is shown a second practical embodiment of the invention, where the mouth (1) for granulates with automatic closing and stirring system is configured from a hopper (2) suitable for coupling, by its top, to the liner outlet to which is intended, and by the bottom, by an outlet pipe (3) to the draining container. The liner is not illustrated in Figs. 4 to 6.

[0022] The hopper (2) presents the particular feature of having inside a movable blade (4) that is configured to strike the granular product passing through the hopper (2) in gravity emptying operations of the liner, in order to break the lumps or clods that could be formed and for whose actuation said blade (4) is linked to a pneumatic mechanism located on a housing (5) placed adjacent to the hopper (2).

[0023] Said mechanism comprises at least a double acting cylinder (6), with two ends of stroke and that is fed by a valve (7), preferable a double solenoid valve. This cylinder (6) moves a connecting rod (8') coupled to a first axle (9') connect to a second axle (10') which in turn is rigidly joined to the lower end of the blade (4) inside the hopper (2), forming a connecting rod-crank mechanism pneumatically driven by the cylinder (6).

[0024] In parallel, the hopper (2) has a closing lid (11) configured to allow the flow of product.

[0025] Finally, it should be note that the hopper (2) is attached to the liner through a plurality of lateral anchorages (12) provided for this purpose in the same, being arranged so that is not accessible in operation through its top and bottom.

Claims

1. A mouth (1) for granulates with automatic closing and stirring system comprising a hopper (2) having an outlet pipe (3) engageable to the draining container, a movable blade (4) located inside, in the passageway of un granular product, and a closing lid (11); where said mouth (1) is **characterized in that** the lower end of the blade (4) is connected with a pneumatic actuator (6) through a connection mechanism (8, 9, 10, 8', 9', 10').

2. The mouth (1) of claim 1, where the pneumatic actuator (6) and connection mechanism (8, 9, 10, 8', 9', 10') are located on a housing (5) adjacent to the hopper (2).

3. The mouth (1) of any of claims 1-2, where the connection mechanism comprises a gear rack (8) connected with the pneumatic actuator (6) to which is coupled a pinion (9) the axle (10) of which in turn is rigidly joined to the lower end of the blade (4) inside the hopper (2).

4. The mouth (1) of claim 3, where the closing lid (11) is linked to a second pneumatic actuator (13) and configured to adjust the flow rate.

5. The mouth (1) of any of claims 3-4, where the first

pneumatic actuator (6) and second pneumatic cylinder (13) are compact double acting cylinders and 100 mm in diameter.

6. The mouth (1) of any of claims 1-2, where the connection mechanism comprises a connecting rod (8') coupled to a first axle (9') which in turn is connected to a second axle (10') rigidly joined to the lower end of the blade (4) located inside the hopper (2).

7. The mouth (1) of claim 6, where the pneumatic actuator (6) is a compact double acting cylinder of 100 mm in diameter, connected with a double solenoid valve (7).

8. The mouth (1) of any of the preceding claims, where the hopper (2) is attached at the liner outlet, where both have the same shape and dimensions, through a plurality of lateral anchorages (12) configured to prevent access through its top and bottom during the operation of the hopper (2).

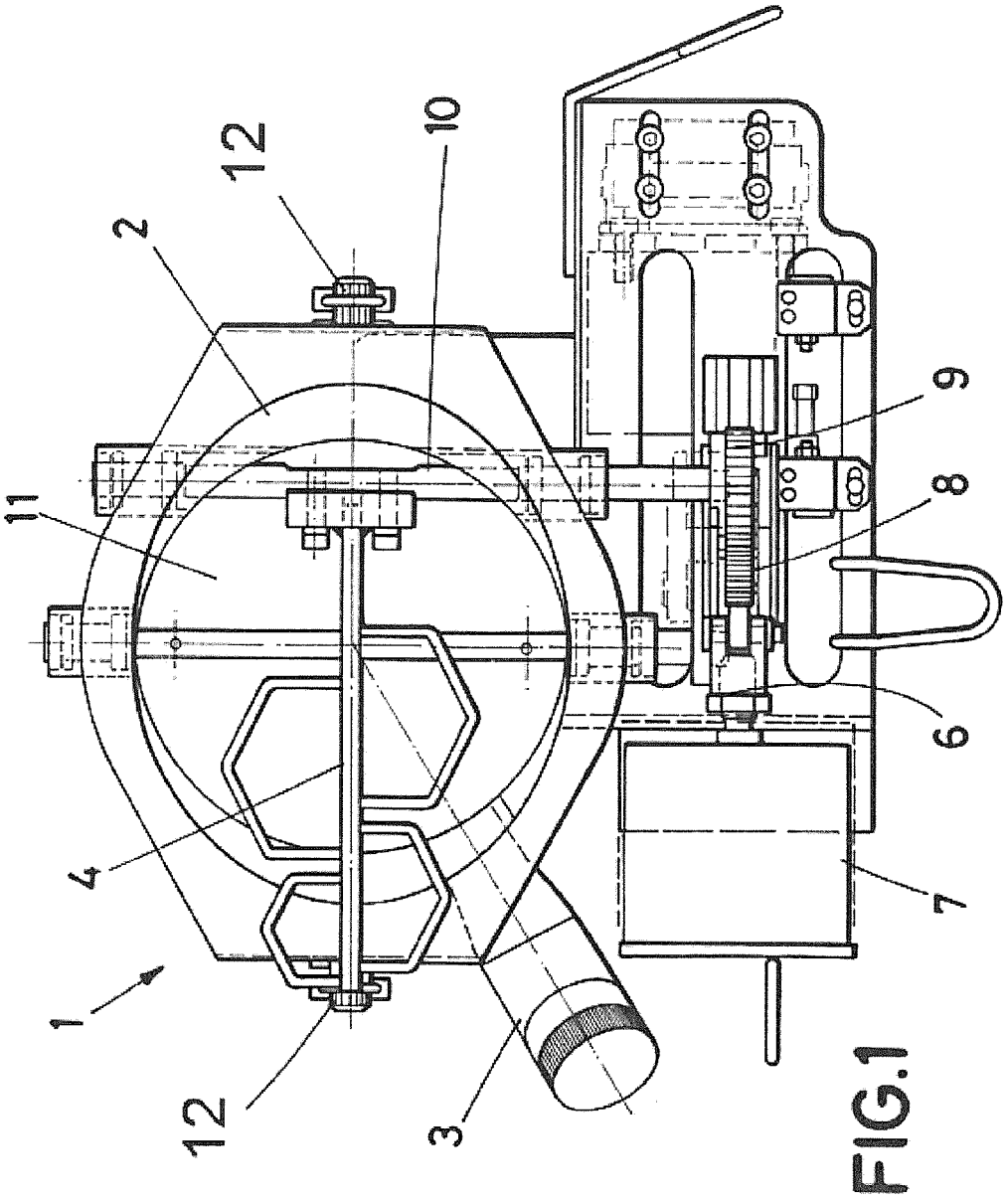


FIG.1

FIG.2

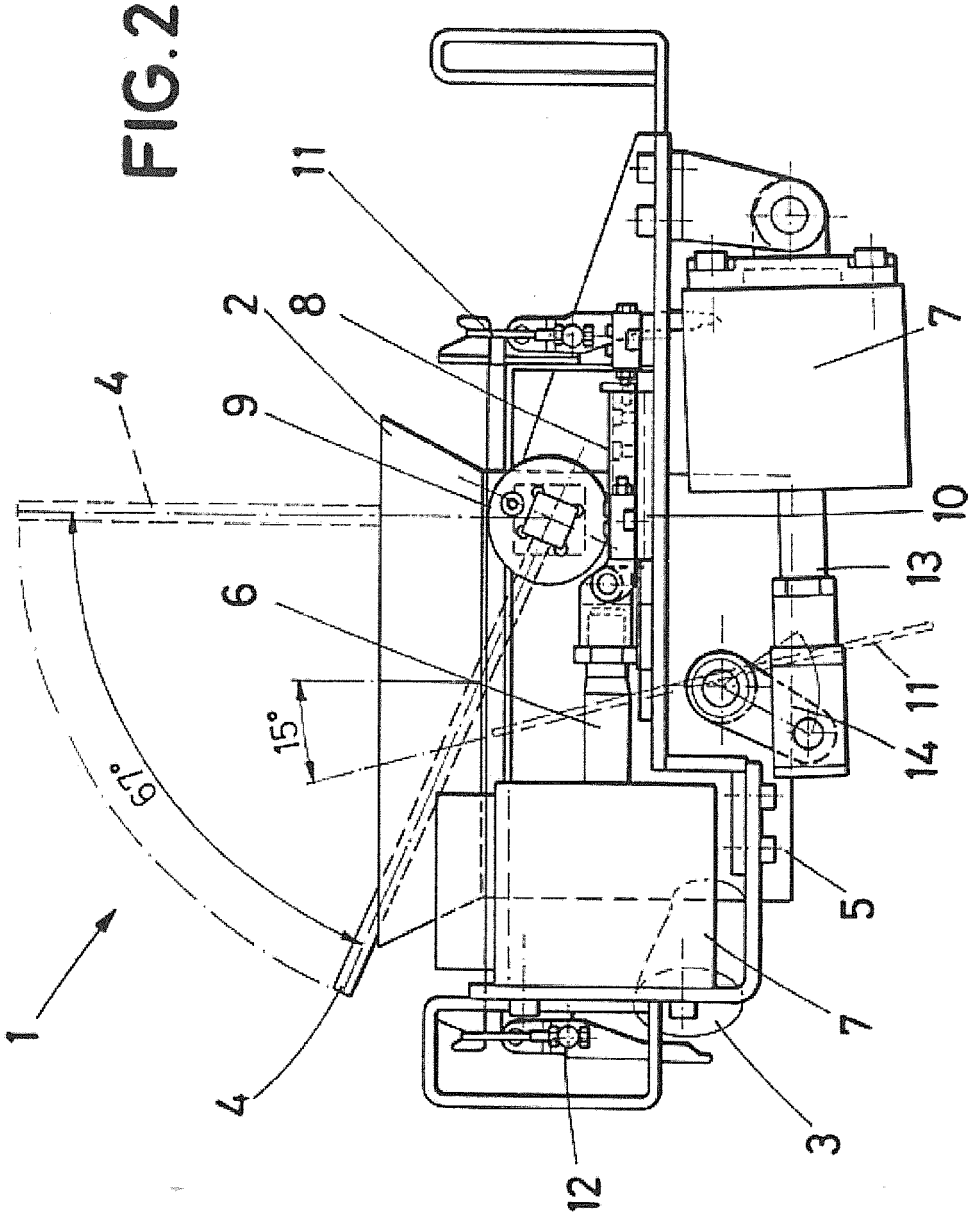
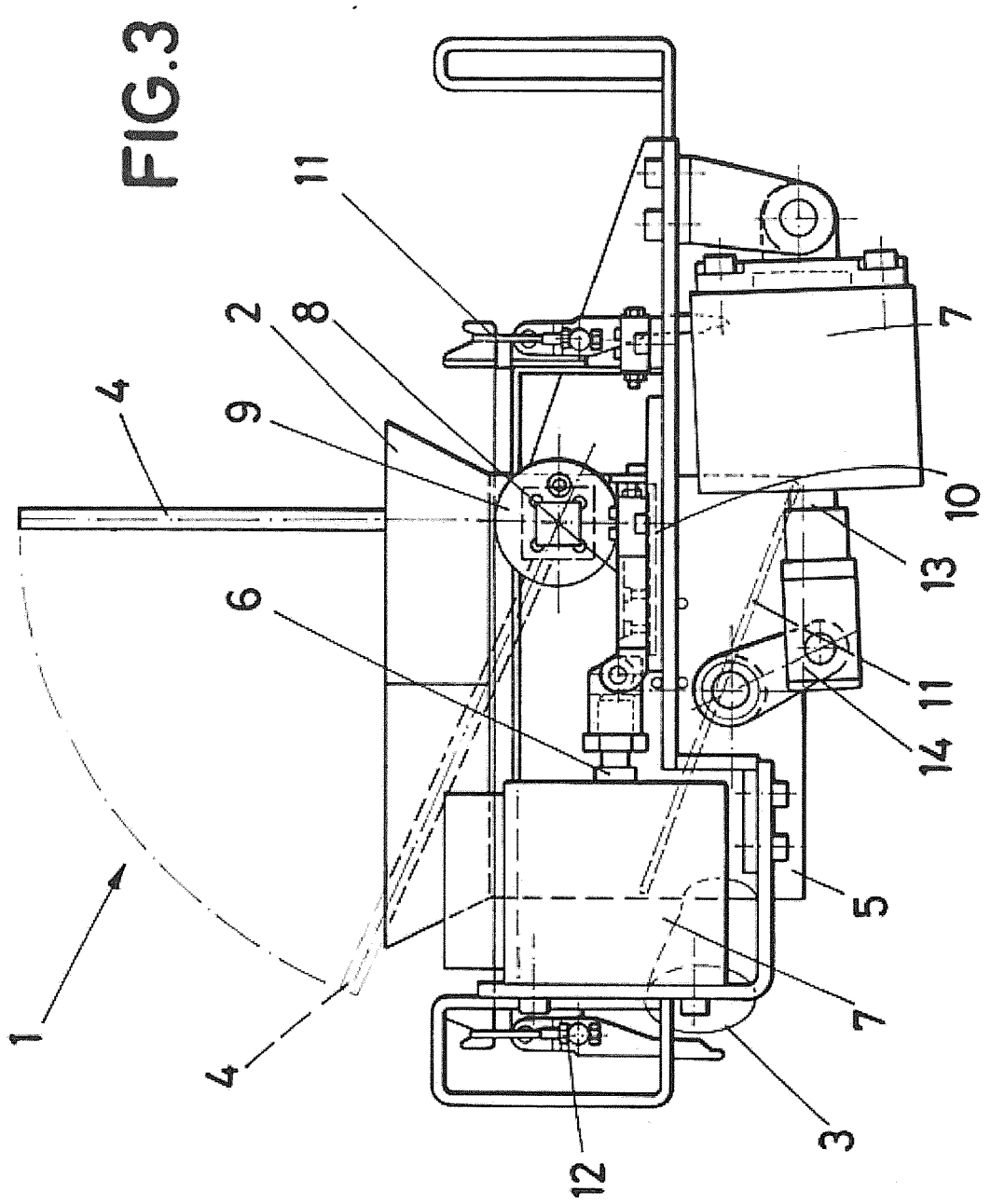


FIG.3



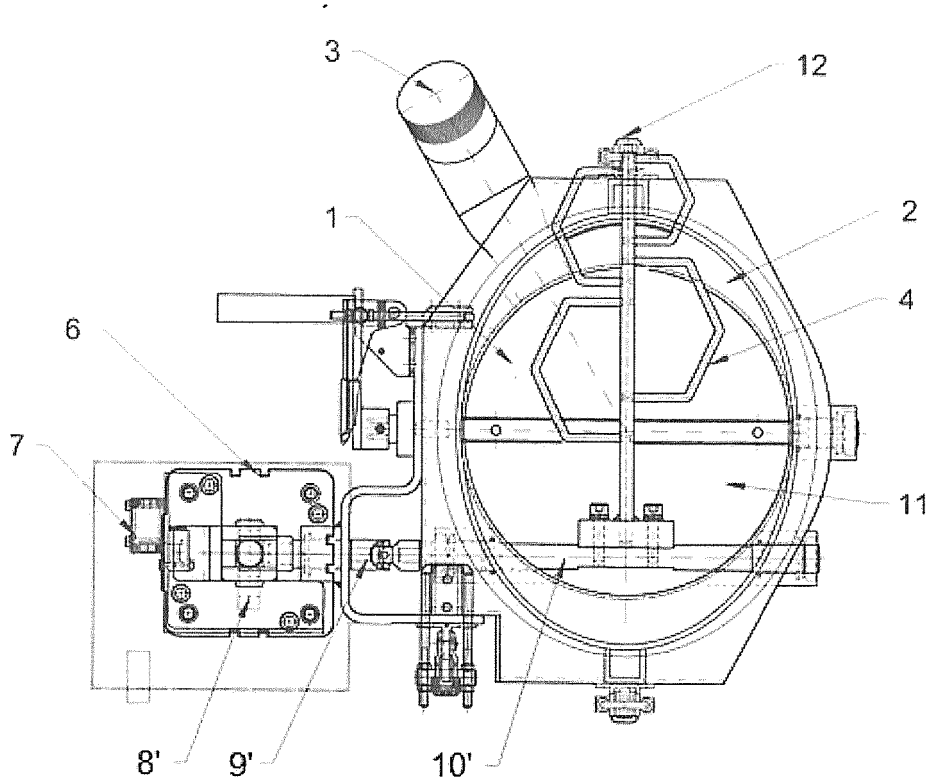


FIG.4

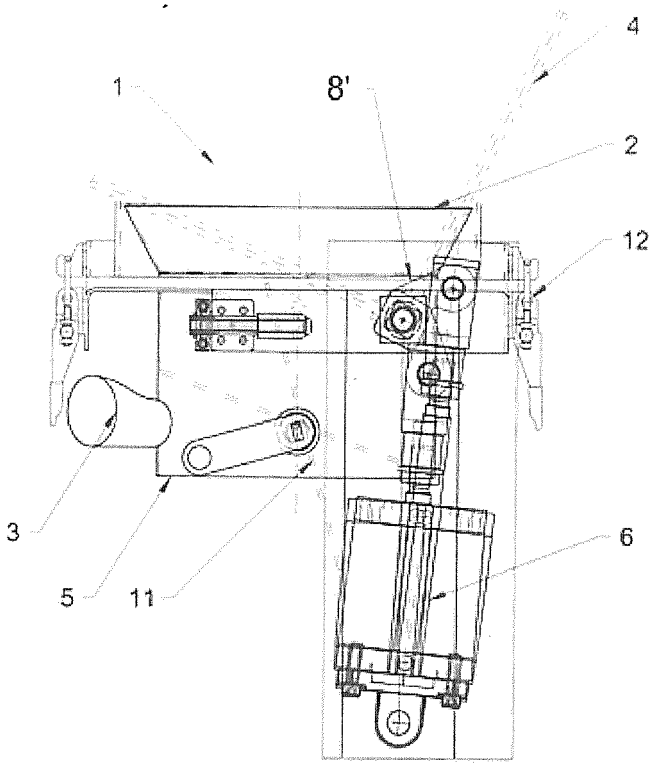


FIG.5

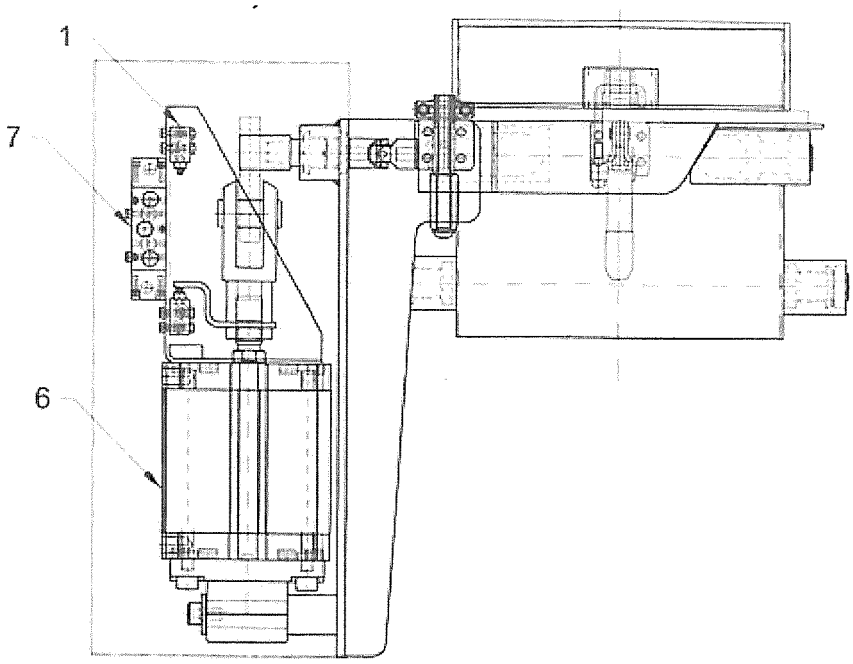


FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 3254

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 223 290 A (L. SCHULD) 14 December 1965 (1965-12-14) * column 1, line 69 - column 2, line 59; figures * -----	1	INV. B65G65/46 B65G69/08 B65D88/68
A	DE 33 03 892 A1 (W. ZIRNGIBL) 9 August 1984 (1984-08-09) * page 7, line 4 - page 9, line 2; figures * -----	1	
A	CH 402 737 A (REIT-HOLZVERWERTUNGSANLAGEN) 31 May 1966 (1966-05-31) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC) B65G B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 November 2014	Jagusiak, Antony

CATEGORY OF CITED DOCUMENTS

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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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