(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 390 195 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.11.2011 Bulletin 2011/48

(51) Int Cl.:
B65B 69/00 *(2006.01)*

(21) Application number: **10425179.8**

(22) Date of filing: **26.05.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

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(54) **Emptying apparatus, particularly for deformable containers**

(57) An emptying apparatus, particularly for deformable containers, comprising at least one conveyance line (2) for deformable containers (A), which is interposed between a loading station (3) and an unloading station (4). The emptying apparatus comprises at least one processing station (5), which is arranged along the conveyance line (2) and is partially shielded. The processing station (5) comprises at least one cutter (6), which rotates along a trajectory that affects the containers (A), conveyed by the conveyance line (2), in order to cut them and consequently empty them of any substances contained therein.

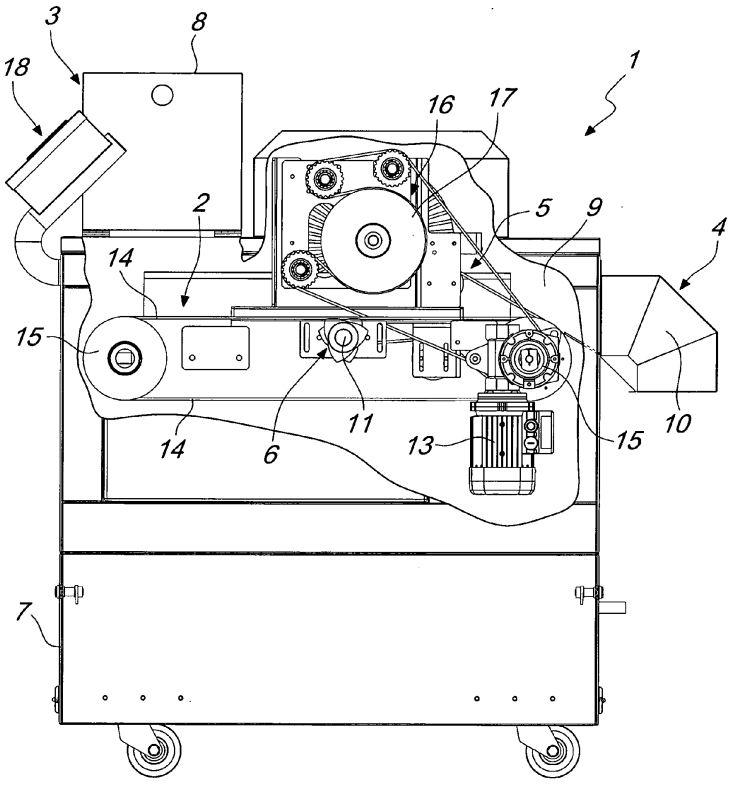

Fig. 2

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Description

[0001] The present invention relates to an emptying apparatus, particularly for deformable containers.

[0002] As is known, in hospitals, clinics, nursing homes, retirement homes, etcetera, the use in large quantities of catheters and the like, necessary for collecting urine and other excrements produced by patients who, for various reasons, are bedridden, is widespread.

[0003] Therefore, health workers must empty and dispose of the urine progressively collected in the bags (usually made of deformable material) associated with the catheters.

[0004] Tight restrictions are imposed by the statutory provisions of reference legislation on disposal operations and relate to the large quantities of bags accumulated in the facilities mentioned above; they are aimed at safeguarding the safety of health workers and at containing any pollution caused by the excrements.

[0005] The bags containing urine in fact must be sent to adapted collection centers, where they can be incinerated and/or recycled after being emptied.

[0006] This solution, however, is not free from drawbacks.

[0007] The need to store and subsequently send large quantities of bags full of urine to recycling plants requires hospitals and medical institutions to bear very substantial logistic costs, which are often unsustainable.

[0008] On the other hand, indeed to comply with the safety of the operators, which is safeguarded as noted by current statutory provisions, it is not permitted to perform a preliminary manual emptying of the bags (in order then to empty their content directly into the sewers or subsequently transport empty containers, which obviously have a much smaller bulk). In fact, manual emptying would expose assigned workers to unacceptable biological hazards, because they might come into contact accidentally with the urine (or other excrements) of the patients, which might be infected.

[0009] The aim of the present invention is to solve the problems mentioned above, by providing an apparatus that allows to empty deformable containers, such as bags for collecting urine and other excrements, in a practical and easy manner.

[0010] Within this aim, an object of the invention is to provide an apparatus that allows to empty deformable containers, such as bags for collecting urine and other excrements, without exposing the assigned worker to risks for his safety and hygiene.

[0011] Another object of the invention is to provide an apparatus that can be installed and used directly in hospitals, nursing homes and the like.

[0012] Another object of the invention is to provide an apparatus that ensures high reliability in operation.

[0013] Another object of the invention is to provide an apparatus that can be obtained easily starting from commonly commercially available elements and materials.

[0014] Another object of the invention is to provide an apparatus that has a low cost and is safe in use.

[0015] This aim and these and other objects that will become better apparent hereinafter are achieved by an emptying apparatus, particularly for deformable containers, which comprises at least one conveyance line for deformable containers, which is interposed between a loading station and an unloading station, characterized in that it comprises at least one processing station, which is arranged along said conveyance line and is partially shielded, said at least one processing station comprising at least one cutter, which rotates along a trajectory that affects the containers, conveyed by said conveyance line, in order to cut them and consequently empty them of any substances contained therein.

[0016] Further characteristics and advantages of the invention will become better apparent from the detailed description that follows of a preferred but not exclusive embodiment of the apparatus according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the emptying apparatus according to the invention;

Figure 2 is a side elevation view of the emptying apparatus according to the invention, partially open in order to show the arrangement of the internal components;

Figure 3 is a top perspective view of a group of components of the emptying apparatus according to the invention;

Figure 4 is a bottom perspective view of the group of components of Figure 3;

Figure 5 is a perspective view of one of the components of Figure 3;

Figure 6 is a schematic side elevation view of the operation of the component of Figure 5.

[0017] With reference to the figures, an apparatus according to the invention, generally designated by the reference numeral 1, comprises at least one conveyance line 2, which is interposed between a loading station 3 and an unloading station 4, for deformable containers A, for which the apparatus 1 is particularly suitable.

[0018] In this regard, it is useful to note that according to the preferred application of the invention, to which reference shall be made constantly in the continuation of the present description, the apparatus 1 is designed for the disposal of deformable containers A such as bags (typically made of polymeric material) used for collecting the urine of patients in a hospital, in a nursing home and the like. The urine (and optionally other waste liquids or excrements) is therefore the substance that must be disposed.

[0019] Reference shall be made to this preferred application in the continuation of the present description, but the possibility is not excluded (and is within the protective scope defined herein) of using the apparatus 1 according to the invention for emptying different type of

substances even from containers A of a different kind.

[0020] According to the invention, the emptying apparatus 1 comprises at least one processing station 5, which is arranged along the conveyance line 2 and is partially shielded.

[0021] The processing station 5 comprises at least one cutter 6, which rotates along a trajectory that affects the containers A, carried by the conveyance line 2, in order to cut them, thus emptying them of any substances (for example, as shown, urine) contained therein.

[0022] By way of the action of the cutter 6, which cuts the containers A inside the processing station 5 that is at least partially shielded, it is thus possible to empty the containers A in a practical and easy manner, without exposing the operators to the risk of contamination, thus achieving the intended aim.

[0023] In particular, the emptying apparatus 1 according to the invention comprises a substantially box-shaped frame 7 (shown in Figures 1 and 2), which has an access hatch 8, in turn comprised within the loading station 3.

[0024] The hatch 8 leads to the conveyance line 2, which is arranged in a compartment 9 located inside the frame 7 and can be shielded completely from the outside (by closing the hatch 8); the conveyance line 2 faces, on the opposite side with respect to the hatch 8, a removal duct 10 for the processed containers A, which lies outside the frame 7 and is comprised within the unloading station 4.

[0025] In order to allow easy collection of the containers A already deprived of the substances previously contained therein, it is possible to arrange a collector of various types downstream of the duct 10: the empty containers A can be thus stored in large quantities in a configuration that has a very small volume.

[0026] According to an embodiment of considerable practical interest, mentioned by way of non-limiting illustration of the application of the invention, the emptying apparatus 1 according to the invention comprises a shaft 11, which is coupled to the frame 7 and rotates about an axis that is substantially transverse to the direction of advancement of the containers A, which is defined by the conveyance line 2: the cutter 6 is then keyed on the shaft 11 in order to cut and empty (even just by gravity) the containers A during their conveyance along the line 2.

[0027] In particular, the cutter 6 is substantially constituted by a disk 12 that is supported coaxially and rigidly by the shaft 11 and has sharp edges for cutting the containers A; as can be deduced in particular from Figure 5, the disk 12 preferably has a substantially multilobed shape.

[0028] More particularly, in order to increase the efficiency and productivity of the apparatus 1, it can comprise a plurality of disks 12, distributed in series along the shaft 11, in order to cut simultaneously one or more containers A (which optionally advance in parallel along the conveyance line 2).

[0029] With further reference to the preferred embodiment and to the accompanying figures, cutting occurs while a motor 13 actuates the rotation of one or more platforms 14, which constitute the line 2 and are assigned to conveying the containers A. The platforms 14 can be, for example, wound in a loop around a pair of pulleys 15 (one of which is actuated directly by the motor 13).

[0030] Conveniently, the emptying apparatus 1 comprises a presser 16 for the containers A, arranged along the conveyance line 2 proximate to the cutter 6 (or cutters 6), in order to keep the containers A forcibly pressed in position during their cutting and in order to facilitate their emptying.

[0031] In particular, the presser 16 is constituted by a substantially cylindrical brush 17 (preferably made of a polymeric material, for example propylene), which rotates about an axis which is parallel to the shaft 11.

[0032] During the rotation, a peripheral region of the brush 17 assumes a trajectory for affecting the containers A, in order to press and crush them at least partially, thus ensuring that they are kept in position and at the same time facilitating their complete emptying.

[0033] Conveniently, the emptying apparatus 1 comprises a disposal outlet, substantially provided along the base of the frame 7, in order to allow the evacuation of the substances expelled from the containers A.

[0034] Moreover, in order to collect and convey the substances toward such disposal outlet, below the conveyance line 2 there are inclined metal plates that lead to such outlet.

[0035] The disposal outlet can thus be connected directly to the sewer system, in order to dispose of the urine without it being able to return, after insertion in the apparatus 1, in any way in contact with workers and operators assigned to the emptying of the containers A.

[0036] Optionally, the apparatus 1 can be provided with a region for collecting the urine, associated with a disposal pump, in order to facilitate expulsion through the outlet described above.

[0037] Advantageously, the emptying apparatus 1 according to the invention comprises a unit for washing and disinfecting the compartment 9, in order to clean and remove the residues of any substances accumulated following the emptying of the containers A.

[0038] In particular, such washing and disinfection unit comprises a plurality of nozzles, arranged inside the compartment 9 and adapted to spray it with a washing fluid (for example water optionally with the addition of disinfectant liquid, optionally scale remover).

[0039] In order to ensure the complete emptying of the containers A, in particular if receptacles have formed which collect the substances among the folds of the container A after cutting, the apparatus 1 according to the invention comprises positively a dripping station, which is interposed between the processing station 5 and the unloading station 4. In this dripping station it is possible to impose a stop of preset duration to the containers A, after the cut performed in the processing station 5, for complete emptying.

[0040] The operation of the apparatus according to the

invention is as follows.

[0041] If it is necessary to empty bags of urine without exposing the worker to risks of contamination, it is possible to use the emptying apparatus 1 according to the invention.

[0042] First of all, the operator can access the compartment 9 inside the frame 7 through the hatch 8: by opening it, he can in fact deposit one or more containers A along the conveyance line 2.

[0043] After closing the hatch 8, and having thus shielded completely the compartment 9 and particularly the processing station 5, he can start the working cycle (or, as an alternative, the cycle can start automatically when the hatch 8 closes), for example through a control interface 18 associated with the motor 13 (and with the other actuation systems of the apparatus 1).

[0044] It should be noted that the hatch 8 can be provided with an electric lock that prevents the accidental opening of the hatch 8 during the operation of the apparatus 1, as a further assurance of safety for operators.

[0045] The motor 13 thus turns the pulleys 15, which move the platforms 14, which in turn carry the containers A toward the rotating cutters 6. Such cutters can thus cut the bags, while the brush 17 conveys them and keeps them forcibly pressed in position, thus ensuring the emptying and the expulsion of the urine and of the other substances contained therein, which are thus evacuated through the disposal outlet provided at the base of the frame 7.

[0046] The containers A, carried by the platforms 14, can thus continue past the processing station 5 and, after an optional stop in the dripping station in order to complete the emptying process, are automatically evacuated through the duct 10.

[0047] The unloading of the emptied containers A can cause, even automatically, the activation of the washing and disinfection unit, which sprays the compartment 9 with the chosen washing fluid; at the end of this operation, the hatch 8 is released and it is possible to start a new working cycle.

[0048] It is thus evident that the apparatus 1 according to the invention ensures the disposal even of large quantities of bags full of urine with a practical and easy solution that has a small size and can thus easily be installed directly in hospitals and in nursing homes, relieving them from the burden of managing the full bags.

[0049] The possibility to shield completely the compartment 9 (or anyway the processing station 5) is a guarantee of hygiene and avoids the risk of contamination or biological hazard for the operator.

[0050] The emptying method, particularly for deformable containers, consists in a first step a., in feeding a loading station 3 with at least one container A of the deformable type for substances to be disposed.

[0051] Subsequently it is possible, in a step b., to transfer, by means of a conveyance line 2, the container A to a processing station 5, which is at least partially shielded.

[0052] With the container A in the processing station 5, it is thus possible, in a step c., to cut the containers A, by means of at least one rotating cutter 6, arranged along a trajectory for affecting the containers A, in order to allow to empty the containers A of the substances contained therein.

[0053] In practice it has been found that the apparatus according to the invention fully achieves the intended aim, because, thanks to the action of the cutter that cuts the containers inside a processing station that is at least partially shielded, it is possible to obtain the emptying of such containers in a practical and easy manner, without however exposing the operators to the risk of contamination.

[0054] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0055] In the exemplary embodiments shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0056] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0057] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0058] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An emptying apparatus, particularly for deformable containers, comprising at least one conveyance line (2) for deformable containers (A), which is interposed between a loading station (3) and an unloading station (4), **characterized in that** it comprises at least one processing station (5), which is arranged along said conveyance line (2) and is partially shielded, said at least one processing station (5) comprising at least one cutter (6), which rotates along a trajectory that affects the containers (A), conveyed by said conveyance line (2), in order to cut them and consequently empty them of any substances contained therein.

2. The emptying apparatus according to claim 1, **characterized in that** it comprises a substantially box-shaped frame (7), which has at least one access hatch (8), which is comprised in said loading station

(3) and leads to said conveyance line (2), which is arranged in a compartment (9) inside said frame (7) and can be shielded completely with respect to the outside, said conveyance line (2) facing, on the opposite side, a duct (10) for evacuating the containers (A), said duct (10) extending externally with respect to said frame (7) and being comprised in said unloading station (4).

3. The emptying apparatus according to claims 1 and 2, **characterized in that** it comprises a shaft (11) that rotates about an axis which is substantially transverse to the direction of advancement of the containers (A), which is defined by said conveyance line (2), said at least one cutter (6) being keyed on said shaft (11) in order to cut and empty the containers (A) during their conveyance.

4. The emptying apparatus according to one or more of the preceding claims, **characterized in that** said at least one cutter (6) is substantially constituted by a disk (12) which is supported coaxially and rigidly by said shaft (11) and is provided with sharp edges, in order to cut the containers (A), said disk (12) having preferably a substantially multilobed shape.

5. The emptying apparatus according to one or more of the preceding claims, **characterized in that** it comprises a plurality of said disks (12) distributed in series along said shaft (11), in order to cut simultaneously one or more containers (A).

6. The emptying apparatus according to claim 1, **characterized in that** it comprises a presser (16) for the containers (A), which is arranged along said conveyance line (2) proximate to said at least one cutter (6), in order to keep said containers (A) forcibly in position during cutting and in order to facilitate their emptying.

7. The emptying apparatus according to one or more of the preceding claims, **characterized in that** said presser (16) is constituted by a substantially cylindrical brush (17), which rotates about an axis which is parallel to said shaft (11), during the rotation at least one peripheral region of said brush (17) assuming a trajectory that affects the containers (A), in order to press and crush them at least partially, in order to keep them in position and facilitate their complete emptying.

8. The emptying apparatus according to one or more of the preceding claims, **characterized in that** it comprises a disposal outlet, provided substantially along the base of said frame (7), in order to evacuate the substances expelled from the containers (A), below said conveyance line (2) there being inclined metal plates which lead to said outlet, in order to collect and convey the substances toward said disposal outlet.

9. The emptying apparatus according to one or more of the preceding claims, **characterized in that** it comprises a unit for washing and disinfecting the compartment (9), in order to clean and remove the residues of any substances accumulated following the emptying of the containers (A).

10. The emptying apparatus according to claim 9, **characterized in that** said washing and disinfection unit comprises a plurality of nozzles, arranged inside said compartment (9) and adapted to spray it with a washing fluid.

11. The emptying apparatus according to one or more of the preceding claims, **characterized in that** it comprises a dripping station, which is interposed between said processing station (5) and said unloading station (4), in order to impose a stop of preset duration to the containers (A), after the cutting performed in said processing station (5), in order to ensure the complete emptying of said containers (A).

12. An emptying method, particularly for deformable containers (A), which comprises the steps of:

a. feeding a loading station (3) with at least one container (A) of the deformable type of substances to be disposed;
b. transferring, by means of a conveyance line (2), the container (A) to a processing station (5), which is at least partially shielded;
c. cutting the containers (A), by means of at least one rotating cutter (6) arranged along a trajectory that affects the containers (A), in order to allow to empty said containers (A) of the substances contained therein.

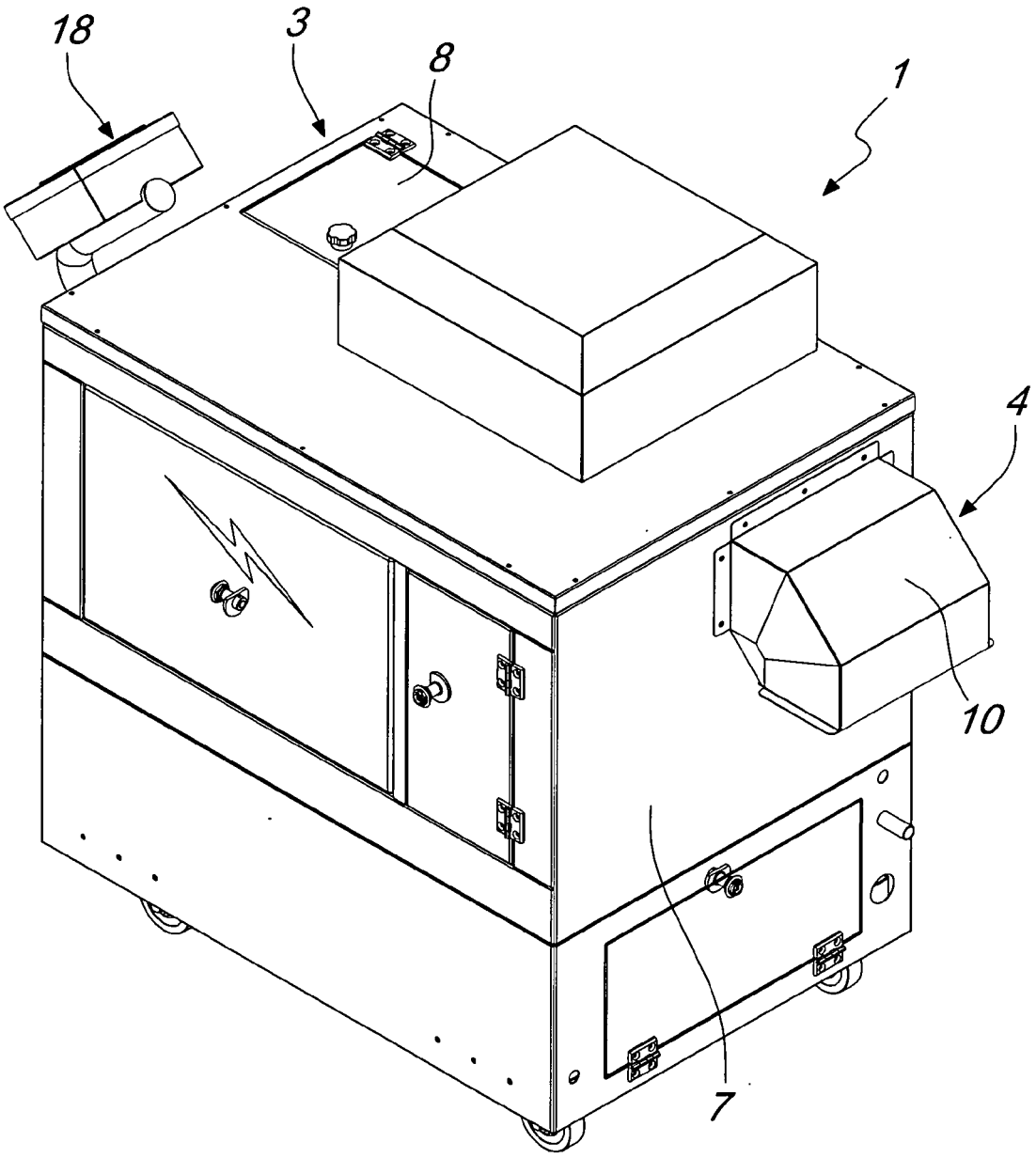

Fig. 1

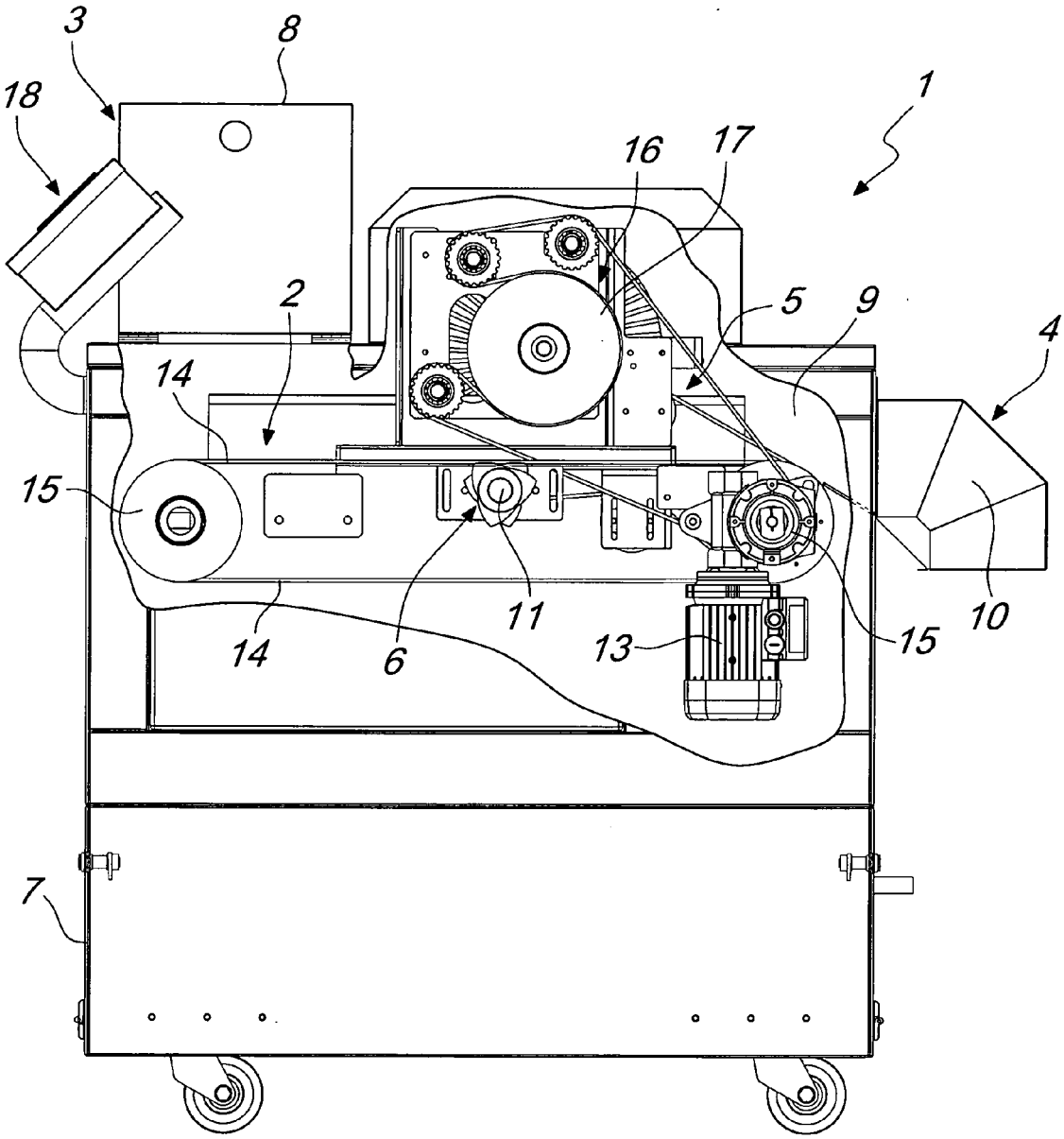

Fig. 2

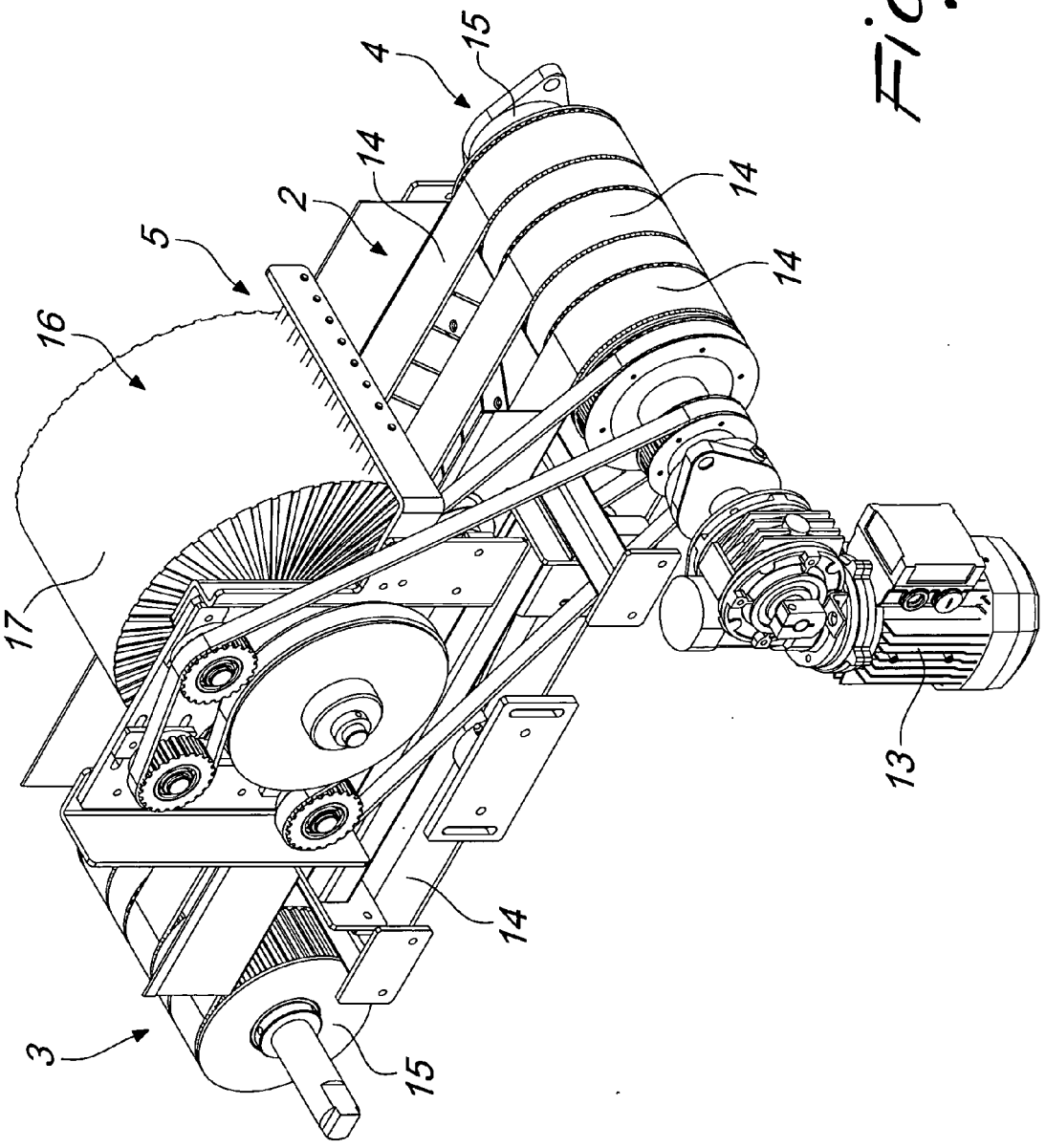

Fig. 3

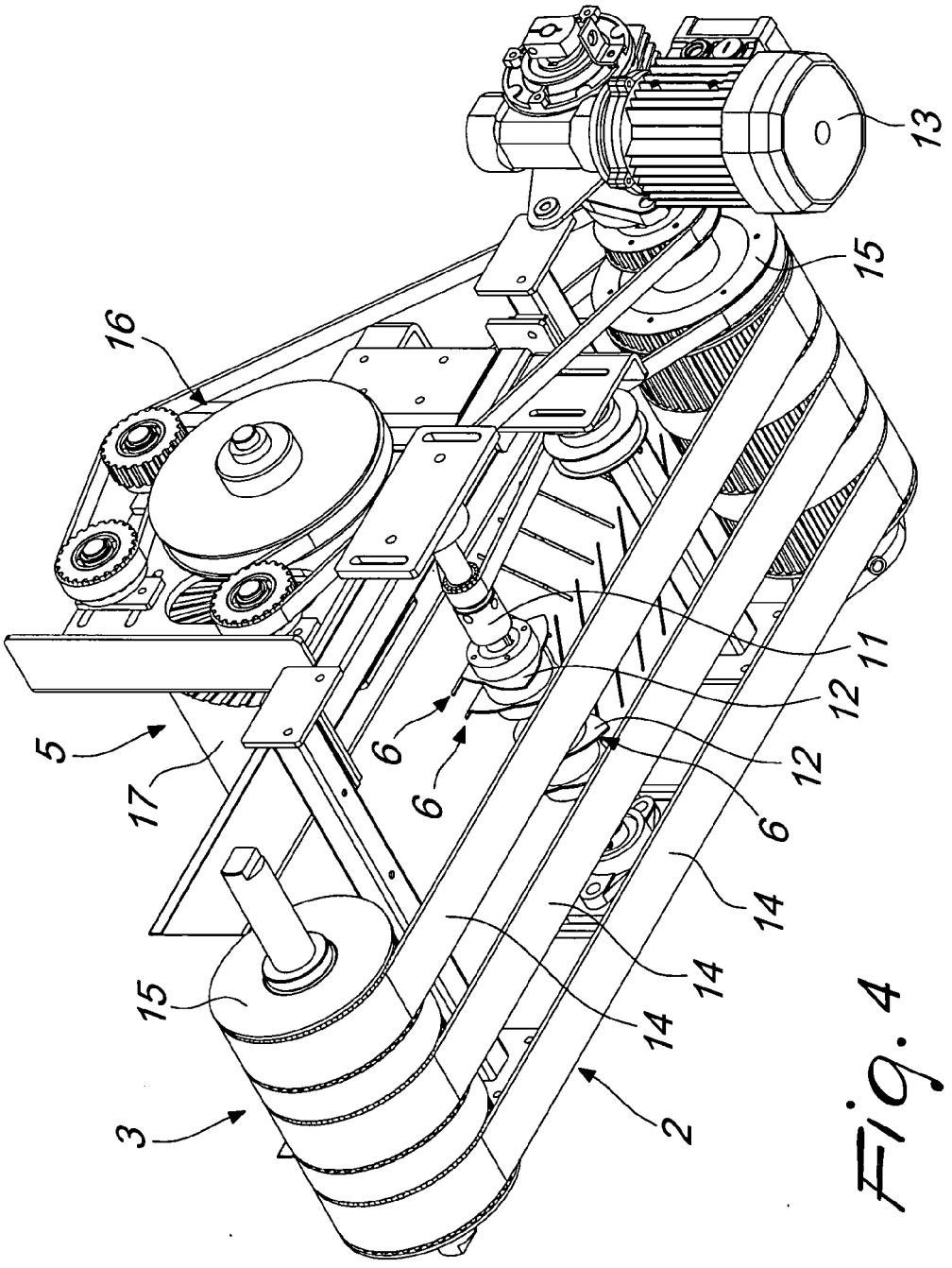

Fig. 4

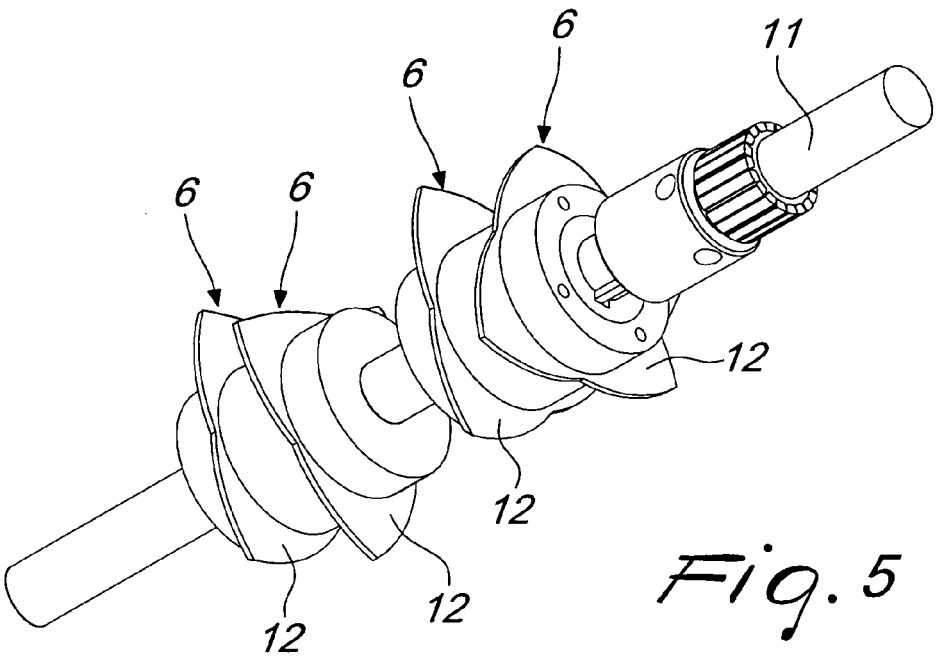

Fig. 5

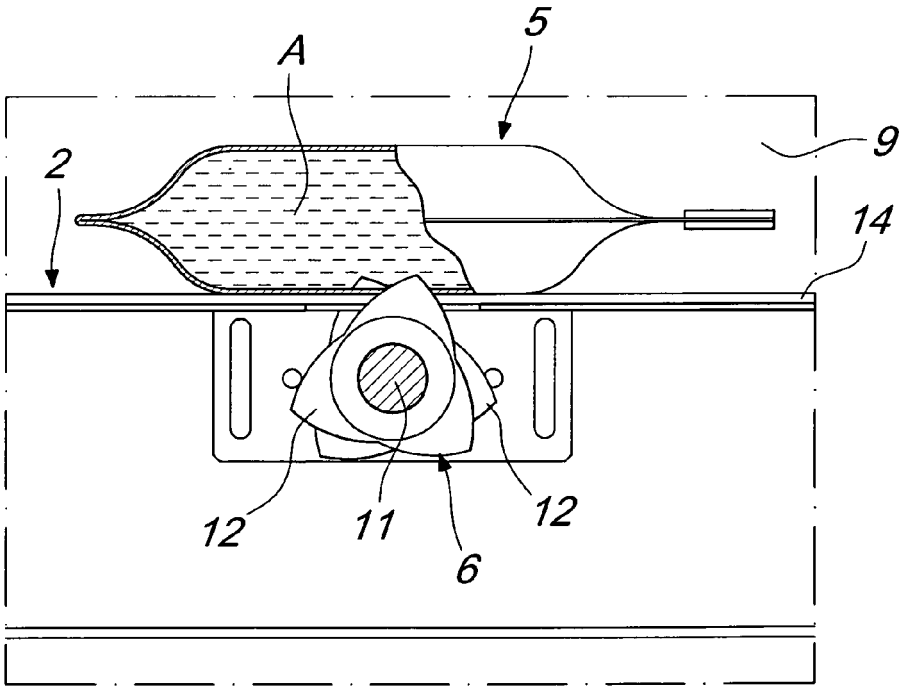

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5179

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X Y	US 6 351 858 B1 (TOIA MARIO FERNANDO [AR]) 5 March 2002 (2002-03-05) * column 8, line 18 - column 10, line 24; figures 2,3 *	1-3,6, 8-10,12 4	
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Y	EP 1 053 946 A1 (VAUCHE P SA [FR]) 22 November 2000 (2000-11-22) * the whole document *	4	
X	US 6 079 929 A (MUMA JOSEPH HAROLD [CA] ET AL) 27 June 2000 (2000-06-27) * column 5, line 56 - column 6, line 49 *	7	TECHNICAL FIELDS SEARCHED (IPC) B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 December 2010	Yazici, Baris

CATEGORY OF CITED DOCUMENTS

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15-12-2010

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