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

(11) **EP 3 592 160 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
11.01.2023 Bulletin 2023/02

(21) Application number: **18710430.2**

(22) Date of filing: **08.03.2018**

(51) International Patent Classification (IPC):
A24D 3/02 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A24D 3/0216

(86) International application number:
PCT/EP2018/055691

(87) International publication number:
WO 2018/162608 (13.09.2018 Gazette 2018/37)

(54) FEEDING DEVICE AND METHOD FOR FEEDING SPHERICAL OBJECTS IN A TOBACCO INDUSTRY MACHINE

ZUFÜHRVORRICHTUNG UND VERFAHREN ZUM ZUFÜHREN VON KUGELFÖRMIGEN GEGENSTÄNDEN IN EINER MASCHINE DER TABAKINDUSTRIE

DISPOSITIF D'INTRODUCTION ET PROCÉDÉ D'INTRODUCTION D'OBJETS SPHÉRIQUES DANS UNE MACHINE DE L'INDUSTRIE DU TABAC

(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 RS SE SI SK SM TR

(30) Priority: **10.03.2017 PL 42079817**

(43) Date of publication of application:
15.01.2020 Bulletin 2020/03

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a feeding device for feeding spherical objects, applicable for tobacco industry, and to a method for feeding spherical objects in a tobacco industry machine.

BACKGROUND

[0002] Tobacco industry products may comprise capsules with scent substances. For example, the capsules can be placed in cigarette filters, and the smokers, before or during smoking, can squeeze the capsule with their fingers to release the scent. The capsules may be placed in a filtering material. There are known cigarettes with two capsules placed in a mouthpiece in the filtering material, wherein the two capsules may be squeezed separately or both at the same time. There are known mouthpieces for cigarettes, which are made of two or more different filtering segments, where the capsules may be placed in a space between the segments.

[0003] The capsules are delivered to a feeding machine, for feeding the capsules in the filtering material, usually in a mass flow, i.e. are poured into a mass container. The capsules are transferred from the mass container to the device, which places them one by one into the filtering material. The capsules received from the mass container have to be transferred to the device which handles single capsules or a stream of single capsules.

[0004] A US patent application US2007068540A1 discloses a device, in which capsules are received from a mass chamber and are transferred to a single layer chamber. From the single layer of capsules, the capsules are received by means of sockets of a feeding wheel and as a result the stream of single capsules moving on a circular path, is formed. From the feeding wheel the capsules are transferred to the filtering material band.

[0005] A PCT patent application WO2005032286A2 discloses a device in which capsules are received from a rotary container by means of negative pressure and are transferred to sockets of a feeding wheel.

[0006] A PCT patent application WO2011083405A1 discloses a device in which separate streams are formed of capsules from a rotary mass chamber, wherein the streams move in horizontal ducts, wherein the ducts rotate together with the mass chamber.

[0007] A US patent US7757835B2 discloses a device wherein streams of capsules move at a certain angle.

[0008] In Japanese patent application JPH06135542A discloses a bead feeding apparatus comprising a mass hopper and a single layer hopper, the beads flowing from the mass hopper to the single layer hopper. Above the entrance to the single layer hopper there is provided a rotary cylinder the task of which is forming a single layer flow of beads. Further from the single layer hopper the beads are delivered through pipe channels to feeding units provided with rotary feeders.

[0009] There is therefore a need to provide a device that would allow effective transformation of a mass of capsules into a single stream or a plurality of separate streams of capsules. In particular, there is a need to provide such a device which could be utilized for feeding the device such as presented in the US patent application US2013181003B2.

[0010] In the present disclosure, the capsules are also referred to as spherical objects.

SUMMARY

[0011] There is disclosed a feeding device for feeding spherical objects for tobacco industry applications, and a method of feeding spherical objects in a tobacco industry machine, according to the appended claims.

BRIEF DESCRIPTION OF FIGURES

[0012] The object of the present disclosure is presented by means of example embodiments in a drawing, in which:

Fig. 1 shows a feeding device for feeding spherical objects;
Fig. 2 shows a side view of the device of Fig. 1 without a sidewall;
Figs. 3 and 4 show an outlet of the feeding device of Fig. 1;
Fig. 5 shows a feeding device with two single layer chambers.

DETAILED DESCRIPTION

[0013] A mass chamber 2 for capsules 3, in a feeding device 1 presented in Fig. 1, has a form of a container that is open at the top and at the bottom and comprises sidewalls 4, 5, a front wall 6 and an inclined bottom 7. The front wall 6 and the bottom 7 are convergent, forming an outlet 8 in a lower part 2A of the mass chamber 2. In other embodiments, the mass chamber 2 may have other shapes as well.

[0014] The capsules 3 may be delivered to the mass chamber 2 manually, by means of a container or by means of a typical feeding unit, for example a pneumatic feeding unit or a mechanical feeding unit with a transporter for capsules 3, wherein the feeding unit is not shown in the drawing.

[0015] A cylindrical rotary element 9 is located under the bottom 7 along a bottom edge 7A of the bottom 7, wherein a driving unit for rotating this element is not shown for clarity. In a preferable embodiment, the cylindrical rotary element rotates in a direction depicted by an arrow 9R, it means that it rotates such that its surface of contact with the capsules 3, moves in an opposite direction to the direction of flow of the capsules from the mass chamber 2 to a single layer chamber 10. The device may

also operate when the cylindrical rotary element 9 rotates in an opposite direction, i.e. when it rotates such that its surface of contact with the capsules 3 moves in the same direction as the direction of flow of the capsules from the mass chamber 2 to the single layer chamber 10. The capsules 3 rotate due to the action of the force of friction between a surface of the capsules 3 and a rotating side surface 9A. The rotation of the capsules 3 facilitates their downward movement, because it reduces at least partially situations wherein non-rotating capsules could be blocked between the outlet 8 of the mass chamber and a front wall 11 of the single layer chamber 10. An axis of rotation X of the cylindrical rotary element 9 is substantially in parallel to the bottom edge 7A. Between the bottom edge 7A and the side surface 9A of the cylindrical rotary element 9 there is a gap, which has a width smaller than a diameter of the capsule 3. The cylindrical rotary element 9 may be located such that its side surface 9A is tangential to an inner surface 7B of the bottom 7 and it constitutes an extension of the bottom 7. The length of the cylindrical rotary element 9 is at least equal to the length of the edge 7A of the bottom 7. The length of the cylindrical rotary element 9 is substantially equal to a length of the outlet 8.

[0016] The single layer chamber 10 is attached to the mass chamber 2. The front wall 11 of the single layer chamber 10 forms an extension of the front wall 6 of the mass chamber 2, wherein the length of the single layer chamber 10 is equal to the length of the outlet 8 of the mass chamber 2. Another wall 12 of the single layer chamber 10 is spaced apart from its front wall 11 by a distance slightly greater than the diameter of the capsule 3, such as to enable the capsules 3 to fall under the force of gravity in the single layer chamber 10. In an upper part 10A of the single layer chamber 10 an inner surface 12A of the wall 12 is preferably located tangentially to the side surface 9A of the cylindrical rotary element 9. Preferably, the single layer chamber 10 is located vertically, but it may also be inclined in order to slow down sliding of the capsules and to increase the smoothness of the flow of the capsules. Side walls 13 and 14 of the single layer chamber 10 are arranged substantially in parallel to each other, and they may be also arranged convergently or divergently in a downward direction.

[0017] In a lower part 10B of the single layer chamber 10 there is an outlet 15 having a form of multiple outlet ducts 16. At an inlet 16E of the outlet duct 16 there are two rollers 17, 18, wherein their circumferential surfaces 17A, 18A constitute walls of the outlet duct 16. The inlet 16E of the outlet duct 16 is formed by the surfaces 17A, 18A and the surfaces 11A and 12A of the walls 11 and 12 (Fig. 2). The rollers 17, 18 are mounted pivotally, wherein for clarity of the drawing, a driving unit of the rollers is not shown. As presented in Fig. 1 and Fig. 3, the rollers 17, 18 rotate in the same directions 17R and 18R, so their circumferential surfaces 17A, 18A move in opposite directions with respect to the inlet 16E of the outlet duct 16. Therefore, when the capsules 3 are above the rollers 17, 18, some of them will be displaced or will be pushed by one of the rollers (the circumferential surface of which moves in a direction towards the inlet of the outlet duct) towards the inlet, and the rest of the capsules will be displaced or pushed by the second roller (the circumferential surface of which moves in a direction opposite to the inlet of the outlet duct) in the direction opposite to the outlet - it allows to prevent blocking of the capsules 3 and provides good flow conditions of the capsules 3 from the single layer chamber 10 to the outlet ducts 16. The rollers of the consecutive pairs of rollers 18 and 17', 17' and 18', 18' and 17", 17" and 18" rotate in a similar manner. The ducts and rollers are arranged such that one roller 18, 17', 18', 17" cooperates with two outlet ducts 16, i.e. the circumferential surface of one roller constitutes the wall of one duct and of the neighboring duct. Between the rollers of the neighboring outlet ducts there may be located distributors 19 (shown in Fig. 4) for directing the capsules 3 to particular outlet ducts 16.

[0018] Fig. 5 shows another embodiment of a feeding device 1' - having a doubled efficiency with respect to the feeding device 1 shown in Fig. 1. The feeding device 1' has a mass chamber 2' having side walls 4, 5, a front wall 6 and a back wall 6' and a bottom 7', which comprises two surfaces 7B and 7B'. The mass chamber 2' is connected with two single layer chambers 10 and 10'. A first cylindrical rotary element 9 is located in the region of the connection of the mass chamber 2' with the single layer chamber 10, and a second cylindrical rotary element 9' is located in the region of the connection of the mass chamber 2' with the single layer chamber 10'. The feeding device 1', in a top view, occupies a similar area as the feeding device 1 of Fig. 1, but it allows to deliver twice as much of the capsules.

[0019] In yet another embodiment, it is possible to use one cylindrical rotary element 9, which is located in the region of connection of the mass chamber 2' with the single layer chamber 10, tangentially to the surface 7B and in the region of the connection of the mass chamber 2' with the single layer chamber 10', tangentially to the surface 7B'.

[0020] The capsules 3, after being poured into the mass chamber 2, 2', fill the chamber, but displace only to a small extent to the single layer chamber 10, 10', because a high coefficient of friction between the capsules prevents their free flow to the single layer chamber, causing the capsules to stay above the inlet to the single layer chamber in the form of little bridges. Initializing the rotation of the cylindrical rotary element 9, 9', wherein its side surface 9A constitutes a fragment of the bottom of the mass chamber, causes the capsules to begin to rotate with respect to the cylindrical rotary element 9, 9' and with respect to other capsules 3. Such location of the cylindrical rotary element is preferable, because the capsules do not have a possibility to block each other at the inlet to the single layer chamber 10, 10' during the operation of the device.

[0021] The device as presented herein may be further

extended to achieve a desired amount of outlet ducts, depending on the efficiency of the receiving device. For example, one mass chamber may be connected with several single layer chambers. Moreover, the single layer chamber together with the duct (or ducts) and the rotary element (or rotary elements) may form a module which may be connected to improve a previously constructed device. Moreover, when the single layer chamber has multiple outlets, some of the outlets may be blocked, so as to adapt the efficiency of the feeding device to the receiving efficiency of cooperating devices.

Claims

1. A feeding device for feeding spherical objects (3) for tobacco industry applications, comprising:

   - a mass chamber (2, 2') for storing a plurality of the spherical objects (3);
   - at least one single layer chamber (10, 10') located below the mass chamber (2, 2') and connected with the mass chamber (2, 2') such that the spherical objects (3) may flow from the mass chamber (2, 2') to the single layer chamber (10, 10'), wherein the single layer chamber (10, 10') comprises an outlet (15) having multiple outlet ducts (16) for outputting the spherical objects (3) to a receiving device;
   - at least one roller (17, 18) located next to the outlet duct (16), wherein a circumferential surface (17A, 18A) of the roller (17, 18) constitutes a wall of the outlet duct (16);
   - a cylindrical rotary element (9, 9') located below the mass chamber (2, 2') in an area of connection of the mass chamber (2, 2') and the single layer chamber (10, 10'), wherein a side surface (9A) of the cylindrical rotary element (9, 9') constitutes a wall for guiding the flow of the spherical objects (3) from the mass chamber (2, 2') to the single layer chamber (10, 10');

   characterized in that

   - the cylindrical rotary element (9, 9') is located tangentially to the wall (7B, 7B') of the bottom (7, 7') of the mass chamber (2, 2').

2. The device according to claim 1, wherein the cylindrical rotary element (9, 9') is located tangentially to the single layer chamber (10, 10').

3. The device according to any of the previous claims, wherein the single layer chamber (10, 10') is arranged vertically.

4. The device according to any of claims from 1 to 3, wherein two rollers (17, 18) are located at the outlet duct (16), wherein circumferential surfaces of the rollers (17, 18) are configured to rotate in opposite directions during operation of the device.

5. The device according to claim 4, wherein the circumferential surface (17A, 18A) of one roller (17, 18) constitutes a side wall of two neighboring outlet ducts (16, 16').

6. The device according to any of the previous claims, wherein during operation of the device, the cylindrical rotary element (9, 9') is configured to rotate in a direction in which its surface of contact with the spherical objects (3) moves in an opposite direction to the direction of flow of the spherical objects (3) from the mass chamber (2) to the single layer chamber (10).

7. The device according to any of claims from 1 to 5, wherein during operation of the device, the cylindrical rotary element (9, 9') is configured to rotate in a direction in which its surface of contact with the spherical objects (3) moves in the same direction as the direction of flow of the spherical objects (3) from the mass chamber (2) to the single layer chamber (10).

8. A method of feeding spherical objects in a tobacco industry machine, from a mass chamber (2, 2') to outlet ducts (16) through a single layer chamber (10, 10') located below the mass chamber (2, 2'), **characterized by** inducing the spherical objects (3) fed from the mass chamber (2, 2') to the single layer chamber (10, 10') to rotate by means of a cylindrical rotary element (9, 9') located below the mass chamber (2, 2') in the region of connection of the mass chamber (2, 2') and the single layer chamber (10, 10'), wherein the cylindrical rotary element (9, 9') is located tangentially to the wall (7B, 7B') of the bottom (7, 7') of the mass chamber (2, 2').

9. The method according to claim 8, comprising rotating the cylindrical rotary element (9, 9') in a direction in which its surface of contact with the spherical objects (3) moves in an opposite direction to the direction of flow of the spherical objects (3) from the mass chamber (2) to the single layer chamber (10, 10').

10. The method according to claim 8, comprising rotating the cylindrical rotary element (9, 9') in a direction in which its surface of contact with the spherical objects (3) moves in the same direction as the direction of flow of the spherical objects (3) from the mass chamber (2) to the single layer chamber (10, 10').

11. The method according to any of claims 8 to 10, comprising inducing the spherical objects (3) fed from the single layer chamber (10, 10') to the outlet ducts

(16) to rotate by means of the rollers (17, 18) located at the inlet of the outlet ducts (16), wherein the circumferential surfaces of the rollers (17, 18) move in opposite directions.

Patentansprüche

1. Zuführvorrichtung zum Zuführen von kugelförmigen Gegenständen (3) für Anwendungen in der Tabakindustrie, umfassend:

- eine Massenkammer (2, 2') zum Lagern einer Vielzahl der kugelförmigen Gegenständen (3);
- mindestens eine Einzelschichtkammer (10, 10'), die sich unterhalb der Massenkammer (2, 2') befindet und mit der Massenkammer (2, 2') so verbunden ist, dass die kugelförmigen Gegenstände (3) von der Massenkammer (2, 2') in die Einzelschichtkammer (10, 10') strömen können, wobei die Einzelschichtkammer (10, 10') einen Auslass (15) mit mehreren Auslasskanälen (16) zum Ausgeben der kugelförmigen Gegenstände (3) in eine Aufnahmevorrichtung umfasst;
- mindestens eine Rolle (17, 18), die sich neben dem Auslasskanal (16) befindet, wobei eine Umfangsfläche (17A, 18A) der Rolle (17, 18) eine Wand des Auslasskanals (16) bildet;
- ein zylindrisches Rotationselement (9, 9'), das sich unterhalb der Massenkammer (2, 2') in einem Verbindungsbereich der Massenkammer (2, 2') und der Einzelschichtkammer (10, 10') befindet, wobei eine Seitenfläche (9A) des zylindrischen Rotationselements (9, 9') eine Wand zum Leiten des Stroms der kugelförmigen Gegenstände (3) von der Massenkammer (2, 2') in die Einzelschichtkammer (10, 10') bildet;

dadurch gekennzeichnet, dass

- sich das zylindrische Rotationselement (9, 9') tangential zu der Wand (7B, 7B') des Bodens (7, 7') der Massenkammer (2, 2') befindet.

2. Vorrichtung nach Anspruch 1, wobei sich das zylindrische Rotationselement (9, 9') tangential zu der Einzelschichtkammer (10, 10') befindet.

3. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Einzelschichtkammer (10, 10') vertikal angeordnet ist.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, wobei sich zwei Rollen (17, 18) am Auslasskanal (16) befinden, wobei Umfangsflächen der Rollen (17, 18) dazu konfiguriert sind, während des Betriebs der Vorrichtung gegenläufig zu rotieren.

5. Vorrichtung nach Anspruch 4, wobei die Umfangsfläche (17A, 18A) einer Rolle (17, 18) eine Seitenwand von zwei benachbarten Auslasskanälen (16, 16') bildet.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei während des Betriebs der Vorrichtung das zylindrische Rotationselement (9, 9') dazu konfiguriert ist, in einer Richtung zu rotieren, in der sich seine Kontaktfläche mit den kugelförmigen Gegenständen (3) in einer gegenläufigen Richtung zu der Strömungsrichtung der kugelförmigen Gegenstände (3) von der Massenkammer (2) in die Einzelschichtkammer (10) bewegt.

7. Vorrichtung nach einem der Ansprüche 1 bis 5, wobei während des Betriebs der Vorrichtung das zylindrische Rotationselement (9, 9') dazu konfiguriert ist, in einer Richtung zu rotieren, in der sich seine Kontaktfläche mit den kugelförmigen Gegenständen (3) in der gleichen Richtung wie die Strömungsrichtung der kugelförmigen Gegenstände (3) von der Massenkammer (2) in die Einzelschichtkammer (10) bewegt.

8. Verfahren zum Zuführen von kugelförmigen Gegenständen in einer Maschine der Tabakindustrie, von einer Massenkammer (2, 2') zu Auslasskanälen (16) durch eine Einzelschichtkammer (10, 10'), die sich unterhalb der Massenkammer (2, 2') befindet, **gekennzeichnet durch** das Bewirken, dass die aus der Massenkammer (2, 2') in die Einzelschichtkammer (10, 10') zugeführten kugelförmigen Gegenstände (3) mittels eines sich unterhalb der Massenkammer (2, 2') in dem Verbindungsbereich der Massenkammer (2, 2') und der Einzelschichtkammer (10, 10') befindlichen zylindrischen Rotationselements (9, 9') rotieren, wobei sich das zylindrische Rotationselement (9, 9') tangential zur Wand (7B, 7B') des Bodens (7, 7') der Massenkammer (2, 2') befindet.

9. Verfahren nach Anspruch 8, umfassend das Rotieren des zylindrischen Rotationselements (9, 9') in einer Richtung, in der sich seine Kontaktfläche mit den kugelförmigen Gegenständen (3) in einer gegenläufigen Richtung zu der Strömungsrichtung der kugelförmigen Gegenstände (3) von der Massenkammer (2) in die Einzelschichtkammer (10, 10') bewegt.

10. Verfahren nach Anspruch 8, umfassend das Rotieren des zylindrischen Rotationselements (9, 9') in einer Richtung, in der sich seine Kontaktfläche mit den kugelförmigen Gegenständen (3) in der gleichen Richtung wie die Strömungsrichtung der kugelförmigen Gegenstände (3) von der Massenkammer (2) in die Einzelschichtkammer (10, 10') bewegt.

11. Verfahren nach einem der Ansprüche 8 bis 10, umfassend das Bewirken, dass die von der Einzelschichtkammer (10, 10') zu den Auslasskanälen (16) zugeführten kugelförmigen Gegenstände (3) mittels der Rollen (17, 18) rotieren, die sich am Eingang der Ausgangskanäle (16) befinden, wobei sich die Umfangsflächen der Rollen (17, 18) gegenläufig bewegen.

Revendications

1. Dispositif d'introduction destiné à introduire des objets sphériques (3) pour des applications de l'industrie du tabac, comprenant :

- une chambre de stockage en masse (2, 2') destinée à stocker une pluralité d'objets sphériques (3) ;
- au moins une chambre de stockage en couche simple (10, 10') située sous la chambre de stockage en masse (2, 2') et raccordée à la chambre de stockage en masse (2, 2') de sorte que les objets sphériques (3) puissent s'écouler à partir de la chambre de stockage en masse (2, 2') jusqu'à la chambre de stockage en couche simple (10, 10'), ladite chambre de stockage en couche simple (10, 10') comprenant une sortie (15) possédant de multiples conduits de sortie (16) pour délivrer en sortie les objets sphériques (3) à un dispositif de réception ;
- au moins un rouleau (17, 18) situé à côté du conduit de sortie (16), une surface circonférentielle (17A, 18A) du rouleau (17, 18) constituant une paroi du conduit de sortie (16) ;
- un élément rotatif cylindrique (9, 9') situé sous la chambre de stockage en masse (2, 2') dans une zone de raccordement de la chambre de stockage en masse (2, 2') et de la chambre de stockage en couche simple (10, 10'), une surface latérale (9A) de l'élément rotatif cylindrique (9, 9') constituant une paroi destinée à guider le flux des objets sphériques (3) de la chambre de stockage en masse (2, 2') vers la chambre de stockage en couche simple (10, 10') ; **caractérisé en ce que**
- l'élément rotatif cylindrique (9, 9') est situé tangentiellement à la paroi (7B, 7B') du fond (7, 7') de la chambre de stockage en masse (2, 2').

2. Dispositif selon la revendication 1, ledit élément rotatif cylindrique (9, 9') étant situé tangentiellement à la chambre de stockage en couche simple (10, 10').

3. Dispositif selon l'une quelconque des revendications précédentes, ladite chambre de stockage en couche simple (10, 10') étant agencée verticalement.

4. Dispositif selon l'une quelconque des revendications 1 à 3, deux rouleaux (17, 18) étant situés au niveau du conduit de sortie (16), lesdites surfaces circonférentielles des rouleaux (17, 18) étant conçues pour tourner dans des sens opposés durant le fonctionnement du dispositif.

5. Dispositif selon la revendication 4, ladite surface circonférentielle (17A, 18A) d'un rouleau (17, 18) constituant une paroi latérale de deux conduits de sortie voisins (16, 16').

6. Dispositif selon l'une quelconque des revendications précédentes, durant le fonctionnement du dispositif, ledit élément rotatif cylindrique (9, 9') étant conçu pour tourner dans un sens dans lequel sa surface de contact avec les objets sphériques (3) se déplace dans un sens opposé au sens d'écoulement des objets sphériques (3) de la chambre de stockage en masse (2) à la chambre de stockage en couche simple (10).

7. Dispositif selon l'une quelconque des revendications 1 à 5, durant le fonctionnement du dispositif, ledit élément rotatif cylindrique (9, 9') étant conçu pour tourner dans un sens dans lequel sa surface de contact avec les objets sphériques (3) se déplace dans le même sens que le sens d'écoulement des objets sphériques (3) de la chambre de stockage en masse (2) à la chambre de stockage en couche simple (10).

8. Procédé d'introduction d'objets sphériques dans une machine de l'industrie du tabac, à partir d'une chambre de stockage en masse (2, 2') vers des conduits de sortie (16) à travers une chambre de stockage en couche simple (10, 10') située sous la chambre de stockage en masse (2, 2'), **caractérisé par** l'entraînement des objets sphériques (3) introduits à partir de la chambre de stockage en masse (2, 2') vers la chambre de stockage en couche simple (10, 10') à tourner au moyen d'un élément rotatif cylindrique (9, 9') situé sous la chambre de stockage en masse (2, 2') dans la zone de raccordement de la chambre de stockage en masse (2, 2') et de la chambre de stockage en couche simple (10, 10'), ledit élément rotatif cylindrique (9, 9') étant situé tangentiellement à la paroi (7B, 7B') du fond (7, 7') de la chambre de stockage en masse (2, 2').

9. Procédé selon la revendication 8, comprenant la rotation de l'élément rotatif cylindrique (9, 9') dans un sens dans lequel sa surface de contact avec les objets sphériques (3) se déplace dans un sens opposé au sens d'écoulement des objets sphériques (3) à partir de la chambre de stockage en masse (2) vers la chambre de stockage en couche simple (10, 10').

10. Procédé selon la revendication 8, comprenant la ro-

tation de l'élément rotatif cylindrique (9, 9') dans un sens dans lequel sa surface de contact avec les objets sphériques (3) se déplace dans le même sens que le sens d'écoulement des objets sphériques (3) à partir de la chambre de stockage en masse (2) vers la chambre de stockage en couche simple (10, 10').

11. Procédé selon l'une quelconque des revendications 8 à 10, comprenant l'entraînement des objets sphériques (3) introduits à partir de la chambre de stockage en couche simple (10, 10') dans les conduits de sortie (16) à tourner au moyen des rouleaux (17, 18) situés au niveau de l'entrée des conduits de sortie (16), lesdites surfaces circonférentielles des rouleaux (17, 18) se déplaçant dans des sens opposés.

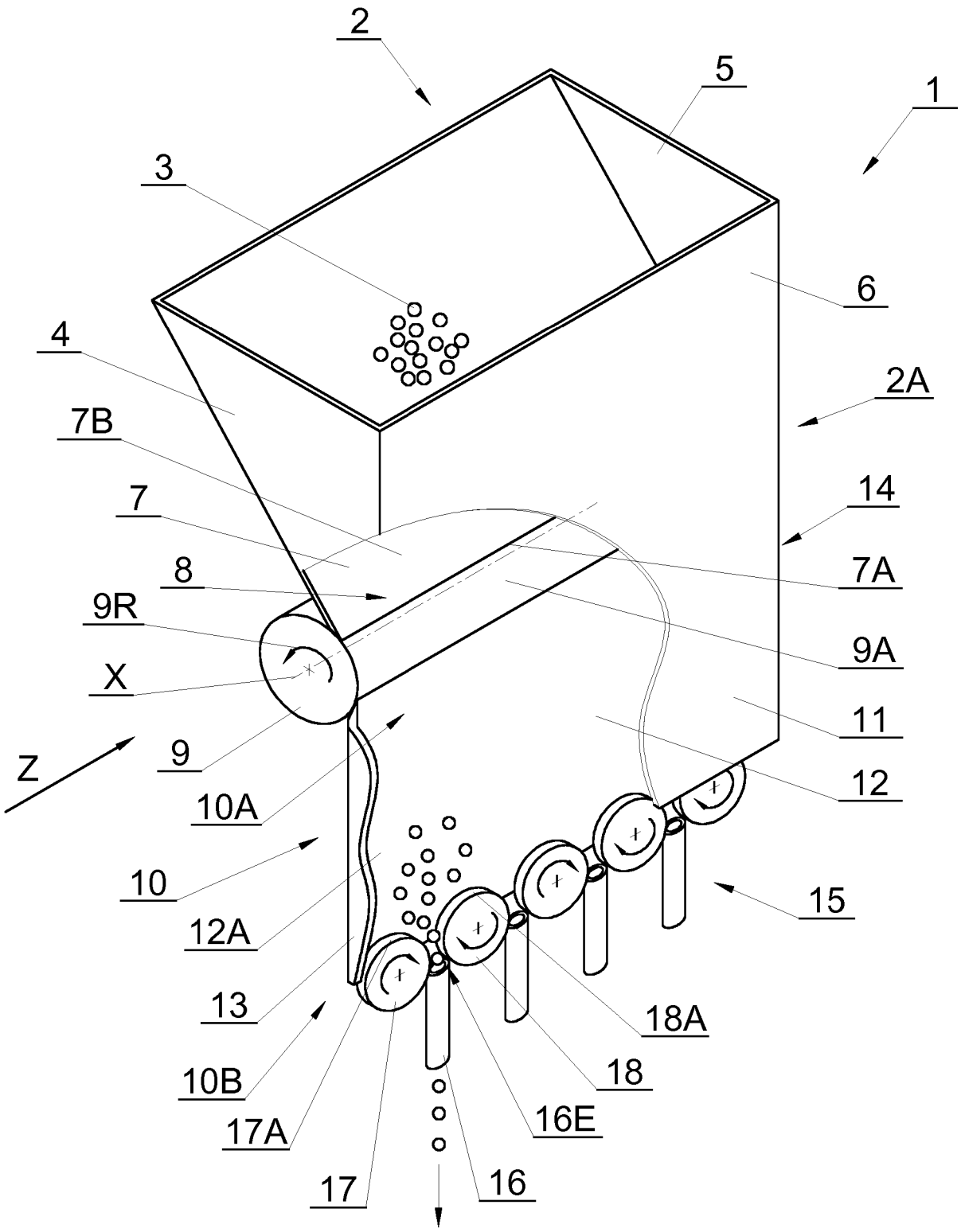
2
5
1
3
6
4
2A
7B
14
7
7A
8
9R
9A
X
11
Z
9
12
10A
10
15
12A
13
18A
10B
18
17A
16E
17
16

Fig. 1

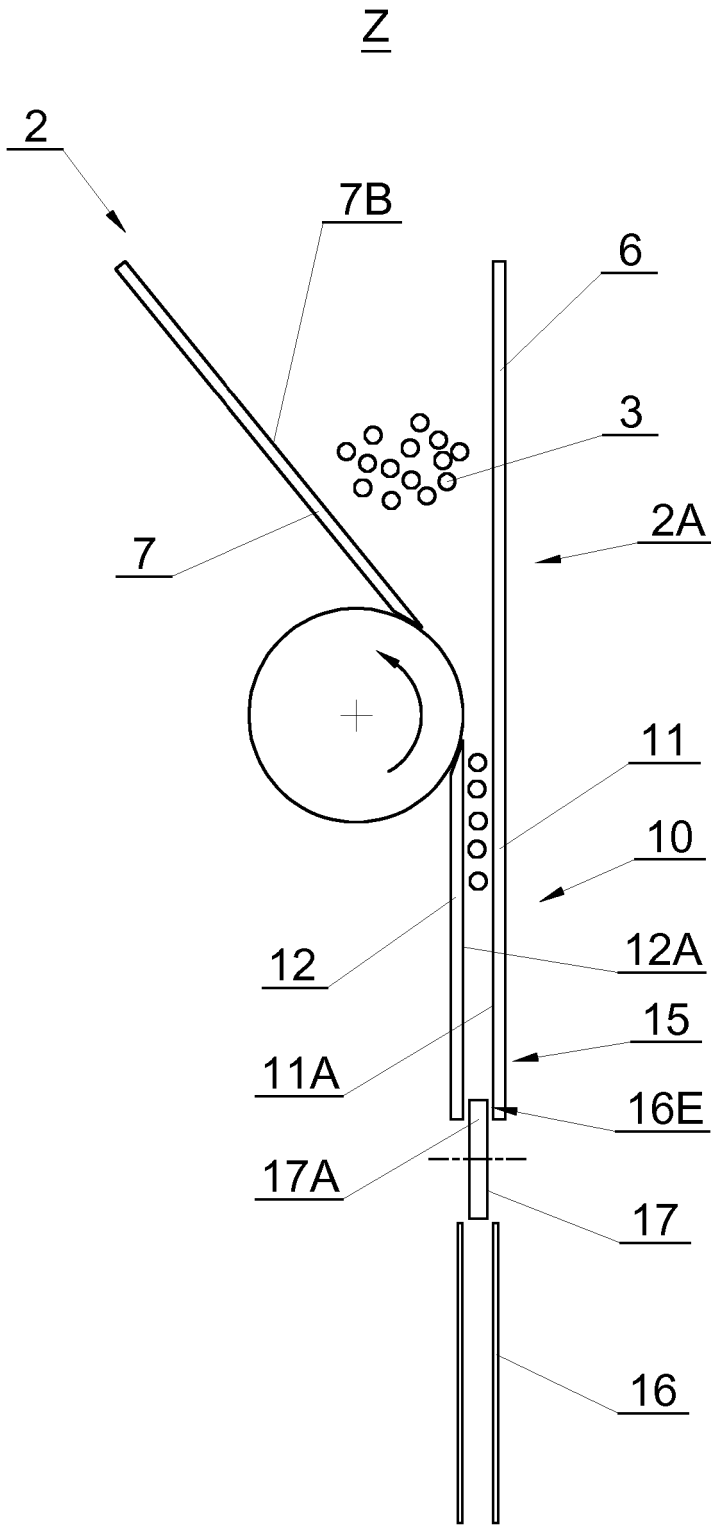

Fig. 2

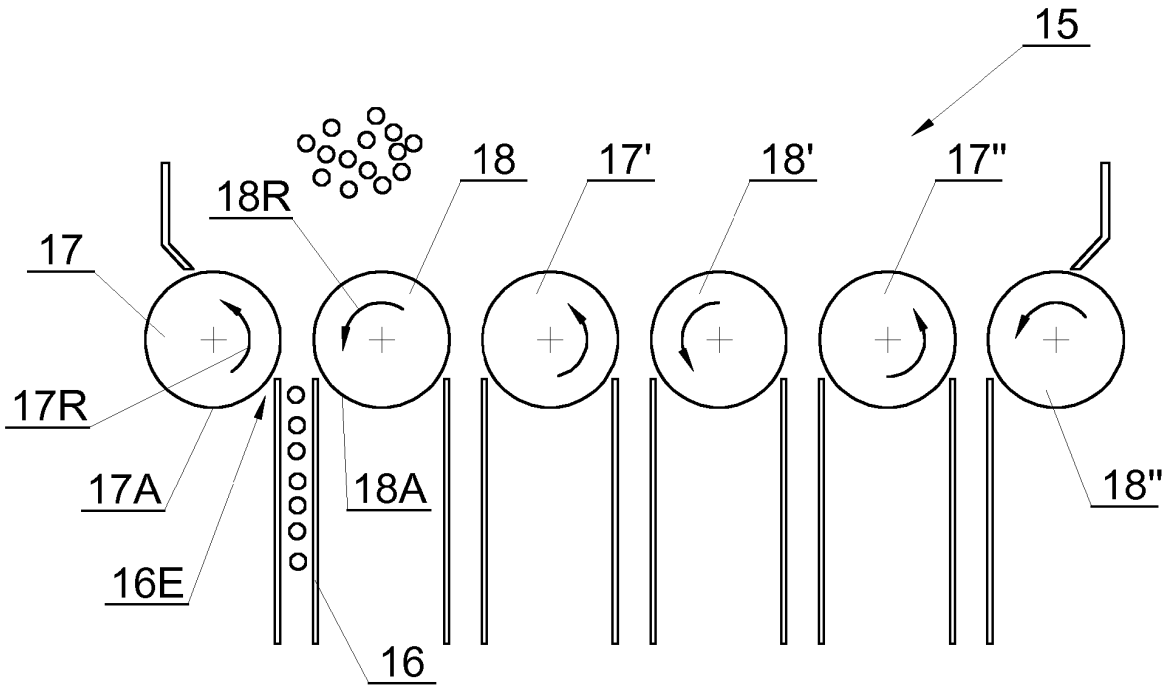

Fig. 3

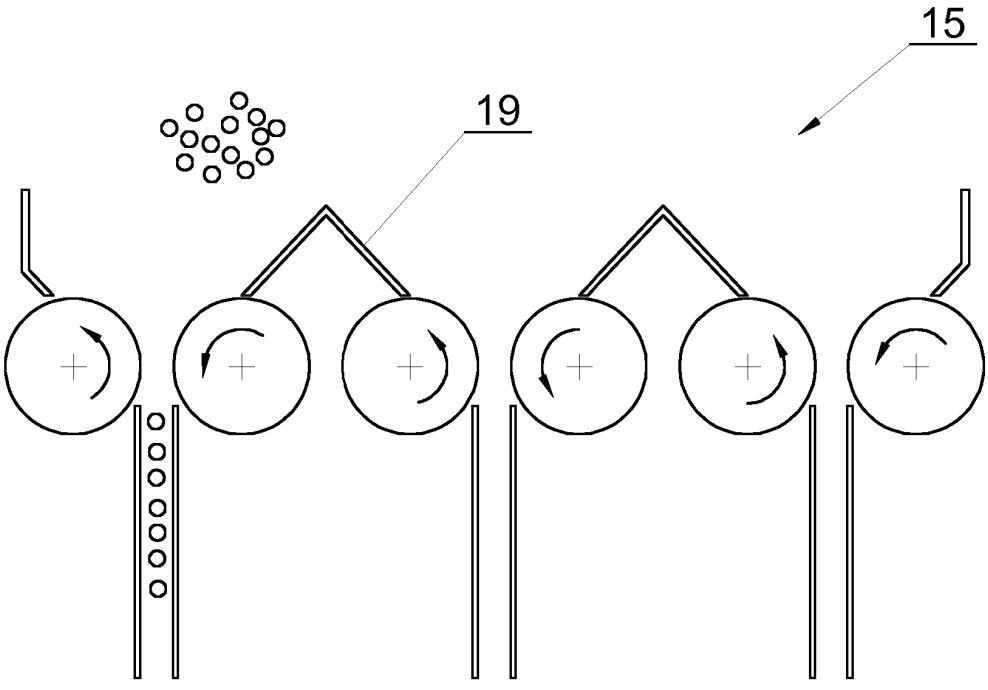

Fig. 4

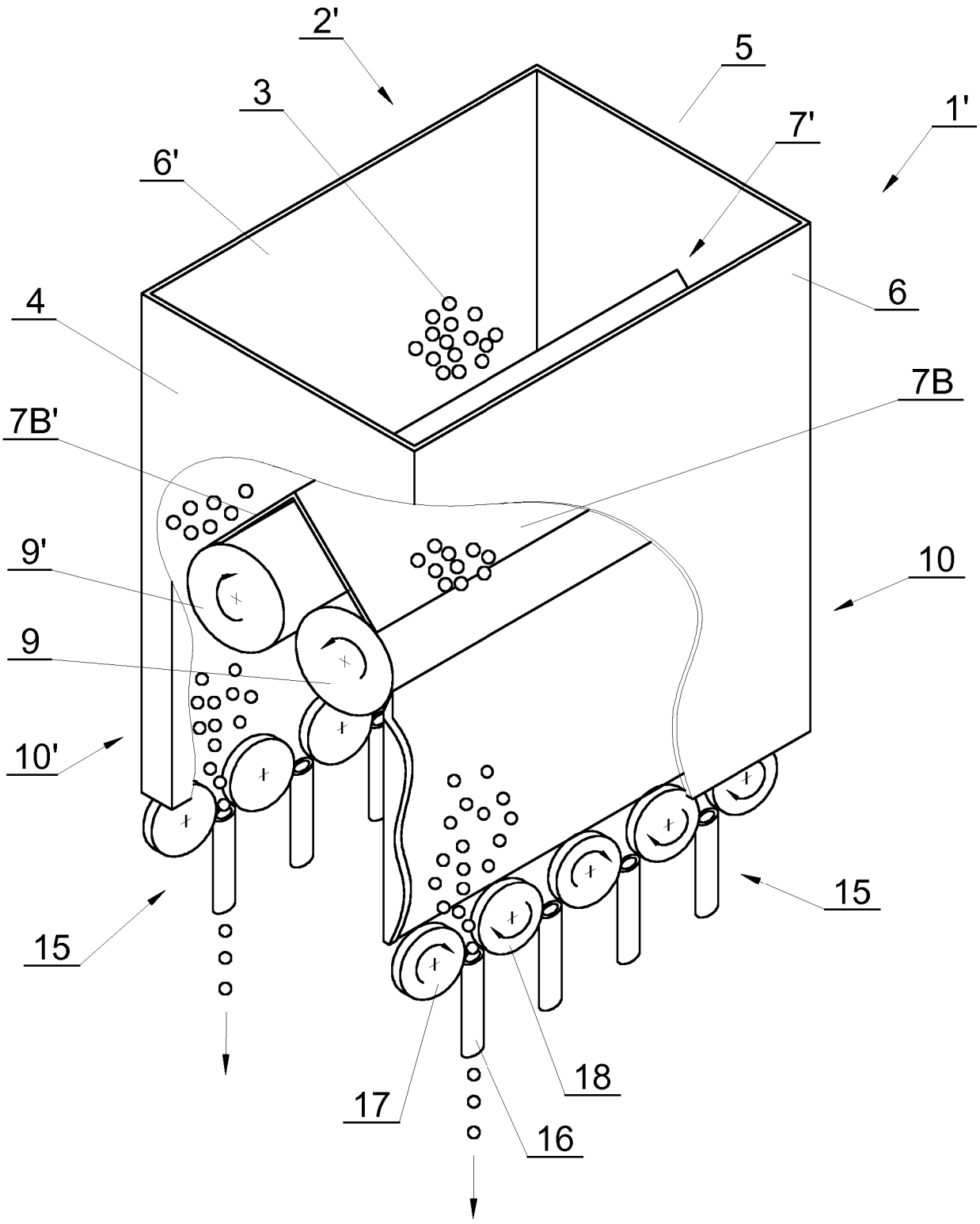

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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