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(54) **A DEVICE FOR FILING CONTAINERS WITH TOBACCO MATERIAL AND A METHOD FOR FILING
A CONTAINER WITH TOBACCO MATERIAL**

VORRICHTUNG ZUM VERPACKEN VON TABAKMATERIAL IN BEHÄLTERN UND VERFAHREN
ZUM VERPACKEN VON TABAKMATERIAL IN EINEM BEHÄLTER

DISPOSITIF POUR EMBALLER UN MATÉRIAU DE TYPE TABAC DANS DES CONTENANTS ET
PROCÉDÉ PERMETTANT D'EMBALLER UN MATÉRIAU DE TYPE TABAC DANS UN RÉCIPIENT

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(56) References cited:
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Description

[0001] The present invention relates to a device for packing tobacco material into containers and a method of packing tobacco material into a container.

[0002] In the tobacco industry, there is a need for packing a tobacco cut filler material into containers, which are then stored or transported. Containers for the tobacco cut filler may have a form of rectangular wooden or cardboard boxes. The tobacco cut filler is basically a material having a fibrous consistency, i.e. it has a low bulk density, and contains air in its volume. In order to increase the amount of the cut filler packed in the container, the cut filler may be concentrated by eliminating the air from its volume.

[0003] A common practice is to compress the cut filler with mechanical or hydraulic presses by pressing the cut filler with a piston. The cut filler can be also packed into tight plastic bags, from which air is drawn out.

[0004] A standard solution known from the prior art is to compress the cut filler with mechanical or hydraulic press having a vertically arranged piston, i.e. to compress in a direction from the top to the bottom in an inlet part of a chute to a container. A disadvantage of this solution is the degradation of the cut filler, caused by pressure of the piston which presses the cut filler in the filling channel and the container. Moreover, the cut filler compressed this way has a non-uniform density within the volume of the container. For example, portions of the cut filler which are located at the bottom of the container are less exposed to pressure and degradation caused by the piston, than portions located in the upper part. The cut filler compressed this way is difficult to be removed from the container, and after removing it for further processing, it often stays agglomerated.

[0005] Devices and methods for compressing the tobacco cut filler are described and known i.a. from the US patent US3641734. It relates to various problems concerning construction of devices and methods for packing and compressing a tobacco cut filler. In order to avoid excessive degradation of the cut filler, a single portion of the cut filler is pressed by the press piston only once. Therefore the amount of the cut filler which can be compressed in one container is limited to the volume of the filling channel of the device. Moreover, while the device operates, mainly during packing the container and compression of the cut filler, some tobacco dust and particles may be released to the environment from the tobacco cut filler. To restrain or eliminate this effect, the process of compression should be carried out in a possibly tight manner, such as not to allow the dust to leave the device. Elimination of subsidence or escape of the cut filler facilitates unification of the weight accuracy of the filling and compressing process.

[0006] The PCT application WO8404286 discloses a device for compressing tobacco cut filler with use of a piston operating in the up-and-down direction in a filling channel. The lower part of the filling channel of this de-

vice, which is placed inside a container, has double walls, wherein the inner wall is perforated in order to enable drawing air out of the container while compression of the cut filler. Such construction does not provide sufficient and uniform extraction of air from the cut filler in the container.

[0007] A patent application DE2848505 discloses a machine for filling voluminous powdery material from a storage hopper into packing containers, particularly plastics sacks, of dustproof flexible material. The inlet of a filler pipe is connected to the hopper, the pipe containing an air-permeable piston movable between the inlet and discharge positions and being of external cross-section approximately equal to the internal cross-section of the packing container.

[0008] The aim of the invention is to provide a method and a device for packing tobacco material into containers, where the disadvantages of the similar methods and devices known from the prior art will be eliminated.

[0009] The aim of the invention is to provide a method and a device for packing tobacco material into containers, which will not excessively degrade tobacco material, and wherein the material packed with the provided method and device will be easy to be removed from the containers and will be have a low degree of agglomeration.

[0010] The object of the invention is a device and a method for packing tobacco material into containers in tobacco industry, as defined in the accompanying claims.

[0011] The object of the invention is presented in details by means of preferable embodiments on the drawing, wherein:

- Fig. 1 shows the device according to the invention in the first embodiment in a cross-sectional view.
- Fig. 2 shows the device according to the invention in the second embodiment in a cross-sectional view.
- Fig. 3 shows the principle of drawing air out of the container by a piston.
- Fig. 4a shows the device for packing tobacco cut filler into containers, during the transportation of empty container under the filling channel.
- Fig. 4b shows the device for packing tobacco cut filler into containers, during providing the cut filler to the filling channel and the container.
- Fig. 4c shows the device for packing tobacco cut filler into containers during drawing air out of the container.
- Fig. 4d shows the device for packing tobacco cut filler into containers after the end of the process of packing.
- Fig. 5 shows the device for packing tobacco cut filler into containers, having a sealing chamber during the phase of drawing air out of the container.
- Fig. 6 shows the second embodiment of the device for packing tobacco cut filler into containers

having a sealing chamber, during transportation of empty container to the sealing chamber.

Fig. 6a shows the second embodiment the device for packing tobacco cut filler into containers having the sealing chamber, in the phase of drawing air out of the container and the sealing chamber.

Fig. 7 shows the steps of an exemplary method of packing tobacco material into container.

[0012] Fig. 1 shows a piston 1A of the device for packing containers in a first embodiment in a front cross-sectional view. The piston 1A has a form of a plate 3 with bottom surface 2 extraction openings 4A. The bottom surface 2 refers herein to any surface located at the bottom of the piston 1A. The openings 4A are distributed on the whole surface of the plate 3, and their diameter is designed such that the speed of the extracted air is lower than the speed of entrainment of the material. The openings 4A may be distributed regularly, for example in an orthogonal arrangement, or irregularly. The group of materials, which can be concentrated by the use of such device, includes for example tobacco cut filler, tobacco leaves, tobacco veins, fibrous materials and other loose materials which can be concentrated. The extracted air flows through the openings 4A in the plate 3 to the chamber 5 of the piston 1A, next to the extraction channel 6 of the piston 1A, which is connected to filtration devices and to a pump (not shown on the drawing).

[0013] Fig. 2 shows a piston 1B of the device for filling the containers in a second embodiment in a front cross-sectional view. In the plate 3 there are three openings 4B having a surface larger than single elements of the material being concentrated. Inside the openings 4B there can be mounted filtering elements 7, for example a mesh with openings having a surface smaller than the surface of the elements of the material to be concentrated. The filtering element 7 prevents the concentrated material from being drawn out to the chamber of the piston 5 and to the extraction channel 6.

[0014] Fig. 3 shows the piston 1B inserted inside the filling channel 8. The bottom part of the piston 1B is inserted into the container 9 for the concentrated material. A plastic bag 16 is placed inside the container 9, which provides tightness of the container 9 and protects the material against contamination. In this embodiment, the filling channel 8 has channel sealing elements 10, which cooperate with the upper edge of the container 9 such as to seal the clearance between the wall of the filling channel 8 and the upper edge of the container 9. The sealing elements of the channel 10 provide tightness of the system and more effective extraction of air trapped between the fibers of the concentrated material inside the container 9. The channel sealing elements 10 may have a form of a collar overlapping the edges of the container 9, or a sealing which is pressed to the upper edge of the container 9. Sealing of the system between the

piston 1B and the filling channel 8 can be provided by sealing solutions known from the state of the art, which are not presented on the drawing. Due to the applied sealing, the air is drawn out of the entire space occupied by the tobacco material. Drawing of air out of the container 9 (depicted with arrows) in such a system provides accurate and uniform concentration of material, as compared to traditional presses that simultaneously compress and degrade the concentrated material. The piston 1B descends by the force of gravity under its own weight and the force resulting from the difference in pressures acting on it. The descent of the piston 1B inside the filling channel 8 is continued until the air is drawn out of the container with the material and the desired level of concentration is achieved. The air is drawn out in a direction opposite to the direction of descent of the piston 1B.

[0015] The process of packing the material is presented schematically in the following phases of packing the container in Fig. 4a, 4b, 4c, 4d.

[0016] In the phase of transportation of the container, as shown in Fig. 4a, an empty container 9, in which a plastic bag can be located (not shown on the drawing), is delivered by conveyors 11 to the position of filling of the tobacco material 12, where the filling channel 8 is lowered in the container 9 and its lower part is placed inside the container 9, below the upper edge of the container 9 (a typical drive unit for the filling channel 8 is not shown). After achieving the operating position in the filling channel 8, the channel sealing element 10 located in the lower part of the filling channel 8 is pressed to the upper edge of the container 9, to provide the desired tightness of the system.

[0017] Next, as shown in Fig. 4b, the tobacco material 12 located on the conveyor 13, for example a belt conveyor, is poured to the filling channel 8. After pouring an adequate amount of the tobacco material 12 to the filling channel 8, the piston 1 is lowered to the filling channel 8 by means of typical drive units known from the state of the art, not shown on the drawing.

[0018] During the filling of the container 9, piston 1 descends. The packing of the container 9 and the corresponding concentration of the material is achieved by decreasing the volume through extraction of the air from the concentrated material. In other words, the force exerted by the piston 1 on the material is intended mainly to move the material downwards, and not to compress it. While descending, the piston 1 lowers the upper surface of the space occupied by the material. The piston descends on the concentrated material only due to its own weight and due to forces resulting from the difference of pressures. In addition, the weight of the piston may be balanced by a counterweight and by the friction between the piston and the filling channel 8, so that the pressing force exerted by the piston on the concentrated material is smaller than the deadweight of the piston. Moreover, the pressing force that impacts the concentrated material may be minimized by applying a servo system to control the position of the piston with respect to the concentrated

material while the tobacco material is concentrated in the filling channel and the container, such that the piston follows the upper layer of the material to decrease the volume of the material in order to maximally draw air out of the material. To execute the process, it is enough for the weight of the piston (or its weight minus the counterweight) to be greater than the friction force between piston 1 and the internal walls of the filling channel 8.

[0019] The maximum level MAX of the material poured into the filling channel 8 (as shown in Fig. 4b) depends on a plurality of factors, such as the type of the concentrated material, the humidity of material, the volume of the container, the dimensions of the filling channel, the negative pressure force, the pressing force of piston on the concentrated material. During the gravitational descent of the piston 1, the air trapped between the fibers of the concentrated material 12 is drawn out. Drawing air out allows to decrease the volume of the tobacco material 12 located in the filling channel 8 and in the container 9 by descending the piston 1, which overcomes the forces of elasticity of the fibers of the concentrated tobacco material 12 until the moment of reaching the maximal desired degree of air drawn out. In the Fig. 4c minimal space occupied by concentrated tobacco material 12 is marked by the level MIN positioned below the upper edge of the container 9. During that process, air is drawn out, in a way described above, to the device 14 generating negative pressure.

[0020] Next, as shown in Fig. 4d, the piston 1 and the filling channel 8 are retracted to the starting position by means of typical drive units known from the state of the art, and the container 9 with the concentrated tobacco material 12 is transported by the conveyor 11 to a final position or is taken out from the station by an operator.

[0021] During the extraction of air from the concentrated material, the container 9 may be located in the sealing chamber 15, as shown in Fig. 5. The sealing chamber 15 may be sealed with respect to the filling channel 8 and/or the conveyor 11. The air is extracted both by the piston 1 and by the air extracting channels: a lateral air extracting channel 6a and a bottom channel 6b, from the sealing chamber 15. As a result, there is negative pressure acting on the container 9 placed inside the sealing chamber 15. If the negative pressure force is equal to the force of extraction of air from the material concentrated by a piston 1, then the negative pressure applied to the concentrated material is equalized on all sides, therefore the tobacco material 12 is concentrated in a uniform manner. Moreover, the amount of the concentrated material drawn out in the direction of piston is reduced. The lateral extraction channel 6a is connected to the side wall of the sealing chamber 15, thereby the negative pressure acts on the side walls of the container 9, while the bottom extraction channel 6b is connected to the bottom of the sealing chamber 15, thereby the negative pressure acts on the bottom of the container 9. The second end of the extraction channels 6, 6a, 6b is connected to the negative pressure generating device 14,

which also preferably filters fine particles of material input via the openings 4.

[0022] Fig. 6 and Fig. 6a show a process of packing the tobacco material 12 into the container 9 with the use of sealing chamber 15a. The sealing chamber 15a is lowered together with the filling channel 8 on the container located on the conveyor 11a. The conveyor 11a may be made of rubber, silicone, elastic plastic or other elastic materials. In the region of contact of the bottom edge 20 of the sealing chamber 15a with the conveyor 11a, sealing means 21 are applied to provide tightness of the system. The tobacco material 12 is transported to the filling channel 8 from the feeder 13 and next, the piston 1 is lowered downwards by means of the drive unit 17. While descending, air is drawn out from the tobacco material 12 through the piston 1, the extraction channel 6 and the extraction channel 6a from the sealing chamber 15a.

[0023] It can be also considered (outside the scope of the present invention) that the speed of descending of piston 1 might be controlled by control means 18, which receive signals from sensors 19, positioned in the filling channel 8. The sensors 19 might control the height of the filling channel 8 with the tobacco material 12, and the level of descent of the piston 1. The control means 18, responsively to the signals received from sensors 19, might increase or decrease the speed of descent of the piston 1. This might allow to eliminate uncontrolled pressure exerted on the material.

[0024] The piston 1 may be kept in contact with the tobacco material 12 or may follow the material. After achieving the required level of concentration of the tobacco material 12, the device 14 generating negative pressure is turned off, and the piston 1 is retracted up from the filling channel 8 by means of the drive unit 17. Next, the sealing chamber 15a and filling channel 8 are also retracted up by mechanical means, not shown on the drawing. After the end of the process of filling, the container 9 is closed and passed for further processing.

[0025] Preferably, the pressing force of the piston on the tobacco material is not higher than 1500N, preferably not higher than 1100N. Thereby, the degree of degradation of the tobacco material is minimized, and the pressing force is high enough to overcome the resistant forces resulting from the friction between the piston and the filling channel and the internal resistances occurring between the fibers of the material.

[0026] Fig. 7 shows the steps of exemplary method of packing tobacco material into the container 9. First, in step 100, the container 9 is placed on the packing station under the filling channel 8. Preferably, the container 9 is placed inside the sealing chamber 15, 15a to which the negative pressure is applied. Preferably, the plastic bag 16 is placed inside the container 9. Next, the tobacco material 12 is fed in step 101 to the filling channel 8. In the next step 102, the piston 1, 1a, 1b is inserted into the filling channel 8 and the piston 1, 1a, 1b is moved in step 103 towards the upper surface of the tobacco material 12 accumulated in the channel 8. Next, in step 104 neg-

ative pressure is applied to the extraction channel 6 connected to at least one extraction opening 4a, 4b in the bottom surface 2 of the piston 1, 1a, 1b. Subsequently, the piston 1, 1a, 1b is descended in step 105 to the filling channel 8, thus lowering the upper limit of the space occupied by the tobacco material 12 during the descent of the piston 1, 1a, 1b. After the container 9 is filled, negative pressure is turned off in step 106 and the piston 1, 1a, 1b is moved upwards in step 107. At the end, the container 9 is closed in step 108.

List of elements

[0027]

1, 1a, 1b	- piston	5
2	- bottom surface	10
3	- plate	15
4a, 4b	- openings	20
5	- piston chamber	25
6, 6a, 6b	- extraction channel	30
7	- filtering element	35
8	- filling channel	40
9	- container	45
10	- channel sealing element	50
11, 11a	- conveyor	55
12	- tobacco material	
13	- feeder	
14	- negative pressure generating device	
15, 15a	- sealing chamber	
16	- plastic bag	
17	- drive unit	
18	- control means	
19	- sensors	
20	- bottom edge	
21	- sealing means	

Claims

1. A device for packing tobacco material (12) into containers (9) in tobacco industry, comprising:
 - a feeder (13) for feeding the tobacco material (12);
 - a filling channel (8) for accumulating the fed tobacco material (12) and for directing tobacco material (12) to a container (9);
 - a negative pressure generating device (14);
 - a piston (1, 1a, 1b), movable in an up-and-down direction inside the filling channel (8), for lowering the upper limit of the space occupied by the tobacco material (12) present inside the container (9) during the descent of the piston (1, 1a, 1b);
 - whereas the piston (1, 1a, 1b) has in its bottom surface (2) at least one extraction opening (4a, 4b) connected to at least one extraction channel (6) for drawing air out of the tobacco material (12) by the negative pressure generating device (14);

characterized in that

- once in contact with the upper surface of the tobacco material the piston (1, 1a, 1b) is adapted to move downwards inside the filling channel (8) only under the force of gravity resulting from its own weight and the force resulting from the difference of pressures acting on the piston (1, 1a, 1b).
2. The device according to claim 1 **characterized in that** the extraction channel (6) of the piston (1, 1a, 1b) is configured to draw out air in a direction opposite to the direction of the descent of the piston.
3. The device according to claim 1 **characterized in that** the shape of the cross-section of the piston (1, 1a, 1b) corresponds substantially to the shape of the cross-section of the filling channel (8).
4. The device according to claim 1 **characterized in that** the shape of the cross-section of the channel (8) corresponds substantially to the shape of the surface defined by the upper edges of container (9).
5. The device according to claim 1 **characterized in that** it comprises a sealing chamber (15, 15a) for the container (9), connected to the negative pressure generating device.
6. The device according to claim 5 **characterized in that** the negative pressure inside the sealing chamber (15, 15a) acts on the walls of the container (9).
7. The device according to claim 5 **characterized in**

that the negative pressure inside the sealing chamber (15, 15a) acts on the bottom of the container (9).

8. The device according to claim 6 or 7 **characterized in that** the negative pressure acting on the walls or/and on the bottom of container (9) is equal to the negative pressure acting on the tobacco material (12) through the piston (1, 1a, 1b).

9. The device according to any previous claims **characterized in that** the pressing force of the piston (1, 1a, 1b) on the tobacco material (12) is not higher than 1500N, preferably not higher than 1100N.

10. The device according to claim 1 **characterized in that** the filling channel (8) comprises sensors (19) for controlling the level at which the filling channel (8) is filled by the tobacco material (12).

11. A method for packing tobacco material (12) into a container (9) in tobacco industry, comprising the steps of:

- placing (100) the container (9) in a packing station under a filling channel (8);
- feeding (101) the tobacco material (12) to the filling channel (8);
- inserting (102) a piston (1, 1a, 1b) into the filling channel (8) and moving (103) the piston (1, 1a, 1b) towards the upper surface of the tobacco material (12) accumulated in the channel (8);
- supplying (104) negative pressure to an extraction channel (6) connected to at least one extraction opening (4a, 4b) in a bottom surface (2) of the piston (1, 1a, 1b);
- lowering (105) the piston (1, 1a, 1b) in the filling channel (8), thereby lowering the upper limit of the space occupied by the tobacco material (12) during the descent of the piston (1, 1a, 1b);
- turning off (106) the negative pressure after the container is filled (9);
- moving up (107) the piston (1, 1a, 1b);
- closing (108) the container (9);

characterized by

- lowering (105) the piston (1, 1a, 1b) in the filling channel (8), once the piston (1, 1a, 1b) is in contact with the upper surface of the tobacco material, only under the force of gravity resulting from its own weight and the force resulting from the difference of pressures acting on the piston (1, 1a, 1b).

12. The method according to claim 11, **characterized by** further placing the container (9) in a sealing chamber (15, 15a) to which the negative pressure is supplied.

13. The method according to claim 11, **characterized by** placing a plastic bag (16) inside the container (9).

5 Patentansprüche

1. Vorrichtung zum Verfüllen von Tabakmaterial (12) in Behälter (9) in der Tabakindustrie, umfassend:

- eine Zufuhreinrichtung (13) für die Zufuhr des Tabakmaterials (12);
- einen Füllkanal (8) zum Akkumulieren des zugeführten Tabakmaterials (12) und zum Leiten des Tabakmaterials (12) zu einem Behälter (9);
- eine Unterdruckerzeugungsvorrichtung (14);
- einen Kolben (1, 1a, 1b), der in dem Füllkanal (8) aufwärts und abwärts beweglich ist, um während der Senkbewegung des Kolbens (1, 1a, 1b) die Obergrenze des Raums zu senken, den das in dem Behälter (9) vorhandene Tabakmaterial (12) einnimmt;
- wobei der Kolben (1, 1a, 1b) in dessen Unterseite (2) wenigstens eine Absaugöffnung (4a, 4b) aufweist, die mit wenigstens einem Absaugkanal (6) verbunden ist, um durch die Unterdruckerzeugungsvorrichtung (14) Luft aus dem Tabakmaterial (12) zu saugen;

dadurch gekennzeichnet, dass

- sich der Kolben (1, 1a, 1b), sobald er sich in Kontakt mit der Oberseite des Tabakmaterials befindet, in dem Füllkanal (8) einzig durch Schwerkraftwirkung durch sein Eigengewicht und durch die aus der Differenz der auf den Kolben (1, 1a, 1b) wirkenden Druckdifferenzen resultierende Kraft nach unten bewegen kann.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Absaugkanal (6) des Kolbens (1, 1a, 1b) so gestaltet ist, dass er Luft in eine Richtung absaugt, die zu der Richtung der Senkbewegung des Kolbens entgegengesetzt ist.

3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Querschnittsform des Kolbens (1, 1a, 1b) im Wesentlichen der Querschnittsform des Füllkanals (8) entspricht.

4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Querschnittsform des Kanals (8) im Wesentlichen der Form der durch die Oberkanten des Behälters (9) definierten Oberfläche entspricht.

5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** diese eine Dichtungskammer (15, 15a) für den Behälter (9) umfasst, die mit der Unterdruckerzeugungsvorrichtung verbunden ist.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** der Unterdruck in der Dichtungskammer (15, 15a) auf die Wände des Behälters (9) wirkt.
7. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** der Unterdruck in der Dichtungskammer (15, 15a) auf den Boden des Behälters (9) wirkt.
8. Vorrichtung nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** der auf die Wände und/oder den Boden des Behälters (9) wirkende Unterdruck dem über den Kolben (1, 1a, 1b) auf das Tabakmaterial (12) wirkenden Unterdruck entspricht.
9. Vorrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Presskraft des Kolbens (1, 1a, 1b) auf das Tabakmaterial (12) nicht höher ist als 1500N, vorzugsweise nicht höher als 1100N.
10. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Füllkanal (8) Sensoren (19) zur Überwachung des Pegels umfasst, bis zu welchem der Füllkanal (8) mit Tabakmaterial (12) gefüllt ist.
11. Verfahren zum Verfüllen von Tabakmaterial (12) in einen Behälter (9) in der Tabakindustrie, die folgenden Schritte umfassend:
- Platzieren (100) des Behälters (9) in einer Packstation unter einem Füllkanal (8);
 - Zuführen (101) des Tabakmaterials (12) an den Füllkanal (8);
 - Einführen (102) eines Kolbens (1, 1a, 1b) in den Füllkanal (8) und Bewegen (103) des Kolbens (1, 1a, 1b) in Richtung der Oberseite des Tabakmaterials (12), das sich in dem Kanal (8) angesammelt hat;
 - Zufuhr (104) von Unterdruck an einen Absaugkanal (6), der mit wenigstens einer Absaugöffnung (4a, 4b) in einer Unterseite (2) des Kolbens (1, 1a, 1b) verbunden ist;
 - Absenken (105) des Kolbens (1, 1a, 1b) in den Füllkanal (8), wodurch während der Senkbewegung des Kolbens (1, 1a, 1b) die Obergrenze des Raums gesenkt wird, den das Tabakmaterial (12) einnimmt;
 - Abschalten (106) des Unterdrucks, nachdem der Behälter gefüllt ist (9);
 - Bewegen (107) des Kolbens (1, 1a, 1b) nach oben;
 - Verschließen (108) des Behälters (9);

gekennzeichnet durch

- Absenken (105) des Kolbens (1, 1a, 1b) in dem

Füllkanal (8), sobald sich der Kolben (1, 1a, 1b) in Kontakt mit der Oberseite des Tabakmaterials befindet, einzig durch Schwerkraftwirkung durch sein Eigengewicht und durch die aus der Differenz der auf den Kolben (1, 1a, 1b) wirkenden Druckdifferenzen resultierende Kraft.

12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, dass** der Behälter (9) ferner in einer Dichtungskammer (15, 15a) platziert wird, der ein Unterdruck zugeführt wird.

13. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, dass** ein Plastikbeutel (16) in dem Behälter (9) platziert wird.

Revendications

1. Dispositif pour emballer un matériau de type tabac (12) dans des contenants (9) dans l'industrie du tabac, comprenant:

un dispositif d'alimentation (13) pour alimenter en matériau de type tabac (12);

un canal de remplissage (8) pour accumuler le matériau de type tabac alimenté (12) et pour diriger le matériau de type tabac (12) vers un contenant (9);

un dispositif de génération de pression négative (14);

un piston (1, 1a, 1b), mobile dans une direction ascendante et descendante à l'intérieur du canal de remplissage (8), pour abaisser la limite supérieure de l'espace occupé par le matériau de type tabac (12) présent à l'intérieur du contenant (9) pendant la descente du piston (1, 1a, 1b);

tandis que le piston (1, 1a, 1b) a dans sa surface inférieure (2) au moins une ouverture d'extraction (4a, 4b) reliée à au moins un canal d'extraction (6) pour aspirer de l'air hors du matériau de type tabac (12) par le dispositif de génération de pression négative (14);

caractérisé en ce que

une fois en contact avec la surface supérieure du matériau de type tabac, le piston (1, 1a, 1b) est conçu pour se déplacer vers le bas à l'intérieur du canal de remplissage (8) uniquement sous la force de gravité résultant de son propre poids et de la force résultant de la différence de pression agissant sur le piston (1, 1a, 1b).

2. Dispositif selon la revendication 1, **caractérisé en ce que** le canal d'extraction (6) du piston (1, 1a, 1b) est conçu pour aspirer de l'air dans une direction opposée à la direction de descente du piston.

3. Dispositif selon la revendication 1, **caractérisé en ce que** la forme de la section transversale du piston (1, 1a, 1b) correspond sensiblement à la forme de la section transversale du canal de remplissage (8). 5
4. Dispositif selon la revendication 1, **caractérisé en ce que** la forme de la section transversale du canal (8) correspond sensiblement à la forme de la surface définie par les bords supérieurs du contenant (9). 10
5. Dispositif selon la revendication 1, **caractérisé en ce qu'il** comprend une chambre d'étanchéité (15, 15a) pour le contenant (9), reliée au dispositif de génération de pression négative. 15
6. Dispositif selon la revendication 5, **caractérisé en ce que** la pression négative à l'intérieur de la chambre d'étanchéité (15, 15a) agit sur les parois du contenant (9). 20
7. Dispositif selon la revendication 5, **caractérisé en ce que** la pression négative à l'intérieur de la chambre d'étanchéité (15, 15a) agit sur le fond du contenant (9). 25
8. Dispositif selon la revendication 6 ou 7, **caractérisé en ce que** la pression négative agissant sur les parois et/ou sur le fond du contenant (9) est égale à la pression négative agissant sur le matériau de type tabac (12) à travers le piston (1, 1a, 1b). 30
9. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la force de pression du piston (1, 1a, 1b) sur le matériau de type tabac (12) n'est pas supérieure à 1 500 N, de préférence pas supérieure à 1 100 N. 35
10. Dispositif selon la revendication 1, **caractérisé en ce que** le canal de remplissage (8) comprend des capteurs (19) pour commander le niveau auquel le canal de remplissage (8) est rempli par le matériau de type tabac (12). 40
11. Procédé pour emballer du matériau de type tabac (12) dans un contenant (9) dans l'industrie du tabac, comprenant les étapes consistant à: 45
- placer (100) le contenant (9) dans une station d'emballage sous un canal de remplissage (8);
- alimenter (101) en matériau de type tabac (12) le canal de remplissage (8); 50
- insérer (102) un piston (1, 1a, 1b) dans le canal de remplissage (8) et déplacer (103) le piston (1, 1a, 1b) vers la surface supérieure du matériau de type tabac (12) accumulé dans le canal (8); 55
- fournir (104) une pression négative à un canal d'extraction (6) relié à au moins une ouverture d'extraction (4a, 4b) dans une surface inférieure (2) du piston (1, 1a, 1b);
- abaisser (105) le piston (1, 1a, 1b) dans le canal de remplissage (8), abaissant ainsi la limite supérieure de l'espace occupé par le matériau de type tabac (12) pendant la descente du piston (1, 1a, 1b);
- arrêter (106) la pression négative après le remplissage du contenant (9);
- remonter (107) le piston (1, 1a, 1b);
- fermer (108) le contenant (9);
- caractérisé par** l'étape consistant à abaisser (105) le piston (1, 1a, 1b) dans le canal de remplissage (8), une fois que le piston (1, 1a, 1b) est en contact avec la surface supérieure du matériau de type tabac, uniquement sous la force de gravité résultant de son propre poids et la force résultant de la différence de pression agissant sur le piston (1, 1a, 1b).
12. Procédé selon la revendication 11, **caractérisé par** l'étape consistant à placer en outre le contenant (9) dans une chambre d'étanchéité (15, 15a) à laquelle la pression négative est fournie.
13. Procédé selon la revendication 11, **caractérisé par** l'étape consistant à placer un sac en plastique (16) à l'intérieur du contenant (9).

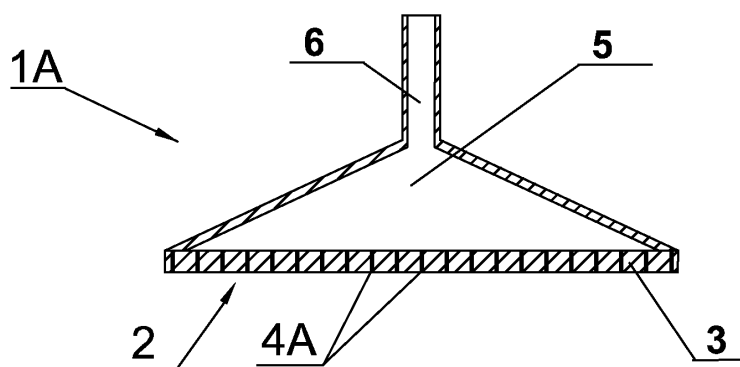


Fig. 1

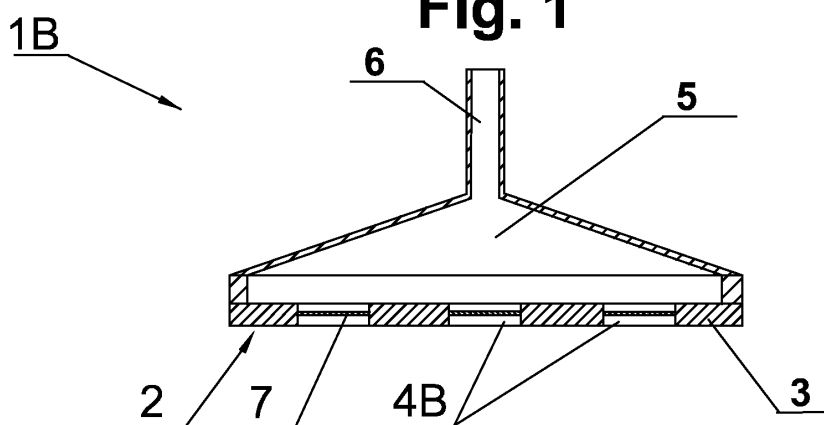


Fig. 2

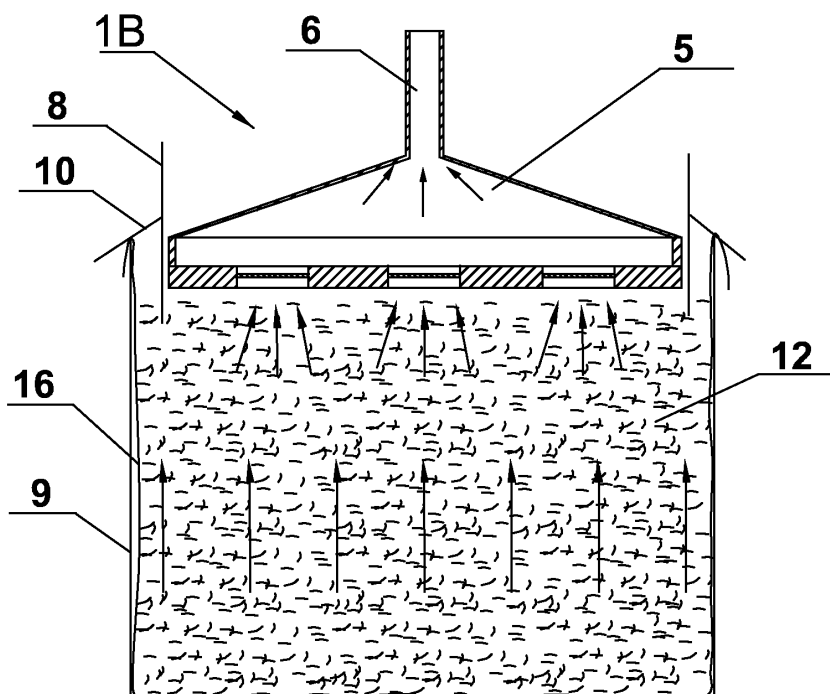


Fig. 3

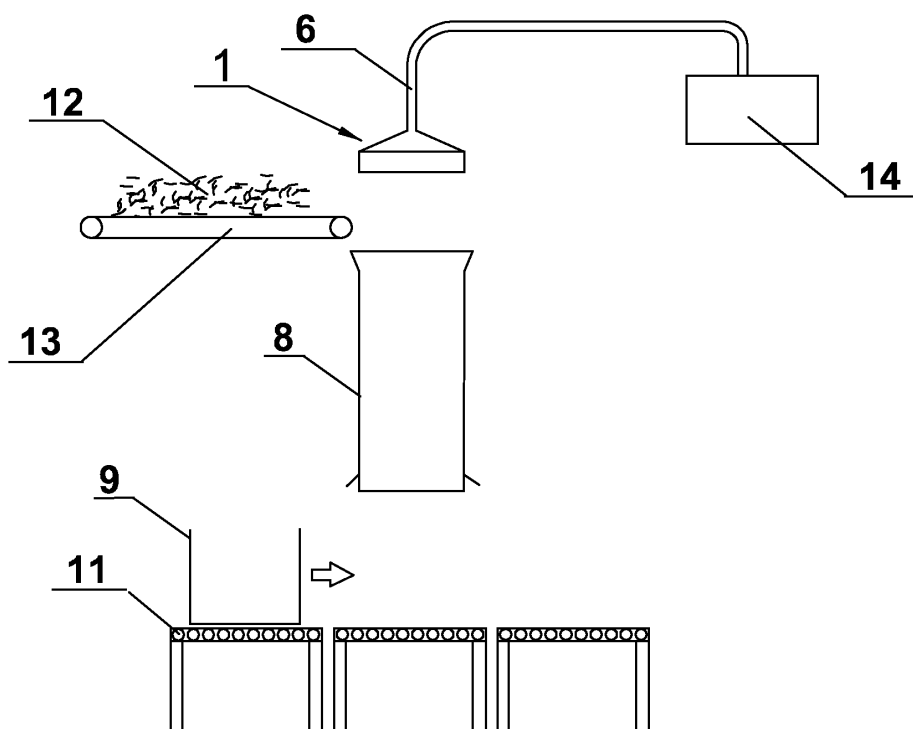


Fig. 4a

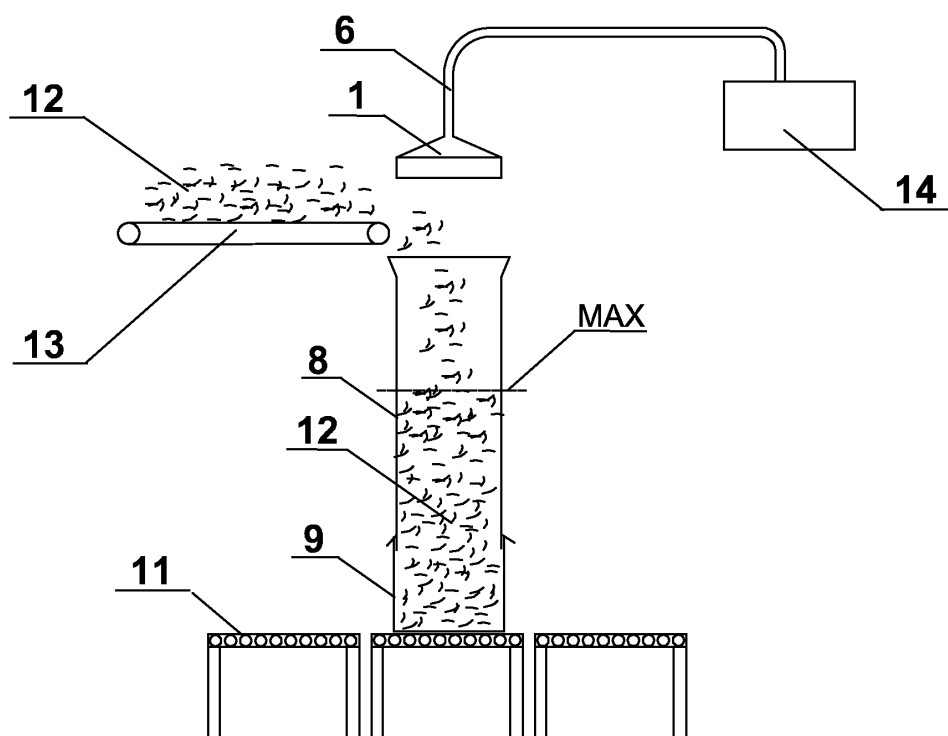


Fig. 4b

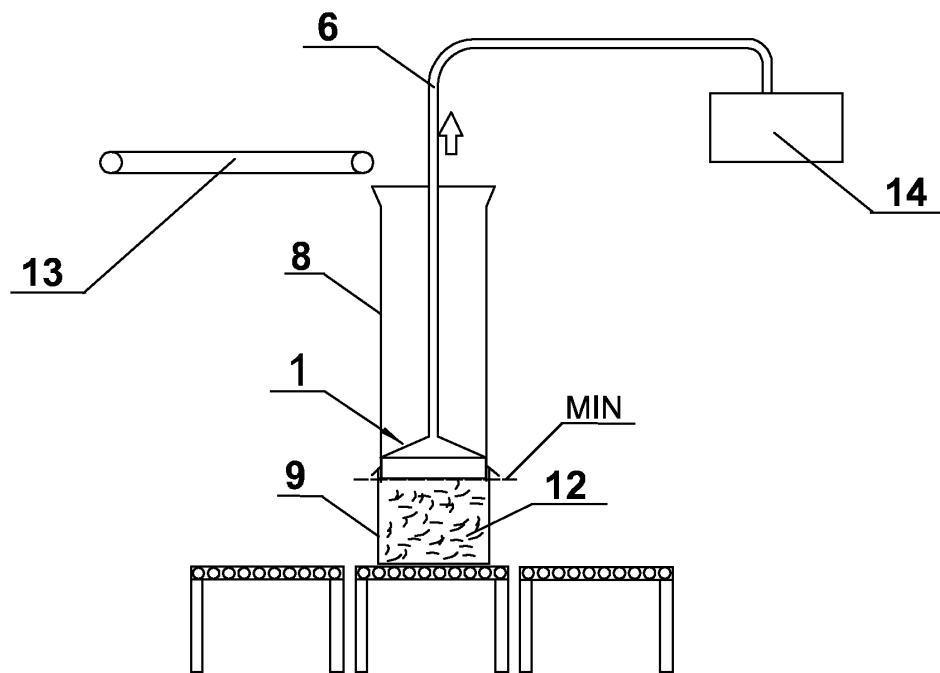


Fig. 4c

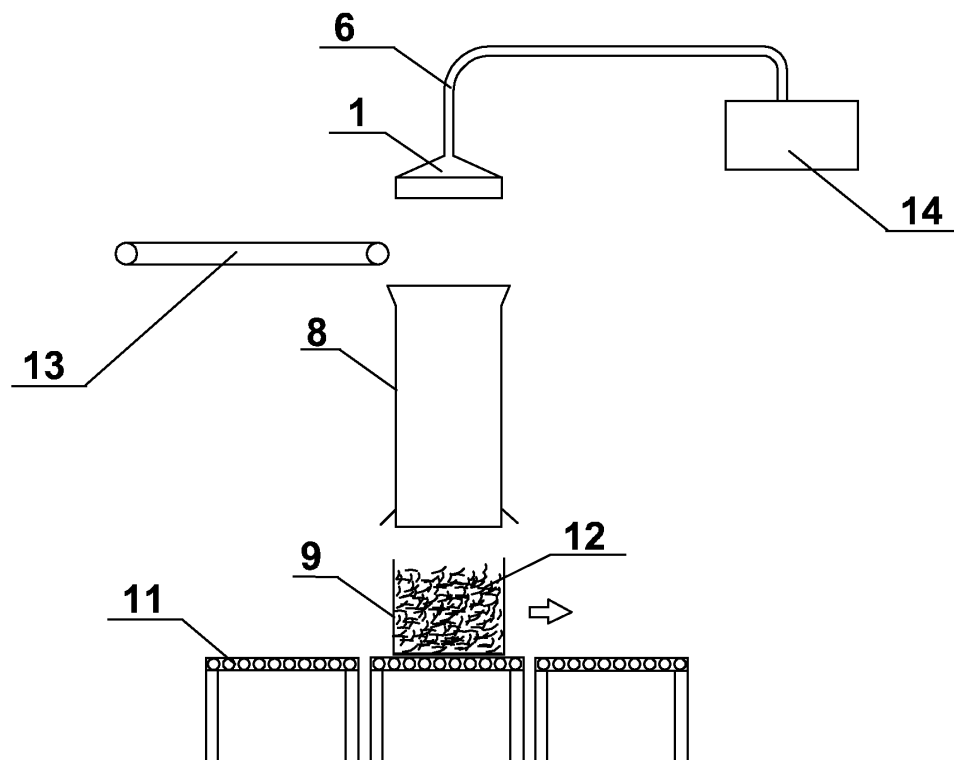


Fig. 4d

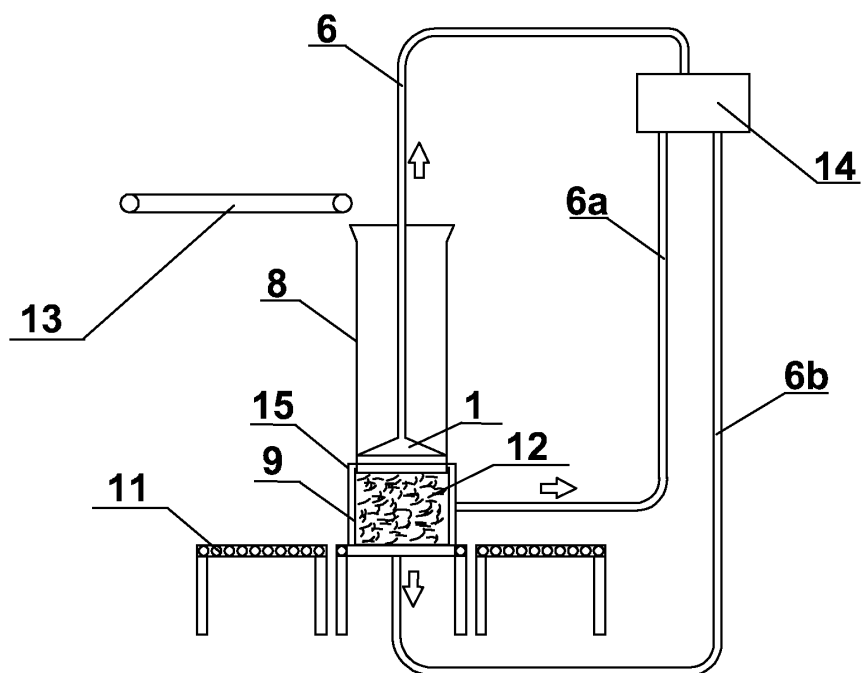


Fig. 5

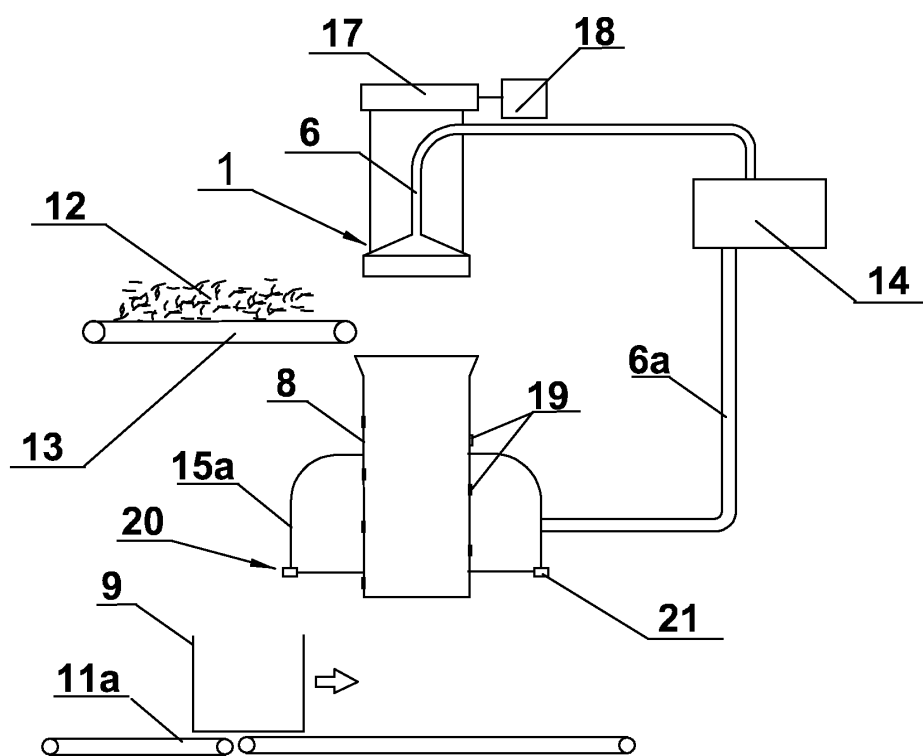


Fig. 6

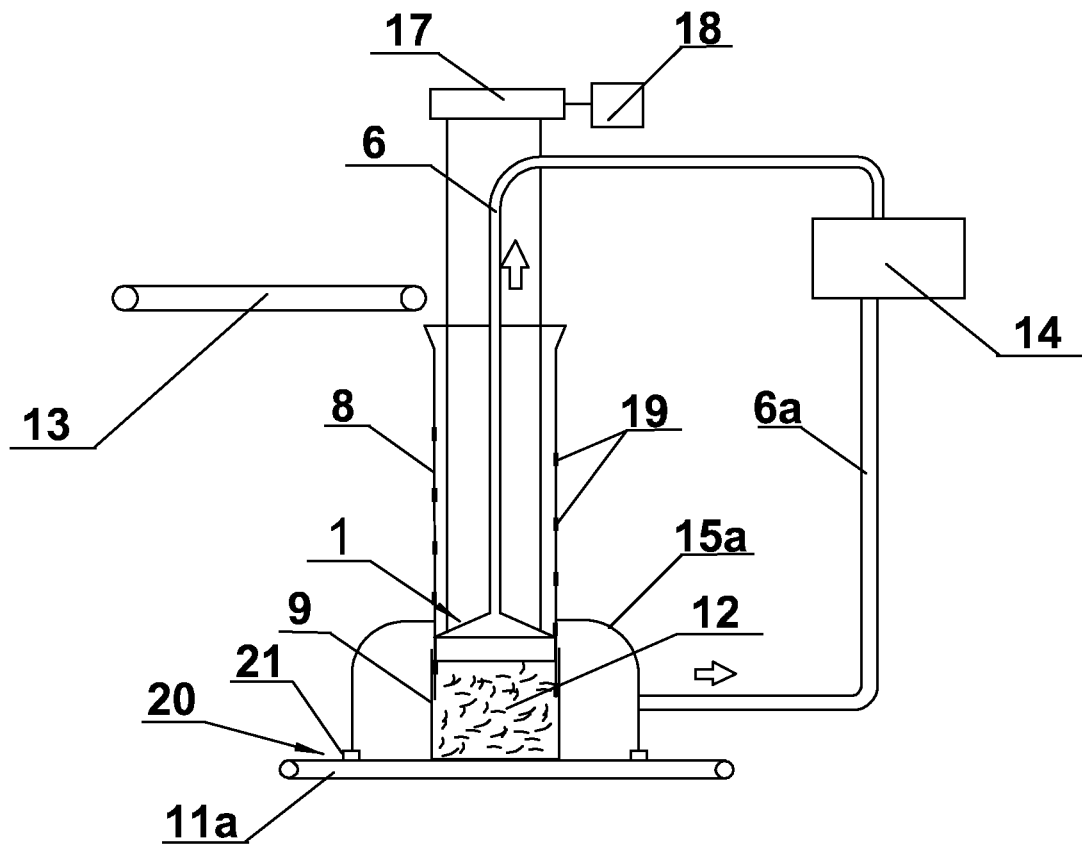


Fig. 6a

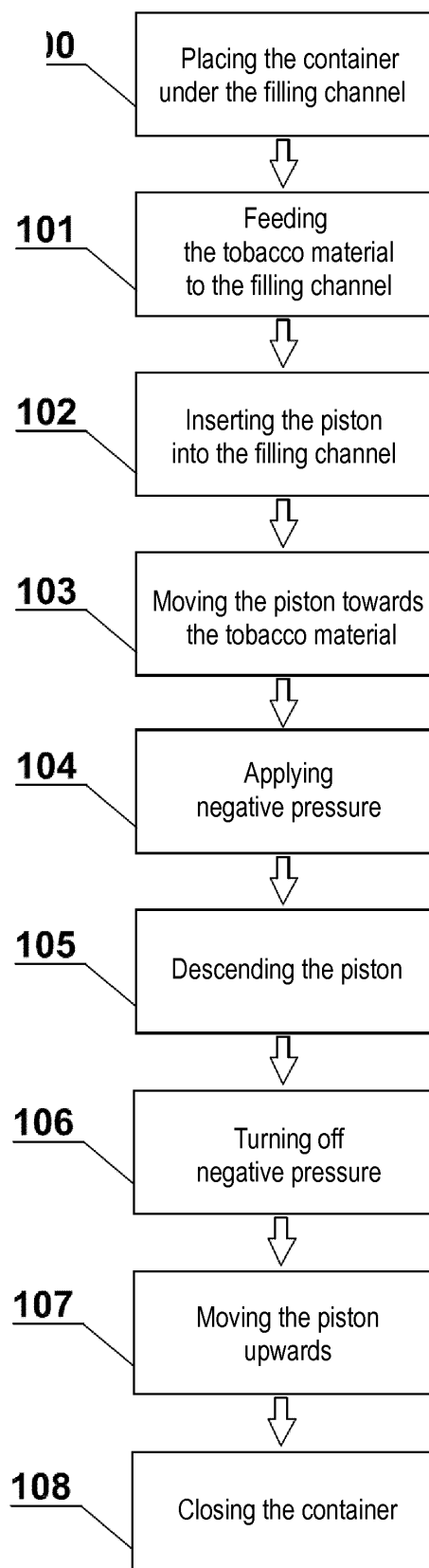


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3641734 A [0005]
- WO 8404286 A [0006]
- DE 2848505 [0007]