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(54) **Apparatus for conditioning of organic materials**

(57) Apparatus for conditioning of organic materials comprising supplying channel (6) connected with an inlet gate (1a) leading to a spreader (2) placed in a conditioning chamber (8). The conditioning chamber (8) is connected with an outlet gate (1b). Further the conditioning chamber (8) is provided with channels (4,5) supplying thermodynamic medium, the conditioning chamber (8) comprises a set of nozzles (10) giving to the thermodynamic medium angular motion, further conditioning chamber (8) comprises an outlet (3) discharging thermodynamic medium outside the apparatus.

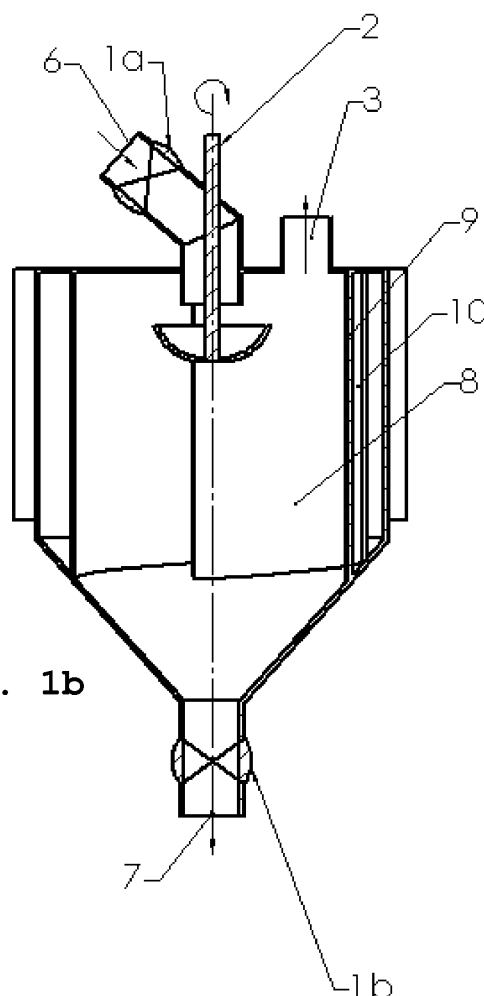


Fig. 1b

Description

[0001] Present invention relates to the apparatus for conditioning of organic materials.

[0002] In the process of conditioning of organic materials, for example tobacco, it is extremely important to precisely control parameters of the conditioning process. This is particularly difficult in a case of the fine particles of the organic material exposed to the thermodynamic medium of high relative speed in relation to the particles being conditioned. The main problem in such process is controlling the parameters of swirling mass consisting of particles of the conditioned organic material, in respect to the particular particles of the organic material.

[0003] There are several apparatus for conditioning of organic materials known in the state of the art. US patent no. 5 908 032 discloses a method and apparatus for expansion of tobacco, which is using a channel in a form of letter C, wherein tobacco is transported by hot gaseous medium.

[0004] US patent no. 5 711 086 discloses an apparatus for continuous drying in a superheated steam. Apparatus disclosed comprises a drying chamber and an assembly of the conveyor belts transporting material being dried. Superheated steam is generated inside the drying chamber from the moisture coming from the material being dried, as a result of exposing the material to hot gas or the moisture is introduced into to the chamber from the external source of the superheated steam.

[0005] US patent no. 4 044 780 discloses an apparatus for expanding in volume of the cut tobacco, the apparatus comprises first unit increasing tobacco temperature and humidity to the state where tobacco particles open. Such apparatus comprises additionally separate unit for creating a thin layer of opened organic material particles in the gas atmosphere and a unit for rapid cooling.

[0006] US patent no. 6 185 843 discloses a dryer where the transport of the organic material is carried out using pneumatic means. The shape of the inlet channel is decreasing the contact of the tobacco particles with a internal surfaces of the transport channel.

[0007] EP patent no. 1 033 081 discloses a method of expanding the food products or tobacco using superheated steam as transport medium.

[0008] According to the invention apparatus for conditioning of organic materials comprises supplying channel connected with an inlet gate leading to the spreader placed in the conditioning chamber, the conditioning chamber is connected with outlet gate. Further the conditioning chamber is provided with channels supplying thermodynamic medium, the conditioning chamber comprises also a set of nozzles giving to the thermodynamic medium angular motion, additionally the conditioning chamber comprises an outlet discharging thermodynamic medium outside the apparatus.

[0009] Apparatus according the invention comprises nozzles having form of slots.

[0010] Apparatus according to the invention comprises

chamber provided with a spreader of the rotary type.

[0011] Present invention has been described in detail below in relation to the preferred embodiment disclosed on figure attached to the description, where:

fig. 1a shows in a plan view in a cross section apparatus according to the invention;

fig. 1b shows in a side view in a cross section apparatus according to the invention;

fig. 1c shows in a perspective view apparatus according to the invention.

[0012] In a preferred embodiment according to the invention shown in the figures 1a, 1b, 1c, the apparatus comprises inlet gate 1a transporting an organic material to the spreader 2. Spreader 2 preferably is a spreader of the rotary type, which uses centrifugal force to throw an organic material into the conditioning chamber 8 with a high speed.

[0013] Apparatus is additionally provided with the outlet gate 1b placed at the bottom of the apparatus for conditioning to discharge the organic material into the channel 7 and further outside the apparatus for conditioning.

[0014] Apparatus for conditioning is further provided with unit 4, 5, 10 supplying the thermodynamic medium into the conditioning chamber and with outlet 3 discharging an excess of thermodynamic medium outside apparatus for conditioning.

[0015] Thermodynamic medium is supplied through channels 4, 5 from an external source (not shown) under pressure, preferably in a range of 100Pa to 1.0MPa, in particular in a range of 100Pa to 0.5MPa. Thermodynamic medium is directed by the set of nozzles in a form of slots 10, which additionally intensify the movement of the thermodynamic medium stream inside the conditioning chamber 8 and give to the flow of the thermodynamic medium angular movement of high speed. Thermodynamic medium is discharged from the conditioning chamber 8 through the outlet 3.

[0016] The apparatus according to the invention disclosed on figures 1a, 1b, 1c operates as described below.

[0017] An organic material for example tobacco, is introduced into the conditioning apparatus through the channel 6 and inlet gate 1a. An organic material gets on spreader 2, for example rotary spreader, which throws an organic material to be conditioned into the conditioning chamber 8, and give to the organic material particles required speed and direction. The organic material particles hit the stream of thermodynamic medium of parameters being essential for exchange of the heat and mass (for example water), and change direction under the inertial force, gravity and hydrodynamic forces. An organic material falls into a swirl motion and gets to the outlet gate 1b. The outlet gate 1b allows controllable discharging of the conditioned material outside the apparatus for conditioning.

[0018] Apparatus for conditioning of organic material is supplied, via inlet channels 4, 5 and set of nozzles in a form of slots 10, with the thermodynamic medium of parameters defined by the person skilled in the art of organic material conditioning. Thermodynamic medium inside the conditioning chamber swirls, and the main component of the process stream (conditioning stream) is preferably parallel (tangential) to the walls of the chamber.

[0019] The thermodynamic medium is a gas, preferably steam in any form, including superheated steam in the temperature of 120°C to 320°C, preferably in a range of 170°C to 270°C. Thermodynamic medium can be air, preferably hot air in the temperature of 80°C to 280°C. Thermodynamic medium may be also any combination of aerosols and/or chemical vapors, as well as gases, for example argon, nitrogen, carbon dioxide etc, which may favorably influence the conditioning process and/or give specific organoleptic properties to the conditioned material.

[0020] An apparatus for conditioning may be supplied with different thermodynamic medium at the same time, for example if the thermodynamic medium is air alone, preferably low humidity air, than the apparatus for conditioning being a drier. Speed of drying increases with the increase of the relative speed between organic material and thermodynamic medium. Along with increase of the relative speed the Nusselt number increases which intensifies exchange heat and mass (for example water) between thermodynamic medium and organic material. Described above process parameters can be controlled by adjusting speed of circulation for thermodynamic medium or by adjusting time period of exposing the organic material to thermodynamic medium.

[0021] Thermodynamic medium could be chosen from the group comprising nitrogen, argon, carbon dioxide or other non reactive gas, then apart from intensive drying the thermodynamic medium can be heated to the temperature above ignition point of the organic material being dried, this allows not only drying but also allows expansion (swelling) of the organic material.

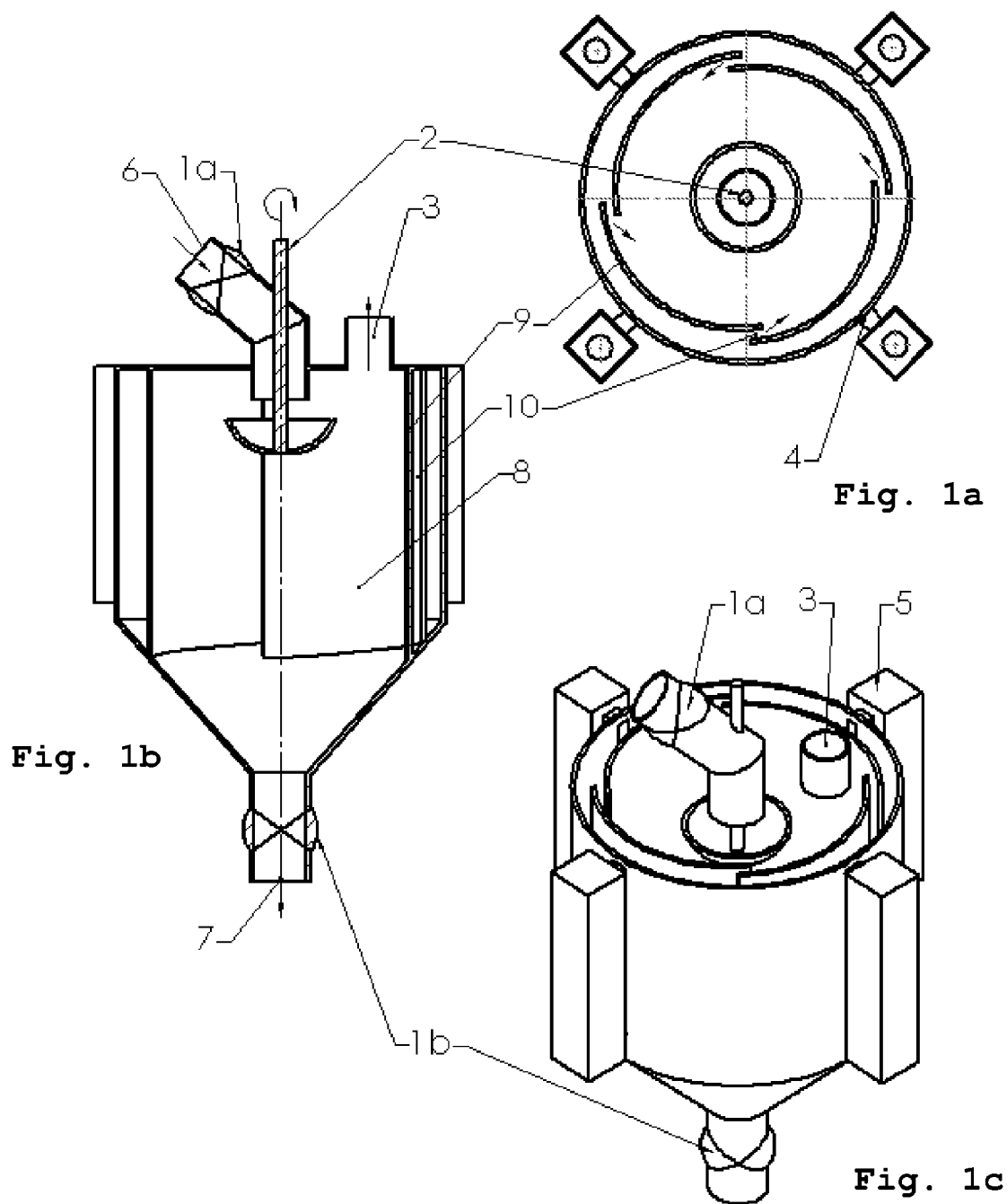
[0022] In a case when thermodynamic medium is a steam with a small addition of air, organic material after introducing into an apparatus is moistened to the point where no condensation appears. This leads to increase of the humidity of an organic material. Keeping an organic material longer in the area of exposing to thermodynamic medium or increasing temperature (considerably higher than the saturation temperature), the organic material can be expanded, and then dried to achieve final humidity. To increase expansion of the material additional steam can be used, the additional steam can be supplied by additional set of nozzles (not shown) placed just behind the inlet gate 1a.

[0023] An apparatus for conditioning of organic materials may be supplied with many different thermodynamic mediums in many different conditioning processes or can be supplied with many different thermodynamic mediums

in a single conditioning process.

Claims

1. Apparatus for conditioning of organic materials comprising supplying channel connected with an inlet gate leading to the spreader placed in the conditioning chamber, conditioning chamber is connected with outlet gate **characterized in that** the conditioning chamber (8) is provided with channels (4, 5) supplying thermodynamic medium, and the conditioning chamber (8) comprises a set of nozzles (10) giving to the thermodynamic medium angular motion, further conditioning chamber (8) comprises outlet (3) discharging thermodynamic medium outside the apparatus.
2. Apparatus according to claim 1, **characterized in that** nozzles (10) are having form of slots.
3. Apparatus according to claim 1, **characterized in that** chamber (8) comprises a spreader (2) of the rotary type.





European Patent
Office

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Application Number
EP 06 12 5432

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 February 2007	Examiner MARZANO MONTEROSSO
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EPO FORM 1503 03.82 (P04C01)

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