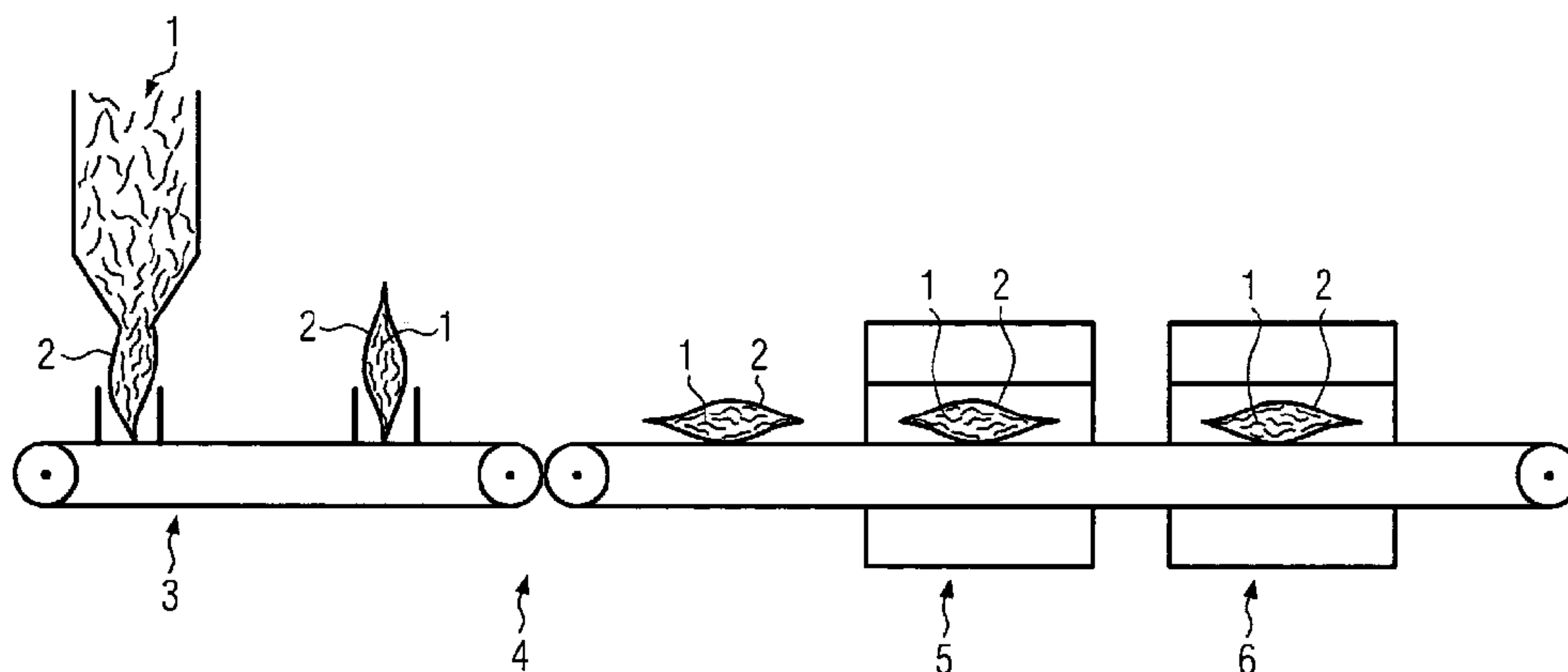




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(72) Inventeurs/Inventors:
NEISS, PHILIPP, CH;
VAN HATTEM, SANDER, CH
(73) Propriétaire/Owner:
PHILIP MORRIS PRODUCTS S.A., CH
(74) Agent: RIDOUT & MAYBEE LLP

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(57) **Abrégé/Abstract:**

The present invention relates to a method for the pasteurization of fine-cut tobacco (1), in particular laminar tobacco, with a cut width of 0.5 mm to 0.9 mm, wherein the tobacco (1) is arranged in a closed package (2). Then, the tobacco (1) in the package (2) is heated such that the tobacco (1) is pasteurized. The invention further relates to a device for the pasteurization of tobacco (1), comprising a packing station (3), a heating station (5) and optionally a cooling station (6). The invention also relates to a packaged tobacco product.

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(71) Applicant: PHILIP MORRIS PRODUCTS S.A.
[CH/CH]; Quai Jeanrenaud 3, CH-2000 Neuchâtel (CH).

(72) Inventors: NEISS, Philipp; Rebstockweg 26, CH-3232
Ins (CH). VAN HATTEM, Sander; Chemin de Chandieu
8, CH-1006 Lausanne (CH).

(74) Agent: HILGERS, Hans; Gr"necker, Kinkeldey, Stock-
mair & Schwanhäusser, Leopoldstrasse 4, 80802 München
(DE).

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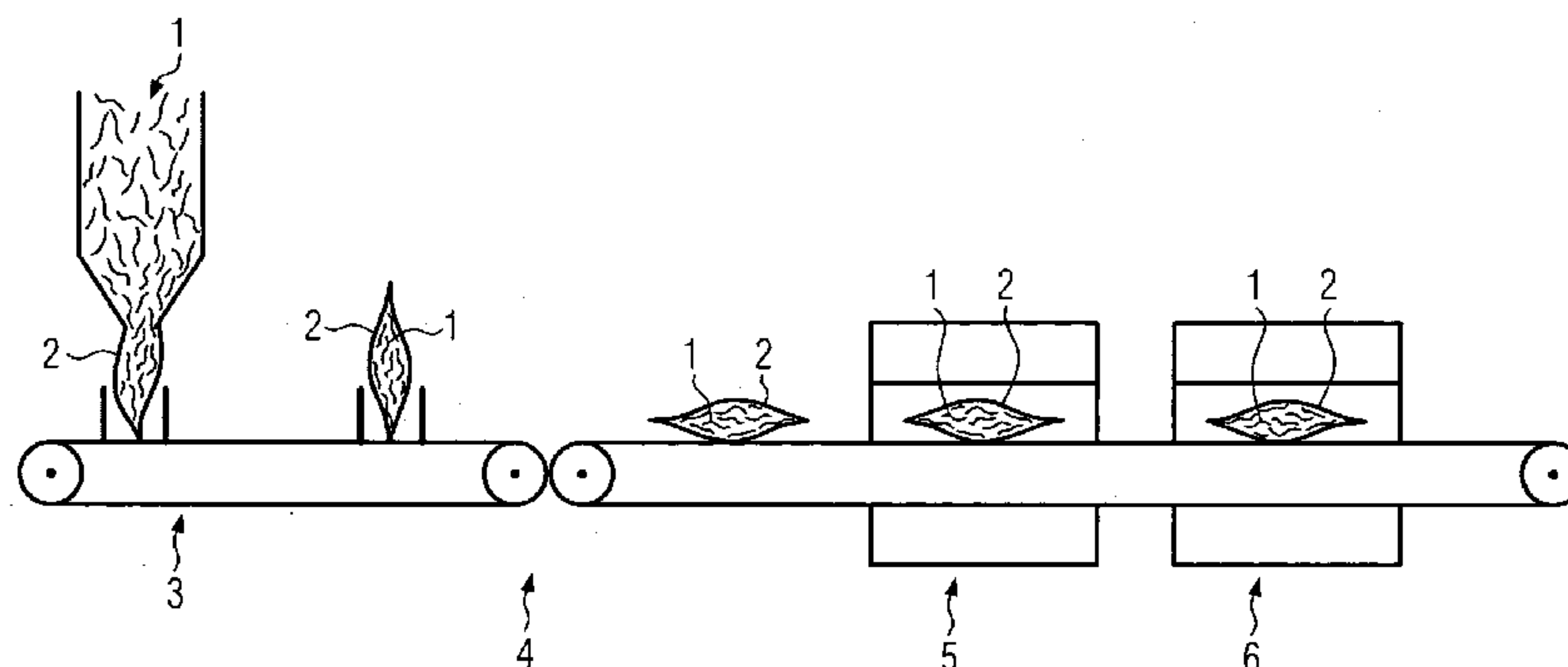


FIG. 1

(57) Abstract: The present invention relates to a method for the pasteurization of fine-cut tobacco (1), in particular laminar tobacco, with a cut width of 0.5 mm to 0.9 mm, wherein the tobacco (1) is arranged in a closed package (2). Then, the tobacco (1) in the package (2) is heated such that the tobacco (1) is pasteurized. The invention further relates to a device for the pasteurization of tobacco (1), comprising a packing station (3), a heating station (5) and optionally a cooling station (6). The invention also relates to a packaged tobacco product.



WO 2013/127528 A1

Pasteurization of Packaged Tobacco

The present invention relates to a method for the pasteurization of tobacco, in particular fine-cut tobacco, which comprises heating the tobacco such that the tobacco is pasteurized.

Roll-your-own and make-your-own tobacco products have a relatively high moisture content of typically above 18 weight percent. In comparison, pre-manufactured cigarettes typically have moisture content below about 14 weight percent. The high moisture content in roll-your-own and make-your-own tobacco facilitates, for example, the handling by the consumer when making cigarettes. As tobacco is an organic product, it may be subject to deterioration by microorganisms, such as mold. In moderate climates, mold spores are naturally present everywhere and the mold growth is favored by moisture. One way to reduce or prevent mold growth is the use of preservatives. However, the use of preservatives in tobacco products may be disfavored.

It is known in the art to pasteurize snuff, a moist tobacco product with even higher moisture content than roll-your-own and make-your-own tobacco, by bulk heating it in a cooker to elevated temperatures over a certain period of time. The pasteurized snuff is then removed from the cooker and further processed. US 2008/0156338 A1 discloses the pasteurization of snuff, which has a high moisture content, and, thus, may otherwise have a short shelf life.

It is the object of the present invention, to provide an improved method for the pasteurization of tobacco which provides a constant product quality and a long shelf life.

According to the invention there is provided a method for the pasteurization of fine-cut tobacco, in particular laminar tobacco, with a cut width of 0.5 mm to 0.9 mm (millimeters) comprising the steps of arranging the tobacco in a closed package, and heating the tobacco in the package such that the tobacco is pasteurized. The pasteurization treatment will reduce the number of viable microorganisms in the package and prolong product shelf life. During the pasteurization the mold count within the tobacco package is significantly reduced. According to the invention, the pasteurization treatment is performed on the packaged product. This is advantageous in that the moisture level can be maintained at a relatively high level, and that the shelf life is significantly increased as compared to non-pasteurized product. The fine-cut tobacco comprises strips of tobacco cut from tobacco leaves or reconstituted tobacco sheets or both, at a predefined cut width in the range of about 0.5 mm to about 0.9 mm.

The cut width is particularly important for roll-your-own self-manufacture of smoking articles, in particular cigarettes, which requires strips or strands of tobacco in a certain size in order to prevent the tobacco from falling out at the open end of the smoking article. Preferably, the strips

or strands of tobacco are in a predefined moisture range, which makes them less brittle and facilitates rolling the tobacco into a tobacco rod during the rolling process by the consumer.

In contrast, for chewing tobacco, namely snus, the tobacco is mostly ground or sometimes finely cut. However, this always results into a sort of dust that then creates the typical snus pulp that is filled in the sachets for consumption.

Similarly, snuff is provided as a ground or finely cut powder. US 2008/0156338 A1 discloses that dry snuff is usually provided as a powder, while moist snuff is usually finely cut. Nevertheless, snuff or snus is not provided in cut widths as defined above, as these cut widths would be detrimental to the intended handling and consumption.

Further reducing the tobacco into such fine dust or pulp has a significant effect on the tobacco, for example, on its cell structure or release of essential oils, as compared to a more macroscopic cutting of leaves into parallel stripes of a distinctive width.

In particular, fine-cut tobacco is unfermented or free of salt or both, and preferably not otherwise treated as snus or snuff is. In some embodiments, fine-cut tobacco only constitutes of tobacco leaves cut into stripes. The lack of other ingredients, such as preservatives, is one of the main reasons why pasteurization is beneficial. Further, the cut width of the fine-cut tobacco as specified is important regarding the combustion process and the resistance-to-draw during consumption of the cigarette.

Advantageously, the package used in the present invention is a retail package and suitable for product distribution and sale. As the method according to the invention eliminates the need for further processing or handling the tobacco after the pasteurization step, the tobacco is well protected from environmental factors which could adversely impact the quality of the tobacco before use, for example, the ingress of microorganisms. Advantageously, the package is substantially air-tight before use. Further, the moisture level of the tobacco remains substantially constant between packaging and use.

Advantageously, the pasteurization method according to the invention involves the heating of the tobacco in a closed package for a certain period of time to reduce the mold count by a factor of at least about 1000 per gram of tobacco, preferably of at least about 100'000 per gram of tobacco.

In one embodiment, the fine-cut tobacco is pasteurized in a continuous process, comprising the steps of: arranging the packages on a continuous conveyor, and applying heat to the packages on the conveyor such that all of the tobacco is pasteurized. Preferably, the heat is uniformly applied to the packages such that the fine-cut tobacco is uniformly pasteurized.

Preferably, the moisture level of the tobacco is above 16 weight percent and preferably below 20 weight percent, more preferably in between 18 and 19 weight percent. In other embodiments,

the moisture level is above 18 weight percent and preferably below 35 weight percent. Tobacco for roll-your-own and make-your-own applications requires a relatively high moisture level such that the tobacco is sufficiently flexible to facilitate manual cigarette making. The desired tobacco moisture level is typically set during tobacco processing comprising the addition of water and drying.

Preferably, during the heating step, the tobacco is heated between about 55 to 120 degrees Celsius, preferably between about 60 to about 85 degrees Celsius. Thus, in this temperature range an efficient pasteurization can be carried out, and the mold count can be significantly reduced.

Preferably, the heating is carried out for between about 30 seconds to about 30 minutes, more preferably for between about 2 minutes and about 7 minutes. The heating can usually be carried out for short period of time, if the heating temperature is high. However, pasteurization at a low temperature for a longer time may be beneficial for the quality of the tobacco and may pose less requirements on the heat stability of the package. The pasteurization conditions are selected such that deterioration of the packaging is prevented while achieving adequate pasteurization of the entire content of the package. It has been found, that the pasteurization method according to the invention does not adversely affect the quality of the tobacco product.

Preferably, the heating is carried out by subjecting the package to a heating medium, in particular water, steam, air or an inert gas. The heating medium may be a mixture of water micro-droplets and saturated steam. Alternatively, the heating medium may be a mixture of water, superheated steam and air. Further, the heating medium may be a mixture of water, steam and air. Generally, the heating medium may be a hot liquid or a hot liquid vapour. Depending on the heat capacity of the heating medium, the amount of heat transferred to the package and the tobacco therein can be controlled. In particular, it is preferable, if a current is provided in the heat medium, such that the heat medium passes the package in order to prevent the formation of locally reduced temperatures around the package. Advantageously, a package according to the invention may be further overwrapped by a water proof outer wrapper to prevent damage to the package that could be otherwise caused by the heating medium, such as water. This is particularly advantageous where the package comprises print or cardboard or both.

In a preferred embodiment, the tobacco is heated by means of microwave radiation. This is in particular beneficial, as the tobacco comprises a significant moisture level, such that the microwave radiation will be able to quickly heat up the tobacco. Thus, a heating by means of microwave radiation allows reducing the time necessary for the heating step. The applied microwave power is preferably controlled to achieve uniform heating and pasteurization of the

tobacco by temperature measurement and control of microwave generator power during continuous processing of the tobacco packages. The applied microwave power may be controlled to achieve uniform heating and pasteurization of the tobacco by control of microwave generator power for successive microwave heating steps, taking into account the specific product parameters of the tobacco being treated, such as water content, which are predefined or determined by according sensors. In one embodiment, the applied microwave power is controlled based on measurements of the temperature inside the closed package, to prevent the creation of hot or cold spots during pasteurization. The microwave heating power may be applied in at least two heating stages, taking into account the specific product parameters, such as water content, which are predefined or determined by according sensors, of the tobacco being treated, to prevent the creation of hot or cold spots during treatment.

In one embodiment, the heating is carried out at a pressure above atmospheric pressure. At a higher pressure, the package may be compressed, such that there is less space in between the individual tobacco particles. Thus, heat conduction in the package can occur faster. In such a preferred embodiment of the method according to the invention, the heating of the tobacco can be carried out more homogenous and quicker. In another embodiment, the pasteurization of the tobacco is carried out at atmospheric pressure. In further embodiments, the pasteurization of the tobacco is carried out at a pressure below atmospheric pressure, to allow treatment with specific pasteurization fluids, such as water, at temperatures of less than 100 degrees Celsius. The pressure during pasteurization is preferably controlled in dependency of the temperature of the treatment and the heating medium outside the package or pasteurization medium inside the package used.

In particular, after the heating, a cooling step may be carried out by subjecting the package to a cooling medium, in particular cold air, water or inert gas. Again, the heat capacity of the cooling medium allows adjusting the time necessary for the cooling step. Further, a current in the cooling medium such as generated by a pump or by a fan may be beneficial. The cooling of the tobacco may beneficially be effected by spraying a mist of cool water onto the package. The evaporation of small water droplets in the mist improves the cooling properties.

Gaseous cooling or heating media are preferred over liquid heating media. While gaseous cooling or heating media comprise a lower heat capacity than liquid cooling media, they however have fewer requirements regarding the material of the package, and do not require the package to dry after the heating or cooling step. As the package is closed, preferably in a hermetic or gas-tight manner, usually the cooling or heating media cannot interfere with the tobacco.

In one embodiment, the cooling is effected to a temperature of the tobacco which is lower than ambient temperature. This allows, that the tobacco can be maintained at the lower

temperature level, which allows keeping the tobacco fresh, and, thus, a longer storage and shelf life for the closed package as retail product. It is emphasized, that after the cooling, the package comprising the tobacco may be distributed while being chilled, in particular transported in a chilled state. Further, chilled storage of the tobacco after or before transportation may be applied and is beneficial regarding the shelf life as well.

Preferably, the temperature of the tobacco is monitored during the heating step. This can be obtained by monitoring the temperature around the package, and estimating from this temperature the temperature of the tobacco. Furthermore, the temperature of the tobacco may be measured by infrared sensors. The monitoring of the temperature allows as well controlling of the temperature during the heating step. Thus, by implementing an analog or digital control device, which controls the amount of energy provided to the closed package comprising the tobacco, defined conditions during the pasteurization can be obtained.

In an embodiment, the temperature of the fine-cut tobacco may be measured at the start and at the end of a heating step, and the applied heating power for a subsequent heating step is adjusted to achieve a uniform, desired temperature of the tobacco.

Preferably, the temperature in the centre of packaged tobacco in the package, which is suitable for product sale to the consumer, is measured at the start and at the end of a heating step, and the applied heating power for a subsequent heating step is adjusted to achieve a uniform, desired temperature of the tobacco throughout the package.

The temperature may also be controlled or monitored during the cooling step.

In one embodiment, the temperature might be changed during the pasteurization process. In particular, the heating step may comprise several different heat levels, thus, the closed package comprising tobacco is subjected to different temperatures. This can improve the efficiency of the pasteurization.

In an embodiment, the packages are passed through a layer of heating medium, in particular steam, to enable a continuous pasteurizing of fine-cut tobacco. Further, the packages may be conveyed through a counter-flow of heating medium, in particular steam. The heating medium may comprise water micro-droplets and steam.

The fine-cut tobacco may be packed in a package suitable for product sale to consumers. The microwave power applied to the tobacco packages may be controlled based on the temperature measured at the centre of the packages, for example by means of an infrared temperature sensor, such as an infrared camera. The position of the tobacco packages may be controlled during pasteurization relative to the position of the microwave heating apertures.

While it is generally preferred carrying out the pasteurization at the packaging site, due to a better control of the pasteurization process, it is alternatively possible, that the pasteurization may be performed at the retailer.

According to the invention, further a device for the pasteurization of tobacco is provided, comprising a packing station, heating station and optionally a cooling station, wherein the device is adapted to conduct the inventive method as specified beforehand.

In particular, the tobacco is filled in packages, such as flexible pouches in the packing station, which are then hermetically closed. This may be obtained by heat sealing the packages. In the heating station, one or several closed packages comprising tobacco are subjected to heat, until the tobacco comprised therein is pasteurized. In the optional cooling station, the packages may be brought back to ambient temperature, or the packages may be cooled down to a temperature below ambient temperature to prolong the shelf life. In any case, the cooling station may provide the benefit of making the method faster, and the cooling time can be reduced.

The surface temperature of the tobacco in the package is preferably about 55 to 120 degrees Celsius, more preferably between about 60 to about 85 degrees Celsius.

In one embodiment, the external pressure around the closed package is controlled during the pasteurization to prevent bursting of the pack. Further or alternatively, the package may be contained within an external enclosure during the treatment to prevent bursting of the package. Several packages may be provided together in one external enclosure, preferably 2 to 10 packages, more preferably 5 to 10 packages.

Preferably, the fine-cut tobacco is pasteurized by heat treating the tobacco within its consumer package, wherein the consumer package is sealed within a disposable, protective packaging prior to heat treatment, and the disposable, protective packaging is removed after heat treatment.

After pasteurization, the tobacco is substantially free of active microorganisms.

The invention also relates to a packaged tobacco product comprising fine-cut tobacco with a cut width of 0.5 mm to 0.9 mm (millimeters), manufactured by the inventive method as specified beforehand. In particular, the package of the packaged tobacco product is a retail pouch or retail container, in which the tobacco will be sold in stores.

Preferably, the packaged tobacco product is a flexible pouch as known for roll-your-own tobacco. However, it is designed to withstand the temperature during the pasteurization step. According to the invention, the package can be at least partially evacuated before pasteurization by partially removing air or process gas from the package before sealing. This has the benefit that the heat transfer between the tobacco and the heating medium can be improved, as the insulating air is removed. Preferably the package is made of a laminate which provides a

moisture barrier and is impermeable to microorganisms. Further, the package is preferably permeable to microwaves.

Preferably, the tobacco in the packaged tobacco product is free from preservatives. Generally, additives may be added to tobacco during manufacturing such as sugar, cocoa, coconut powder, humectants like for example, glycerin, propylene glycol and invert sugar and others. Possible preservatives used in tobacco products may comprise benzoic acid, sodium propionate, natamycin, non-anoic acid and salts thereof.

Preferably, the packaging material is plastic, metal or cardboard laminates or a combination thereof. Preferably, the package of the packaged tobacco product is made of a laminate wherein at least one layer provides a moisture barrier. In other the embodiments, the package may provide a moisture barrier, without being made from a laminate material. This allows, that in particular during the heating, no moisture will escape the package, such that the moisture level in the tobacco will remain constant. Same benefit is also provided during the latter transport and while the product is kept on a shelf for storage and sale, as no evaporation of moisture from the tobacco to the outside of the package can occur.

The closed package is preferably suitable for product sale to the consumer.

In particular, the packaged tobacco product has a weight of 10g to 500g. This is a common range for retail tobacco packages. In particular, pouches with around 30g or 100g and closed boxes with around 140g of tobacco may be provided as the packaged tobacco product according to the invention.

The packaged fine-cut tobacco according to the invention may be used for make-your-own or roll-your-own products, wherein it has been pasteurized to provide enhanced shelf-life and improved sensory properties. In the following, an exemplary embodiment of the method, device and product according to the invention will be explained with reference to the following figure.

Figure 1 shows an exemplary manufacturing line for the method according to the invention.

The present invention relates to a method for pasteurization of tobacco, in particular fine-cut tobacco for roll-your-own and make-your-own products.

Generally, in the first stage tobacco leaves or tobacco leaf pieces will be processed in a common manner, including conditioning, sorting and separation of unwanted material. Then, the leaves or leaf pieces are cut into fine cut tobacco with a cut width of 0.5 to 0.9 mm, and water and additional ingredients such as additives are added. Finally, the tobacco is dried to a certain moisture level, in particular more than 18 weight percent.

The accordingly processed tobacco is indicated with reference number 1 in Figure 1.

The tobacco 1 is then filled in a package 2 in a packing station 3. The packing station 3 further provides that the package 2 is closed, such that it is hermetically sealed. In particular, the

package 2 is a flexible pouch, which will be heat sealed to be closed. However, the closure of the package 2 can be designed such that is openable by a consumer, without the pouch being destroyed. In particular the package 2 is adapted to be reclosable. Alternatively or additionally to closing the package by heat sealing, the package 2 may be provided with adhesive to be closed such that it is hermetically sealed. In some embodiments the package 2 may be heat sealed on some of the sides, while a reclosable opening is only provided with adhesive. The adhesive provided on the opening of the package 2 is in particular non-permanent adhesive allowing as well to reclose the package substantially airtight.

From the packing station 3, the closed packages 2 are transported by a conveyance means 4, for example a conveyance belt, to the heating station 5. In the heating station 5 the packages 2 are heated such that the tobacco 1 comprised therein is pasteurized. In particular, the packages 2 will be heated to 60-85 degrees Celsius for 2 to 7 minutes. The heating is carried out by using a heat medium, which is in the present embodiment hot air. The heating station 5 may be an oven with a hot air fan. A conveyance means extends through the heating station 5.

It is emphasized that in some embodiments it is beneficial to heat the packages 2 individually in the heating station. In other embodiments, a plurality of packages 2 is heated together in the heating station. However, the plurality of the packages 2 is preferably arranged in a manner that the same heating conditions are provided for each of the packages 2, such that a constant quality product is obtained.

In some embodiments, the closed package 2 may be provided in an additional external enclosure. The external enclosure remains around the package at least during the heating step. In particular, the enclosure protects the package from the heating medium and the direct application of heat. The external enclosure is preferably substantially fluid-tight. In particular the external enclosure may be formed from a film material to enable that it may adapt to the outer form of the closed package 2. The external enclosure may be reclosable to enable reusing of same several times. The external enclosure enclosing the packages may be evacuated before the heat treatment to ensure that it is directly in contact with the packages to improve the heat transfer to the packages. In one embodiment, several packages may be provided in one external enclosure together, preferably 2 to 10 packages, more preferably 5 to 10 packages.

It is important that the tobacco 1 in the core of the package 2 reaches the required target temperature, such that all tobacco 1 in the package 2 is pasteurized. As the package 2 is sealed and is made of moisture proof material, the moisture comprised in the tobacco cannot escape the package 2, and is, thus, held at a constant level.

During the heating step, the temperature of the tobacco 1 is preferably monitored, either directly or indirectly by monitoring the temperature of the package 2. The heat that needs to be

applied will depend on the type and size of the package 2, while the temperature of the tobacco 1 is used as an indication of the pasteurization process.

Thus, the presence of microorganisms such as mould is reduced in the tobacco 1, and the tobacco 1 in the packages 2 has a longer shelf life.

The packages 2 either are stopped during the heating step, or they move continuously on a conveyance means through the heating station 5. In some embodiments, the package 2 may be subjected to pressure in the heating station 5, such that the gas or air comprised in the package 2 is compressed, and the tobacco 1 is closer to the package wall and can thus be heated quicker.

In some embodiments, a microwave is used as a heating means for heating the tobacco in the package 2.

The package 2 may in particular be made of a laminate, wherein one layer of the laminate forms a moisture barrier.

After the heating in the heating station 5, the closed packages 2 are further transported to a cooling station 6, in which a cooling step is carried out. A conveyance means extends through the cooling station 6. The cooling step is not necessary in all embodiments and could be replaced by keeping the product at ambient conditions after the heating step. For the cooling step, ambient or cold air is used, to cool the product down to ambient temperature or to a temperature below ambient temperature. In particular, the package 2 is cooled down to 2 to 10 degrees Celsius, and is subsequently kept at this temperature during further transport until it reaches the point of sale such that the shelf life is increased.

Typical shelf life for tobacco treated with the aforementioned method is 6 months.

WE CLAIM:

1. Method for the pasteurization of fine-cut smoking tobacco comprising elongate strips of tobacco having a predefined cut width, comprising the steps of:

arranging the tobacco (1) in a closed package (2), providing a moisture barrier, and

heating the tobacco (1) in the package (2) such that the tobacco (1) is pasteurized.
2. Method according to claim 1, wherein the moisture level of the tobacco (1) is above 16 weight percent.
3. Method according to claim 1, wherein the moisture level of the tobacco (1) is below 20 weight percent.
4. Method according to claim 1, wherein the moisture level of the tobacco (1) is in between 18 and 19 weight percent.
5. Method according to any one of claims 1 to 4, wherein during the heating step, the tobacco (1) is heated to 55 to 120 degrees Celsius.
6. Method according to claim 5, wherein during the heating step, the tobacco (1) is heated to 60 to 85 degrees Celsius.
7. Method according to any one of claims 1 to 6, wherein the heating is carried out for 30 seconds to 30 minutes.
8. Method according to any one of claims 1 to 7, wherein the heating is carried out for 30 seconds to 12 minutes.
9. Method according to any one of claims 1 to 8, wherein the heating is carried out by using a heat medium.
10. Method according to claim 9, wherein the heat medium is water, steam, air or inert gas.
11. Method according to any one of claims 1 to 10, wherein the tobacco (1) is heated by means of microwave radiation.

12. Method according to any one of claims 1 to 11, wherein the heating is carried out at a pressure above atmospheric pressure.
13. Method according to any one of claims 1 to 12, with a cooling step after the heating step, wherein cooling of the tobacco (1) is carried out by using a cooling medium.
14. Method according to claim 13, wherein the cooling medium is cold air, water, or inert gas.
15. Method according to claim 14, wherein the cooling is effected to a temperature of the tobacco (1) which is lower than ambient temperature.
16. Method according to any one of claims 1 to 15, wherein the temperature of the tobacco (1) is monitored during the heating step.
17. Method according to any one of claims 1 to 16, wherein the fine-cut tobacco (1) has a cut width of 0.5 mm to 0.9 mm.
18. Device for the pasteurization of smoking tobacco (1), comprising a packing station (3), a package (2), which provides a moisture barrier and which is filled with the tobacco in the packing station (3), and a heating station (5), wherein the device is adapted to conduct a method according to any one of claims 1 to 17.
19. Device of claim 18, comprising a cooling station (6), wherein the device is adapted to conduct a method according to any one of the previous claims.
20. Packaged smoking tobacco product in a package (2) providing a moisture barrier manufactured by the method according to any one of the claims 1 to 19.
21. Packaged tobacco product according to claim 20, wherein the tobacco (1) comprises up to about 9 percent by total weight of humectants.
22. Packaged tobacco product according to claim 20 or 21, wherein the package (2) is made of a laminate which provides the moisture barrier.
23. Packaged tobacco product according to any one of claims 20 to 22, which has a weight of 10g to 300g.

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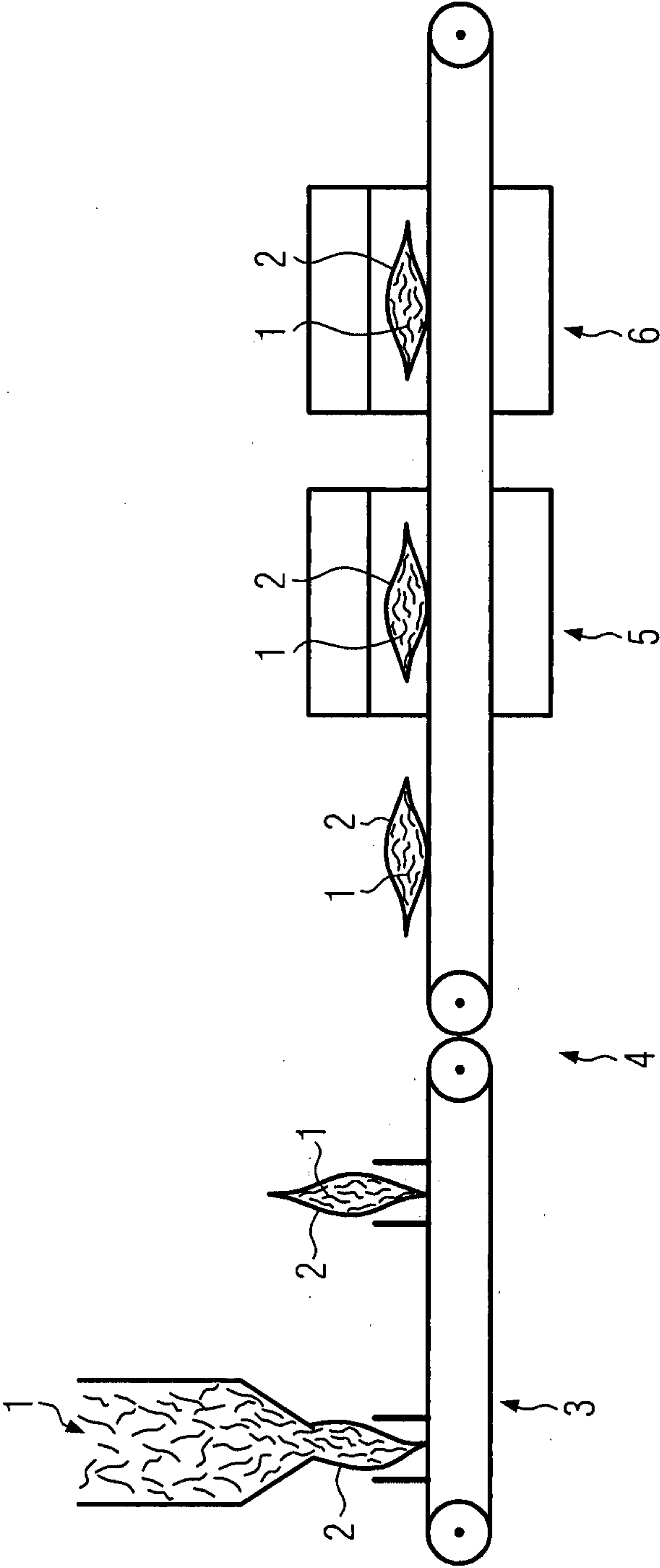


FIG. 1

