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(54) **CARTRIDGE LOADING METHOD**

(57) A method for assembling a cartridge is provided. The method for assembling the cartridge includes the following. Multiple outer tubes (10) are provided, where each of the multiple outer tubes (10) has a sealing portion (20) at a first end (11) of a corresponding outer tube (10). Tobacco (30) is loaded from a second end (12) of the outer tube (10), where the second end (12) is opposite to the first end (11). A closed end (41) of a cooling tube (40) is identified, and the cooling tube (40) is mounted into the outer tube (10) from the second end (12) to make the closed end (41) adjacent to the tobacco (30), where the cooling tube (40) has the closed end (41) and an open end (42) opposite to the closed end (41). A filter member (50) is mounted into the outer tube (10) from the second end (12) to make the filter member (50) adjacent to the cooling tube (40). A heat-not-burn (HNB) cartridge prepared by the method for assembling the cartridge is of high quality.

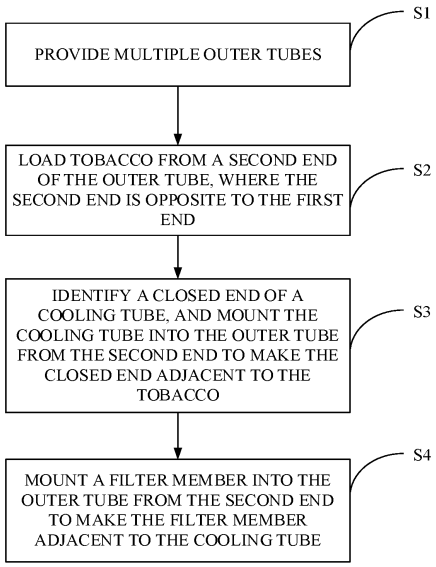

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims priority to Chinese Patent Application No. 202210302142.8, filed March 25, 2022, and entitled "METHOD FOR ASSEMBLING CARTRIDGE", the entire disclosure of which is hereby incorporated by reference.

TECHNICAL FIELD

[0002] This application relates to the field of e-cigarette preparation, in particular, to a method for assembling a cartridge.

BACKGROUND

[0003] With the development of technology, heat-not-burn (HNB) cartridge has been increasingly used among users. In the process of preparing the HNB cartridge by means of assembling, for a cooling tube that is sealed at one end, an unsealed end of the cooling tube may be adjacent to the tobacco, resulting in that the tobacco in the HNB cartridge may fall into the cooling tube. In this case, the use of the HNB cartridge may be affected, and thus the HNB cartridge is of poor quality.

SUMMARY

[0004] Embodiments of the disclosure provide a method for assembling a cartridge. The method for assembling the cartridge includes the following. Multiple outer tubes are provided, where each of the multiple outer tubes has a sealing portion at a first end of a corresponding outer tube. Tobacco is loaded from a second end of the outer tube, where the second end is opposite to the first end. A closed end of a cooling tube is identified, and the cooling tube is mounted into the outer tube from the second end to make the closed end adjacent to the tobacco, where the cooling tube has the closed end and an open end opposite to the closed end. A filter member is mounted into the outer tube from the second end to make the filter member adjacent to the cooling tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] In order to describe technical solutions in embodiments of the disclosure more clearly, the following will give an introduction to the accompanying drawings required for describing the embodiments.

FIG. 1 is a flowchart of a method for assembling a cartridge provided in an embodiment of the disclosure.

FIG. 2 is a schematic structural view of a cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 3 is a schematic view of assembling the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 4 is a flowchart of assembling the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 5 is a schematic view of assembling the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 4.

FIG. 6 is a flowchart of identifying an orientation of an open end of the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 4.

FIG. 7 is a flowchart of sealing an outer tube in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 8 is a flowchart of assembling a filter member in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 9 is a schematic view of assembling the filter member in the method for assembling the cartridge provided in the embodiment of FIG. 8.

FIG. 10 is a flowchart of an assembling position of the filter member in the method for assembling the cartridge provided in the embodiment of FIG. 9.

FIG. 11 is a flowchart of packing and testing the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 1.

FIG. 12 is a schematic structural view of the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 11.

FIG. 13 is a partially enlarged view of the cartridge provided in the embodiment of FIG. 12 at portion I.

FIG. 14 is a flowchart of transporting the outer tube in a preset direction in the method for assembling the cartridge provided in the embodiment of FIG. 11.

FIG. 15 is a flowchart of testing multiple cartridges in the method for assembling the cartridge provided in the embodiment of FIG. 11.

DETAILED DESCRIPTION

[0006] Embodiments of the disclosure provide a method for assembling a cartridge. The method for assembling the cartridge includes the following. Multiple outer tubes are provided, where each of the multiple outer tubes has a sealing portion at a first end of a corresponding outer tube. Tobacco is loaded from a second end of the outer tube, where the second end is opposite to the first end. A closed end of a cooling tube is identified, and the cooling tube is mounted into the outer tube from the second end to make the closed end adjacent to the tobacco, where the cooling tube has the closed end and an open end opposite to the closed end. A filter member is mounted into the outer tube from the second end to make the filter member adjacent to the cooling

tube.

[0007] In an embodiment, the closed end of the cooling tube is identified, and the cooling tube is mounted into the outer tube from the second end to make the closed end adjacent to the tobacco as follows. Multiple cooling tubes are transported in a preset direction. Orientation of the open end of each of the multiple cooling tubes is identified. When an open end of a cooling tube faces towards the preset direction, the cooling tube is reversed to make a closed end of the cooling tube face towards the preset direction after reversing. The multiple cooling tubes are transported to positions of the multiple outer tubes, where the closed end of each of the multiple cooling tubes is closer to the second end than the open end. The cooling tube is mounted into the outer tube from the second end.

[0008] In an embodiment, the orientation of the open end of each of the multiple cooling tubes is identified as follows. The orientation of the open end of each of the multiple cooling tubes is identified for multiple times during transportation of the multiple cooling tubes.

[0009] In an embodiment, the multiple outer tubes are provided as follows. An adhesive is applied to the first end of each of the multiple outer tubes. A sealing member is attached to the first end of each of the multiple outer tubes. A position where the sealing member is attached to the first end of each of the multiple outer tubes is heated and pressurized. The sealing member is cut along an outer contour of each of the multiple outer tubes to form the sealing portion that seals the first end of each of the multiple outer tubes.

[0010] In an embodiment, a duration t for heating the position where the sealing member is attached to the first end of each of the multiple outer tubes satisfies $5s \leq t \leq 8s$, a temperature T for heating the position where the sealing member is attached to the first end of each of the multiple outer tubes satisfies $120°C \leq T \leq 200°C$, and a pressure P applied to the outer tube satisfies $100Pa \leq P \leq 300Pa$.

[0011] In an embodiment, the filter member is mounted into the outer tube from the second end to make the filter member adjacent to the cooling tube as follows. Multiple filter members are provided. The multiple filter members are transported to positions of the multiple outer tubes, where a center of a filter member is aligned with the outer tube and is adjacent to the second end. The filter member is mounted into the outer tube from the second end.

[0012] In an embodiment, the filter member is mounted into the outer tube from the second end as follows. The filter member is mounted into the outer tube from the second end, where one end of the filter member away from the cooling tube is flush with the second end.

[0013] In an embodiment, after the filter member is mounted into the outer tube from the second end to make the filter member adjacent to the cooling tube, the method for assembling the cartridge further includes the following. The multiple outer tubes are transported in a preset direction. An outer surface of each of the multiple outer tubes is wrapped with a packaging member to form multiple cartridges. The multiple cartridges are tested. The multiple cartridges are accommodated after testing.

[0014] In an embodiment, the multiple outer tubes are transported in a preset direction as follows. The multiple outer tubes are transported in a first direction, where a length direction of the outer tube is consistent with the first direction. A transportation direction of the multiple outer tubes is changed to transport the multiple outer tubes in the preset direction, where the length direction of the outer tube is perpendicular to the preset direction.

[0015] In an embodiment, the multiple cartridges are tested as follows. The multiple cartridges are transported in sequence to a testing point. A peripheral side, an inner part, and two opposite ends of each of the multiple cartridges are tested. A cartridge that is unqualified for testing is eliminated.

[0016] In an embodiment, a material of the sealing portion includes at least one of: silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2.

[0017] In an embodiment, a ventilation sealing portion is disposed at the closed end, and a material of the ventilation sealing portion includes at least one of: silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2.

[0018] In an embodiment, the ventilation sealing portion defines one or more through holes.

[0019] In an embodiment, the closed end is identified through visual identification, touch identification, or infrared sensing identification.

[0020] In an embodiment, the closed end abuts against the tobacco.

[0021] In an embodiment, the closed end is spaced apart from the tobacco.

[0022] In an embodiment, one end of the filter member away from the second end is spaced apart from the open end.

[0023] In an embodiment, one end of the filter member away from the second end abuts against the open end.

[0024] In an embodiment, one end of the filter member away from the second end abuts against the open end and partially enters the cooling tube through the open end.

[0025] In an embodiment, the multiple cooling tubes are transported through at least one of a transporting belt, a guide rail, a vehicle, or a robotic arm.

[0026] The following will illustrate technical solutions of embodiments of the disclosure with reference to the accompanying drawings of embodiments of the disclosure. Apparently, embodiments described herein are merely some embodiments, rather than all embodiments, of the disclosure. Based on the embodiments of the disclosure, all other embodiments obtained by those of ordinary skill in the art without creative effort shall fall within the protection scope of the disclosure.

[0027] The terms "first", "second", and the like used in the specification, the claims, and the accompany drawings of the disclosure are used to distinguish different

objects rather than describe a particular order. In addition, the terms "include", "comprise", as well as variations thereof are intended to cover non-exclusive inclusion. For example, a process, a method, a system, a product, or a device that includes a series of steps or units is not limited to the listed steps or units, but optionally further includes an unlisted step or unit, or optionally further includes another step or unit inherent to the process, the method, the product, or the device.

[0028] Reference herein to an "embodiment" or "implementation" means particular features, structures, or characteristics described in connection with embodiments may be included in at least one embodiment of the present disclosure. The phrase appearing in various positions in the specification does not necessarily refer to the same embodiment, nor is it an independent or alternative embodiment that is mutually exclusive with other embodiments. Those of ordinary skill in the art explicitly and implicitly understand that the embodiments described in present disclosure can be combined with other embodiments.

[0029] Embodiments of the disclosure provide a method for assembling a cartridge 1. Reference is made to FIG. 1, FIG. 2, and FIG. 3. FIG. 1 is a flowchart of a method for assembling a cartridge provided in an embodiment of the disclosure. FIG. 2 is a schematic structural view of a cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 1. FIG. 3 is a schematic view of assembling the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 1. In the embodiment, the method for assembling the cartridge 1 includes the following. Multiple outer tubes 10 are provided, where each of the multiple outer tubes 10 has a sealing portion 20 at a first end 11 of a corresponding outer tube 10. Tobacco 30 is loaded from a second end 12 of the outer tube 10, where the second end 12 is opposite to the first end 11. A closed end 41 of a cooling tube 40 is identified, and the cooling tube 40 is mounted into the outer tube 10 from the second end 12 to make the closed end 41 adjacent to the tobacco 30, where the cooling tube 40 has the closed end 41 and an open end 42 opposite to the closed end 41. A filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the cooling tube 40.

[0030] In the embodiment, the method for assembling the cartridge 1 is used in the production of the cartridge 1. Specifically, the method for assembling the cartridge 1 includes operations at S1, S2, S3, and S4. Detailed description of the operations at S1, S2, S3, and S4 will be made in the following.

[0031] At S1, multiple outer tubes 10 are provided.

[0032] In the embodiment, each of the multiple outer tubes 10 has the sealing portion 20 at the first end 11. The sealing portion 20 is used to seal the first end 11 of the outer tube 10, and the sealing portion 20 is made of food-grade material. For example, the material of the sealing portion 20 includes at least one of: silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2. For a user of the cartridge 1, the first end 11 of the outer tube 10 is one end away from the lip of the user, and the second end 12 of the outer tube 10 opposite to the first end 11 is one end close to the lip of the user. Each of the multiple outer tubes 10 is placed vertically, with the first end 11 facing downwards. That is, the second end 12 of each of the multiple outer tubes 10 is on top of the first end 11.

[0033] In the embodiment, for example, the multiple outer tubes 10 may be carried by a carrier assembly with multiple carrier holes. Specifically, the multiple outer tubes 10 are disposed in the multiple carrier holes, and one outer tube 10 is correspondingly disposed in one carrier hole, so that the carrier assembly can carry the multiple outer tubes 10 at the same time, thereby improving the efficiency of assembling the cartridge 1.

[0034] At S2, tobacco 30 is loaded from a second end 12 of the outer tube 10, where the second end 12 is opposite to the first end 11.

[0035] In the embodiment, the tobacco 30 may be in a shape of, but not limited to a granule, a strip, or a block. The tobacco 30 may enter the outer tube 10 from the second end 12, by means of at least one of, but not limited to, gravity of the tobacco 30 or an external force. The tobacco 30 will abut a surface of the sealing portion 20 facing towards the second end 12.

[0036] At S3, a closed end 41 of a cooling tube 40 is identified, and the cooling tube 40 is mounted into the outer tube 10 from the second end 12 to make the closed end 41 adjacent to the tobacco 30.

[0037] In the embodiment, the cooling tube 40 has the closed end 41 and an open end 42 opposite to the closed end 41.Aventilation sealing portion 43 is disposed at the closed end 41, and the ventilation sealing portion 43 is made of food-grade material. For example, the material of the ventilation sealing portion 43 includes at least one of silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2. The ventilation sealing portion 43 may define one or more through holes, so as to increase the air permeability of the cooling portion. In addition, the inner diameter of the through hole on the ventilation sealing portion 43 is smaller than the outer diameter of the tobacco 30, so as to prevent the tobacco 30 from entering the cooling tube 40. In this way, the suction effect of the cartridge 1 will not be affected.

[0038] In the embodiment, the closed end 41 of the cooling tube 40 may be identified through, but not limited to, visual identification, touch identification, or infrared sensing identification, as long as the closed end 41 and the open end 42 can be distinguished.

[0039] In the embodiment, the cooling tube 40 is mounted into the outer tube 10 from the second end 12 to make the closed end 41 adjacent to the tobacco 30. The closed end 41 is used to prevent the tobacco30 from entering the cooling tube40. That the tobacco30 enters the cooling tube 40 may result in a sparse dis-

tribution of the tobacco 30, thereby affecting the heating effect of the tobacco 30. In addition, by preventing the tobacco 30 from entering the cooling tube 40, the cooling effect of the cooling tube 40 may not be affected by the tobacco 30. In an embodiment, the closed end41 abuts against the tobacco 30. In another embodiment, the closed end 41 is spaced apart from the tobacco 30, so that a moving space may be provided for the tobacco 30 when the cartridge 1 is inserted into a smoking set. In this way, the tobacco 30 may be prevented from being pressed, and thus the suction resistance may not increase.

[0040] At S4, a filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the cooling tube 40.

[0041] In the embodiment, the filtering member 50 is made of a porous and fluffy material, for example, a polylactic acid (PLA). The filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the open end 42 of the cooling tube 40. In an embodiment, one end of the filter member 50 away from the second end 12 is spaced apart from the open end 42. In another embodiment, one end of the filter member 50 away from the second end 12 abuts against the open end 42. In another embodiment, one end of the filter member 50 away from the second end 12 abuts against the open end 42 and partially enters the cooling tube 40 through the open end 42.

[0042] In the method for assembling the cartridge 1 provided in the disclosure, before the cooling tube 40 is mounted into the outer tube 10, the closed end 41 of the cooling tube 40 is identified first, and then the cooling tube 40 is mounted into the outer tube 10 to make the closed end 41 of the cooling tube 40 adjacent to the tobacco 30. With the closed end 41, the tobacco 30 may be prevented from entering the cooling tube 40. Therefore, the tobacco 30 of the cartridge 1 will not fall into the cooling tube 40, and thus the cartridge 1 is of high quality. In this way, the HNB cartridge 1 prepared by the method for assembling the cartridge 1 provided in the disclosure is of high quality.

[0043] Reference is made to FIG. 4 and FIG. 5. FIG. 4 is a flowchart of assembling the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 1. FIG. 5 is a schematic view of assembling the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 4. In the embodiment, the closed end 41 of the cooling tube 40 is identified, and the cooling tube 40 is mounted into the outer tube 10 from the second end 12 to make the closed end 41 adjacent to the tobacco 30 as follows. Multiple cooling tubes 40 are transported in a preset direction. Orientation of the open end 42 of each of the multiple cooling tubes 40 is identified. When an open end 42 of a cooling tube 40 faces towards the preset direction, the cooling tube 40 is reversed to make a closed end 41 of the cooling tube 40 face towards the preset direction after reversing. The multiple cooling tubes 40 are transported to positions of the multiple outer tubes 10, where the closed end 41 of each of the multiple cooling tubes 40 is closer to the second end 12 than the open end 42. The cooling tube 40 is mounted into the outer tube 10 from the second end 12.

[0044] In the embodiment, by identifying the orientation of the open end 42 of each of the multiple cooling tubes 40, it is ensured that the open end 42 of the cooling tube 40 faces towards the second end 12 of the outer tube 10 and the cooling tube 40 is mounted into the outer tube 10 from the second end 12. Specifically, the method of assembling the multiple cooling tubes 40 into the multiple outer tubes 10 includes operations at S31, S32, S33, S34, and S35. Detailed description of the operations at S31, S32, S33, S34, and S35 will be made in the following.

[0045] At S31, multiple cooling tubes 40 are transported in a preset direction.

[0046] In the embodiment, the preset direction refers to a direction in which the multiple cooling tubes 40 are transported to positions of the multiple outer tubes 10. The multiple cooling tubes 40 may be transported through, but not limited to, a transporting belt, a guide rail, a vehicle, or a robotic arm, as long as the multiple cooling tubes 40 can be transported in the preset direction. In addition, the multiple cooling tubes 40 may be transported through various manners in combination, such as a transporting belt, a guide rail, a vehicle, or a robotic arm.

[0047] At S32, orientation of the open end 42 of each of the multiple cooling tubes 40 is identified.

[0048] In the embodiment, the open end 41 of each of the multiple cooling tubes 40 may be identified through, but not limited to, visual identification, touch identification, or infrared sensing identification, as long as the closed end 41 and the open end 42 can be distinguished. Specifically, the ventilation sealing portion 43 is disposed at the closed end 41, and no sealing portion is disposed at the open end 42. By identifying whether there is a sealing portion at the ends of the cooling tube 40, the closed end 41 and the open end 42 can be distinguished.

[0049] At S33, when an open end42 of a cooling tube 40 faces towards the preset direction, the cooling tube 40 is reversed to make a closed end 41 of the cooling tube 40 face towards the preset direction after reversing.

[0050] In the embodiment, by identifying the open end 42 and the closed end 41 of each of the multiple cooling tubes 40, the orientation of the open end 42 or the orientation of the closed end 41 of each of the multiple cooling tubes 40 are determined. When the cooling tube 40 is transported with the closed end 41 facing towards the preset direction, the cooling tube 40 continues to be transported in the preset direction. When the cooling tube 40 is transported with the open end 42 facing towards the preset direction, the cooling tube 40 is reversed to make the cooling tube 40 transported with the closed end 41 facing towards the preset direction after reversing.

[0051] At S34, the multiple cooling tubes 40 are transported to positions of the multiple outer tubes 10, where the closed end 41 of each of the multiple cooling tubes 40

is closer to the second end 12 than the open end 42.

[0052] In the embodiment, the multiple cooling tubes 40 are transported to positions of the multiple outer tubes 10, one cooling tube 40 is correspondingly mounted into one outer tube 10, and the closed end 41 of each of the multiple cooling tubes 40 is closer to the second end 12 than the open end 42. The multiple cooling tubes 40 may be transported to positions of the multiple outer tubes 10 through at least one of, but not limited to, a transporting belt, a guide rail, a vehicle, or a robotic arm, so that the multiple cooling tubes 40 are correspondingly mounted into the multiple outer tubes 10. A distance from the closed end 41 of the cooling tube 40 to the second end 12 of the outer tube 10 is x0, which is taken as an example.

[0053] At S35, the cooling tube 40 is mounted into the outer tube 10 from the second end 12.

[0054] In the embodiment, the cooling tube 40 is mounted into the outer tube 10 from the second end 12. Specifically, by applying an external force to the cooling tube 40, the cooling tube 40 enters the outer tube 10. The cooling tube 40 is pushed towards the outer tube 10 in a distance of y1 =x0 + x1, so that the cooling tube 40 enters the outer tube 10 and the closed end 41 is adjacent to the tobacco 30. x1 = L1 - 18mm, where L1 is the length of the outer tube 10. Specifically, L1 satisfies: 42mm < L1 < 46mm.

[0055] Reference is made to FIG. 6, which is a flowchart of identifying an orientation of an open end of the cooling tube in the method for assembling the cartridge provided in the embodiment of FIG. 4. In the embodiment, the orientation of the open end 42 of each of the multiple cooling tubes 40 is identified as follows. The orientation of the open end 42 of each of the multiple cooling tubes 40 is identified for multiple times during transportation of the multiple cooling tubes 40.

[0056] In the embodiment, that the orientation of the open end 42 of each of the multiple cooling tubes 40 is identified, includes operation at S321. Specifically, the operation at S321 will be described in details.

[0057] At S321, the orientation of the open end 42 of each of the multiple cooling tubes 40 is identified for multiple times during transportation of the multiple cooling tubes 40.

[0058] In the embodiment, the orientation of the open end 42 of each of the multiple cooling tubes 40 may be identified for, but not limited to, two times, three times, or more. In this way, the accuracy of identifying the orientation of the open end 42 of the cooling tube 40 is improved, thereby reducing the chances of assembling the cooling tube 40 in a wrong direction, and improving the assembling quality of the cartridge 1.

[0059] Reference is made to FIG. 7, which is a flowchart of sealing an outer tube in the method for assembling the cartridge provided in the embodiment of FIG. 1. In the embodiment, that the multiple outer tubes 10 are provided as follows. An adhesive is applied to the first end 11 of each of the multiple outer tubes 10. A sealing member is attached to the first end 11 of each of the multiple outer tubes 10. A position where the sealing member is attached to the first end 11 of each of the multiple outer tubes 10 is heated and pressurized. The sealing member is cut along an outer contour of each of the multiple outer tubes 10 to form the sealing portion 20 that seals the first end 11 of each of the multiple outer tubes 10.

[0060] In the embodiment, the multiple outer tubes 10 need to be sealed, so that the sealing portion 20 is formed to seal the first end 11. In this way, the multiple outer tubes 10 are available for assembling. Specifically, the process of sealing the multiple outer tubes 10 includes operations at S11, S12, S13, and S14. Detailed description of the operations at S11, S12, S13, and S14 will be made in the following.

[0061] At S11, an adhesive is applied to the first end 11 of each of the multiple outer tubes 10.

[0062] In the embodiment, an adhesive is applied to the first end 11 of each of the multiple outer tubes 10, and the adhesive is a food-grade adhesive, thereby preventing the adhesive from generating harmful substances when the adhesive is heated. For example, the adhesive may be, but is not limited to, food-grade adhesives such as a glutinous rice glue, a lap glue, a straw glue, a white emulsion glue, etc. In an embodiment, the first end 11 of each of the multiple outer tubes 10 is placed in an adhesive, such that the first end 11 of each of the multiple outer tubes 10 is coated with the adhesive. In another embodiment, a container storing an adhesive is moved to the position of the multiple outer tubes 10, such that the adhesive is in contact with the first end 11 of each of the multiple outer tubes 10, and the first end 11 of each of the multiple outer tubes 10 is coated with the adhesive.

[0063] At S12, a sealing member is attached to the first end 11 of each of the multiple outer tubes 10.

[0064] In the embodiment, the sealing member is attached to the first end 11 of each of the multiple outer tubes 10, such that the sealing member is adhered to the first end 11 of each of the multiple outer tubes 10, and the first end 11 of each of the multiple outer tubes 10 is sealed. The sealing member is made of food-grade material. For example, the material of the sealing member includes at least one of silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2.

[0065] At S13, a position where the sealing member is attached to the first end 11 of each of the multiple outer tubes 10 is heated and pressurized.

[0066] In the embodiment, the position where the sealing member is attached to the first end 11 of each of the multiple outer tubes 10 is heated and pressurized, so as to increase the bonding strength between the sealing member and the first end 11.

[0067] At S14, the sealing member is cut along an outer contour of each of the multiple outer tubes 10 to form the sealing portion 20 that seals the first end 11 of each of the multiple outer tubes 10.

[0068] In the embodiment, the sealing member is cut along the outer contour of each of the multiple outer tubes 10. Specifically, in an embodiment, a laser is used to cut the sealing member along the outer contour of each of the multiple outer tubes 10 to form the sealing portion 20 that seals the first end 11 of each of the multiple outer tubes 10. In another embodiment, a cutting tool is used to cut the sealing member along the outer contour of each of the multiple outer tubes 10 to form the sealing portion 20 that seals the first end 11 of each of the multiple outer tubes 10.

[0069] In an embodiment, at S13, a duration t for heating the position where the sealing member is attached to the first end 11 of each of the multiple outer tubes 10 satisfies $5s \leq t \leq 8s$, a temperature T for heating the position where the sealing member is attached to the first end 11 of each of the multiple outer tubes 10 satisfies $120°C \leq T \leq 200°C$, and a pressure P applied to the outer tube 10 satisfies $100Pa \leq P \leq 300Pa$.

[0070] In the embodiment, the adhesive is a viscous solid-liquid mixture at normal atmospheric temperature. When the first end 11 coated with the adhesive is attached to the sealing member at normal atmospheric temperature, and the first end 11 cannot be firmly adhered to the sealing member. In the embodiment, the position where the sealing member is attached to the first end 11 is heated, so that the adhesive at the position where the sealing member is attached to the first end 11 is completely melted and the water inside the adhesive is evaporated, thereby improving the adhesive strength of the adhesive. In addition, by heating the position where the sealing member is attached to the first end 11, off-odor of the adhesive is released. In this way, when the position where the sealing member is attached to the first end 11 is heated again, there will be no off-odor released from the adhesive. In addition, the position where the sealing member is attached to the first end 11 is pressurized, so that the sealing member can be attached to the first end 11 more tightly. After the position where the sealing member is attached to the first end 11 is cooled, the adhesive is cured and can fixedly connect the first end 11 and the sealing member due to water evaporation. After the adhesive being heated and the position where the sealing member is attached to the first end 11 being pressurized, the first end 11 is attached to the sealing member more tightly, and the bonding between the first end 11 and the sealing member becomes stronger. Specifically, for example, the heating duration t for attaching the first end 11 and the seal satisfies: $5s \leq t \leq 8s$, the temperature T satisfies: $120°C \leq T \leq 200°C$, and the pressure P applied to the outer tube 10 satisfies: $100Pa \leq P \leq 300Pa$. Excessively long heating duration, excessively high heating temperature, and excessively high pressure are improper, otherwise damage to the outer tube 10 and the sealing member may be caused. Excessively short heating duration, excessively low heating temperature, and excessively low pressure are improper, otherwise the first end 11 may be unfirmly adhered to the sealing member.

[0071] Reference is made to FIG. 8 and FIG. 9. FIG. 8 is a flowchart of assembling a filter member in the method for assembling the cartridge provided in the embodiment of FIG. 1. FIG. 9 is a schematic view of assembling the filter member in the method for assembling the cartridge provided in the embodiment of FIG. 8. In the embodiment, that the filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the cooling tube 40 as follows. Multiple filter members 50 are provided. The multiple filter members 50 are transported to positions of the multiple outer tubes 10, where a center of a filter member 50 is aligned with the outer tube 10 and is adjacent to the second end 12. The filter member 50 is mounted into the outer tube 10 from the second end 12.

[0072] In the embodiment, the process of assembling the filter member 50 to the outer tube 10 includes operations at S41, S42, and S43. Detailed description of the operations at S41, S42, and S43 will be made in the following.

[0073] At S41, multiple filter members 50 are provided.

[0074] In the embodiment, the outer diameter of the filter member 50 is larger than the inner diameter of the outer tube 10. Specifically, the inner diameter of the outer tube 10 is d0, where d0 satisfies $6.4mm \leq d0 \leq 6.65mm$, and the outer diameter of the filter member 50 is d1, where d1 satisfies $6.5mm \leq d1 \leq 7mm$.

[0075] At S42, the multiple filter members 50 are transported to positions of the multiple outer tubes 10, where a center of a filter member 50 is aligned with the outer tube 10 and is adjacent to the second end 12.

[0076] In the embodiment, the multiple cooling tubes 40 may be transported to positions of the multiple outer tubes 10 through at least one of, but not limited to, a transporting belt, a guide rail, a vehicle, or a robotic arm. The center of the filter member 50 is aligned with the outer tube 10, thereby improving the accuracy of assembling the filter member 50.

[0077] At S43, the filter member 50 is mounted into the outer tube 10 from the second end 12.

[0078] In the embodiment, the filter member 50 is made of a porous and fluffy material, for example, a PLA, such that the filter member 50 may be compressed when subjected to a force. With the material property of the filter member 50, the filter member 50 may be mounted into the outer tube 10 from the second end 12 by applying an external force to the filter member 50. Although the outer diameter of the filter member 50 is larger than the inner diameter of the outer tube 10, the filter member 50 can still be mounted into the outer tube 10 when an external force is applied to the filter member 50. After the filter member 50 enters the outer tube 10, the filter member 50 is tightly fitted with the outer tube 10 by self-expanding, so as to seal the second end 12.

[0079] Reference is made to FIG. 9 and FIG. 10. FIG 10 is a flowchart of an assembling position of the filter member in the method for assembling the cartridge pro-

vided in the embodiment of FIG. 9. In the embodiment, that the filter member 50 is mounted into the outer tube 10 from the second end 12 as follows. The filter member 50 is mounted into the outer tube 10 from the second end 12, where one end of the filter member 50 away from the cooling tube 40 is flush with the second end 12.

[0080] In the embodiment, that the filter member 50 is mounted into the outer tube 10 from the second end 12, includes operation at S431. Detailed description of the operation at S431 will be made in the following.

[0081] At S431, the filter member 50 is mounted into the outer tube 10 from the second end 12, where one end of the filter member 50 away from the cooling tube 40 is flush with the second end 12.

[0082] At the operation at S42, when the center of the filter member 50 is aligned with the outer tube 10, a distance from one end of the filter member 50 adjacent to the second end 12 to the second end 12 is, for example, x2. The filter member 50 is pushed towards the outer tube 10 in a distance of y2, and $y2 = x2 + L2$. L2 is the length of the filter member 50, specifically, L2 satisfies $8mm \leq L2 \leq 10mm$. Therefore, by controlling the distance of pushing the filter member 50, one end of the filter member 50 away from the cooling tube 40 is ensured to be flush with the second end 12 after the filter member 50 is mounted into the outer tube 10.

[0083] Reference is made to FIG. 11, FIG. 12, and FIG. 13. FIG. 11 is a flowchart of packing and testing the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 1. FIG. 12 is a schematic structural view of the cartridge in the method for assembling the cartridge provided in the embodiment of FIG. 11. FIG. 13 is a partially enlarged view of the cartridge provided in the embodiment of FIG. 12 at portion I. In the embodiment, after the filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the cooling tube 40, the method for assembling the cartridge 1 further includes the following. The multiple outer tubes 10 are transported in a preset direction. An outer surface of each of the multiple outer tubes 10 is wrapped with a packaging member 60 to form multiple cartridges 1. The multiple cartridges 1 are tested. The multiple cartridges 1 are accommodated after testing.

[0084] In the embodiment, after completing the operation at S4, each of the multiple outer tubes 10 is wrapped to form the multiple cartridges 1, and then the multiple cartridges 1 are tested to ensure the production quality of the multiple cartridges 1. Specifically, after the filter member 50 is mounted into the outer tube 10 from the second end 12 to make the filter member 50 adjacent to the cooling tube 40, the method for assembling the cartridge 1 further includes operations at S5, S6, S7, and S8. Detailed description of the operations at S5, S6, S7, and S8 will be made in the following.

[0085] At S5, the multiple outer tubes 10 are transported in a preset direction.

[0086] In the embodiment, the preset direction refers to a direction in which the multiple outer tubes 10 are transported to positions where the multiple outer tubes 10 are wrapped. The multiple outer tubes 40 may be transported through, but not limited to, a transporting belt, a guide rail, a vehicle, or a robotic arm.

[0087] At S6, an outer surface of each of the multiple outer tubes 10 is wrapped with a packaging member 60 to form multiple cartridges 1.

[0088] In the embodiment, the outer surface of each of the multiple outer tubes 10 is wrapped with the packaging member 60 to form the multiple cartridges 1. The packaging member 60 is made of food-grade material, so that the packaging member 60 may be prevented from generating toxic substances when the packaging member 60 is heated. Specifically, the packaging member 60 may be, but is not limited to, tipping paper of 32 g/m^2 ~ 40 g/m^2. A surface of the packaging member 60 that is attached to the outer tube 10 is coated with glue, so that the packaging member 60 is able to package the outer tube 10. The packaging member 60 wraps the outer tube 10, and can cover the dirt and creases on an outer surface of the outer tube 10.

[0089] At S7, the multiple cartridges 1 are tested.

[0090] In the embodiment, the multiple cartridges 1 may be tested through, but not limited to, visual detection or infrared detection. Specifically, whether the first end 11 of the outer tube 10 is sealed will be tested, whether the filter member 50 is intact will be tested, whether a rim of the packaging member 60 and the adhesion of the packaging member 60 are fine will be tested, whether the outer surface of the packaging member 60 is contaminated will be tested, whether the tobacco 30 is loaded in the cartridge 1 will be tested, and whether the orientation of the cooling tube 40 is correct will be tested, etc.

[0091] At S8, the multiple cartridges 1 are accommodated after testing.

[0092] In the embodiment, those qualified cartridges 1 are accommodated. It is to be noted that, the qualified cartridge 1 means that the cartridge 1 tested in operation S7 is in good condition in terms of all the criteria. Specifically, the first end 11 of the outer tube 10 is sealed, the filter member 50 is intact, the rim of the packaging member 60 and the adhesion of the packaging member 60 are fine, the outer surface of the packaging member 60 is not contaminated, the tobacco 30 is loaded in the cartridge 1, and the orientation of the cooling tube 40 is correct.

[0093] Reference is made to FIG. 14, which is a flowchart of transporting the outer tube in a preset direction in the method for assembling the cartridge provided in the embodiment of FIG. 11. In the embodiment, the multiple outer tubes 10 are transported in a preset direction as follows. The multiple outer tubes 10 are transported in a first direction, where a length direction of the outer tube 10 is consistent with the first direction. A transportation direction of the multiple outer tubes 10 is changed to transport the multiple outer tubes 10 in the preset direction, where the length direction of the outer tube 10 is perpendicular to the preset direction.

[0094] In the above embodiment, operation at S5 specifically includes operations at S51 and S52. In the embodiment, detailed description of the operations at S51 and S52 will be made in the following.

[0095] At S5 1, the multiple outer tubes 10 are transported in a first direction.

[0096] In the embodiment, a length direction of the outer tube 10 is consistent with the first direction. In the embodiment, the multiple outer tubes 10 are transported using a first transporting belt.

[0097] At S52, a transportation direction of the multiple outer tubes 10 is changed to transport the multiple outer tubes 10 in the preset direction.

[0098] In the embodiment, the length direction of the outer tube 10 is perpendicular to the preset direction, so as to package the outer tube 10 with the packaging member 60. In the embodiment, the multiple outer tubes 10 are transported using a second transporting belt, and the transportation direction of the second transporting belt is perpendicular to the direction of the first transporting belt. In the embodiment, the multiple outer tubes 10 are transferred from the first transporting belt to the second transporting belt, and thus the transportation direction of the multiple outer tubes 10 is changed. For example, the multiple outer tubes 10 may be transferred from the first transporting belt to the second transporting belt through manners such as, but not limited to, gripping by a mechanical arm, sucking by a suction device, or pushing by a push rod structure.

[0099] Reference is made to FIG. 15, which is a flowchart of testing multiple cartridges in the method for assembling the cartridge provided in the embodiment of FIG. 11. In the embodiment, the multiple cartridges 1 are tested as follows. The multiple cartridges 1 are transported in sequence to a testing point. A peripheral side, an inner part, and two opposite ends of each of the multiple cartridges 1 are tested. A cartridge 1 that is unqualified for testing is eliminated.

[0100] In the embodiment, the above operation at S7 specifically includes operations at S71, S72, and S73. Detailed description of the operations at S71, S72, and S73 will be made in the following.

[0101] At S71, the multiple cartridges 1 are transported in sequence to a testing point.

[0102] In the embodiment, the multiple cartridges 1 are transported in sequence to the testing point, so that the multiple cartridges 1 may be tested in the testing point.

[0103] At S72, a peripheral side, an inner part, and two opposite ends of each of the multiple cartridges 1 are tested.

[0104] In the embodiment, the peripheral side, the inner part, and two opposite ends of each of the multiple cartridges 1 are tested, so as to test whether the cartridge 1 is qualified. Specifically, whether the first end 11 of the outer tube 10 is sealed will be tested, whether the filter member 50 is intact will be tested, whether a rim of the packaging member 60 and the adhesion of the packaging member 60 are fine will be tested, whether the outer surface of the packaging member 60 is contaminated will be tested, whether the tobacco 30 is loaded in the cartridge 1 will be tested, and whether the orientation of the cooling tube 40 is correct will be tested, etc.

[0105] At S73, a cartridge 1 that is unqualified for testing is eliminated.

[0106] In the embodiment, among the multiple cartridges 1, a cartridge 1 that is unqualified for testing is eliminated. A cartridge 1 that is unqualified for testing is eliminated through manners such as, but not limited to, gripping by a mechanical arm, sucking by a suction device, or pushing by a push rod structure.

[0107] While the embodiments of the disclosure have been illustrated and described above, it is to be understood that the above embodiments are exemplary and not to be construed as limitations to the present disclosure. Those of ordinary skills in the art can make changes, modifications, substitutions, and variations to the embodiments without departing from the scope of the present disclosure, and these improvements and polishing shall fall within the protection scope of the disclosure.

Claims

1. A method for assembling a cartridge, comprising:

   providing a plurality of outer tubes, wherein each of the plurality of outer tubes has a sealing portion at a first end of a corresponding outer tube;
   loading tobacco from a second end of the outer tube, wherein the second end is opposite to the first end;
   identifying a closed end of a cooling tube, and mounting the cooling tube into the outer tube from the second end to make the closed end adjacent to the tobacco, wherein the cooling tube has the closed end and an open end opposite to the closed end; and
   mounting a filter member into the outer tube from the second end to make the filter member adjacent to the cooling tube.

2. The method for assembling the cartridge of claim 1, wherein identifying the closed end of the cooling tube, and mounting the cooling tube into the outer tube from the second end to make the closed end adjacent to the tobacco, comprises:

   transporting a plurality of cooling tubes in a preset direction;
   identifying orientation of the open end of each of the plurality of cooling tubes;
   reversing a cooling tube to make a closed end of the cooling tube face towards the preset direction after reversing in response to an open end of the cooling tube facing towards the preset direc-

tion;
transporting the plurality of cooling tubes to positions of the plurality of outer tubes, wherein the closed end of each of the plurality of cooling tubes is closer to the second end than the open end; and
mounting the cooling tube into the outer tube from the second end.

3. The method for assembling the cartridge of claim 2, wherein identifying the orientation of the open end of each of the plurality of cooling tubes, comprises:
identifying the orientation of the open end of each of the plurality of cooling tubes for a plurality of times during transportation of the plurality of cooling tubes.

4. The method for assembling the cartridge of claim 1, wherein providing the plurality of outer tubes, comprises:

applying an adhesive to the first end of each of the plurality of outer tubes;
attaching a sealing member to the first end of each of the plurality of outer tubes;
heating and pressurizing a position where the sealing member is attached to the first end of each of the plurality of outer tubes; and
cutting the sealing member along an outer contour of each of the plurality of outer tubes to form the sealing portion that seals the first end of each of the plurality of outer tubes.

5. The method for assembling the cartridge of claim 4, wherein a duration t for heating the position where the sealing member is attached to the first end of each of the plurality of outer tubes satisfies $5s \leq t \leq 8s$, a temperature T for heating the position where the sealing member is attached to the first end of each of the plurality of outer tubes satisfies $120°C \leq T \leq 200°C$, and a pressure P applied to the outer tube satisfies $100Pa \leq P \leq 300Pa$.

6. The method for assembling the cartridge of claim 1, wherein mounting the filter member into the outer tube from the second end to make the filter member adjacent to the cooling tube, comprises:

providing a plurality of filter members;
transporting the plurality of filter members to positions of the plurality of outer tubes, wherein a center of a filter member is aligned with the outer tube and is adjacent to the second end; and
mounting the filter member into the outer tube from the second end.

7. The method for assembling the cartridge of claim 6, wherein mounting the filter member into the outer tube from the second end, comprises:
mounting the filter member into the outer tube from the second end, wherein one end of the filter member away from the cooling tube is flush with the second end.

8. The method for assembling the cartridge of claim 1, wherein after mounting the filter member into the outer tube from the second end to make the filter member adjacent to the cooling tube, the method further comprises:

transporting the plurality of outer tubes in a preset direction;
wrapping an outer surface of each of the plurality of outer tubes with a packaging member to form a plurality of cartridges;
testing the plurality of cartridges; and
accommodating the plurality of cartridges after testing.

9. The method for assembling the cartridge of claim 8, wherein transporting the plurality of outer tubes in the preset direction, comprises:

transporting the plurality of outer tubes in a first direction, wherein a length direction of the outer tube is consistent with the first direction; and
changing a transportation direction of the plurality of outer tubes to transport the plurality of outer tubes in the preset direction, wherein the length direction of the outer tube is perpendicular to the preset direction.

10. The method for assembling the cartridge of claim 8, wherein testing the plurality of cartridges, comprises:

transporting the plurality of cartridges in sequence to a testing point;
testing a peripheral side, an inner part, and two opposite ends of each of the plurality of cartridges; and
eliminating a cartridge that is unqualified for testing.

11. The method for assembling the cartridge of claim 1, wherein a material of the sealing portion comprises at least one of: silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45g/m^2 ~ 105 g/m^2.

12. The method for assembling the cartridge of claim 1, wherein a ventilation sealing portion is disposed at the closed end, and a material of the ventilation sealing portion comprises at least one of: silk tissue paper of 10 g/m^2 ~ 50 g/m^2, high permeability paper of 10 g/m^2 ~ 50 g/m^2, or butter paper of 45 g/m^2 ~ 105 g/m^2.

13. The method for assembling the cartridge of claim 12, wherein the ventilation sealing portion defines one or more through holes.

14. The method for assembling the cartridge of claim 1, wherein the closed end is identified through visual identification, touch identification, or infrared sensing identification.

15. The method for assembling the cartridge of claim 1, wherein the closed end abuts against the tobacco.

16. The method for assembling the cartridge of claim 1, wherein the closed end is spaced apart from the tobacco.

17. The method for assembling the cartridge of claim 1, wherein one end of the filter member away from the second end is spaced apart from the open end.

18. The method for assembling the cartridge of claim 1, wherein one end of the filter member away from the second end abuts against the open end.

19. The method for assembling the cartridge of claim 1, wherein one end of the filter member away from the second end abuts against the open end and partially enters the cooling tube through the open end.

20. The method for assembling the cartridge of claim 3, wherein the plurality of cooling tubes are transported through at least one of a transporting belt, a guide rail, a vehicle, or a robotic arm.

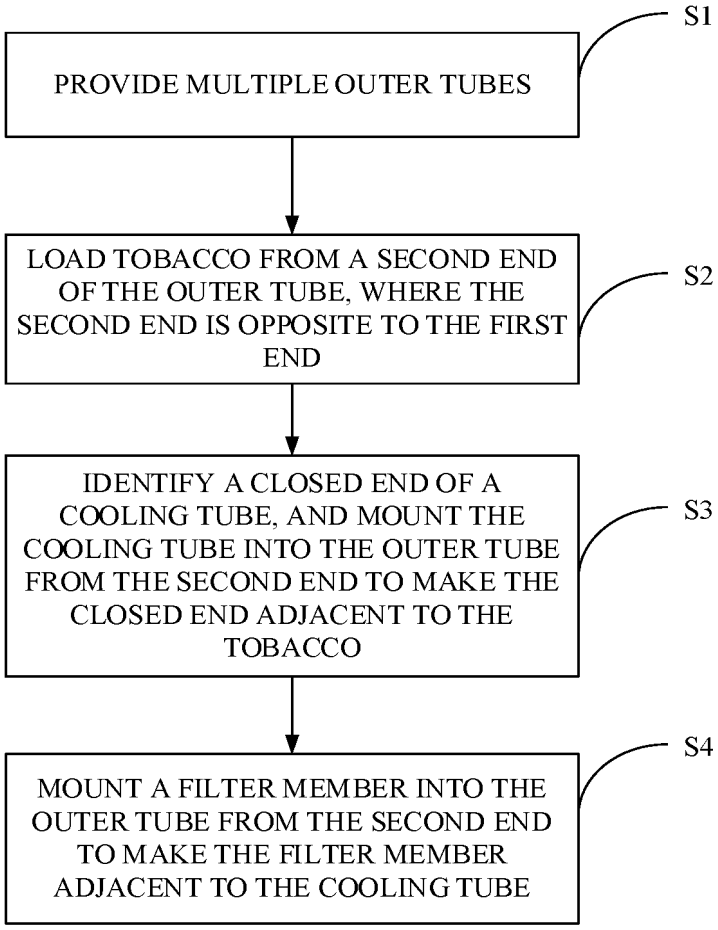
S1
PROVIDE MULTIPLE OUTER TUBES
LOAD TOBACCO FROM A SECOND END OF THE OUTER TUBE, WHERE THE SECOND END IS OPPOSITE TO THE FIRST END
S2
IDENTIFY A CLOSED END OF A COOLING TUBE, AND MOUNT THE COOLING TUBE INTO THE OUTER TUBE FROM THE SECOND END TO MAKE THE CLOSED END ADJACENT TO THE TOBACCO
S3
MOUNT A FILTER MEMBER INTO THE OUTER TUBE FROM THE SECOND END TO MAKE THE FILTER MEMBER ADJACENT TO THE COOLING TUBE
S4

FIG. 1

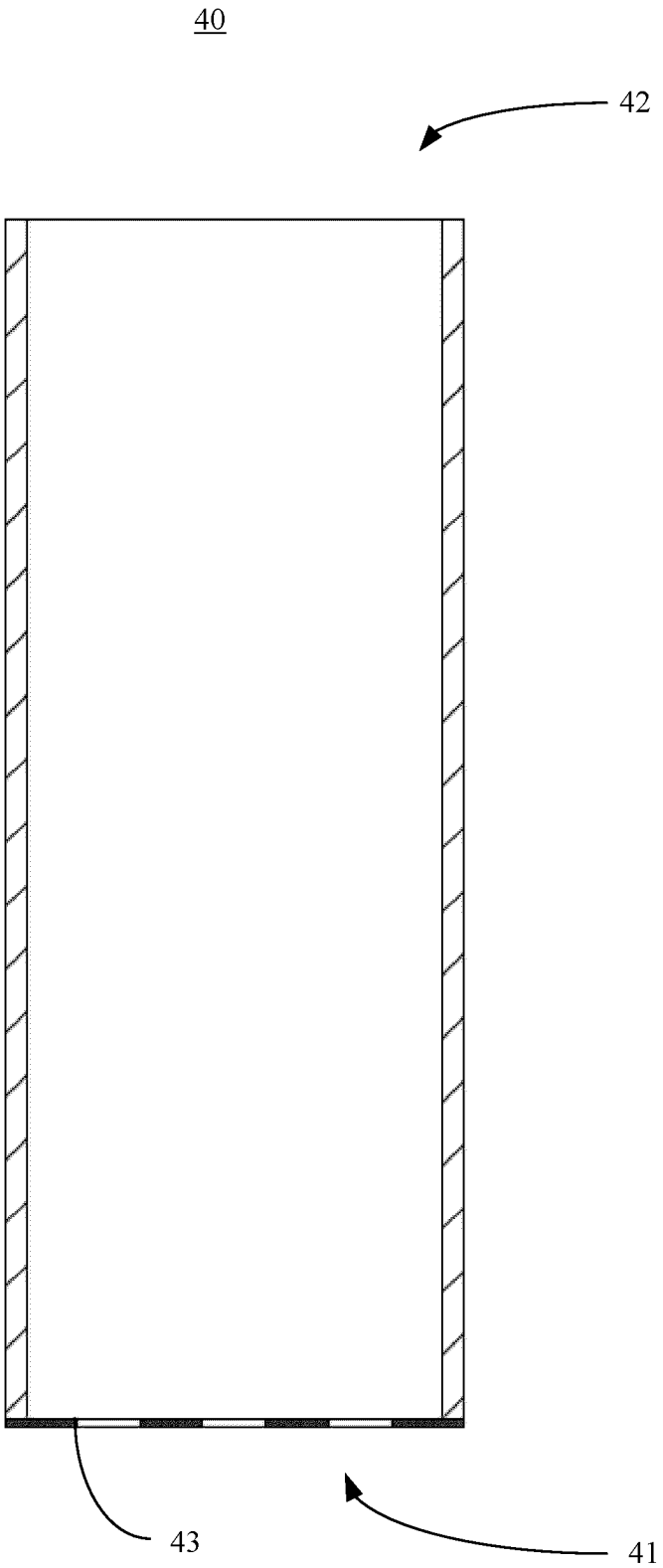

FIG. 2

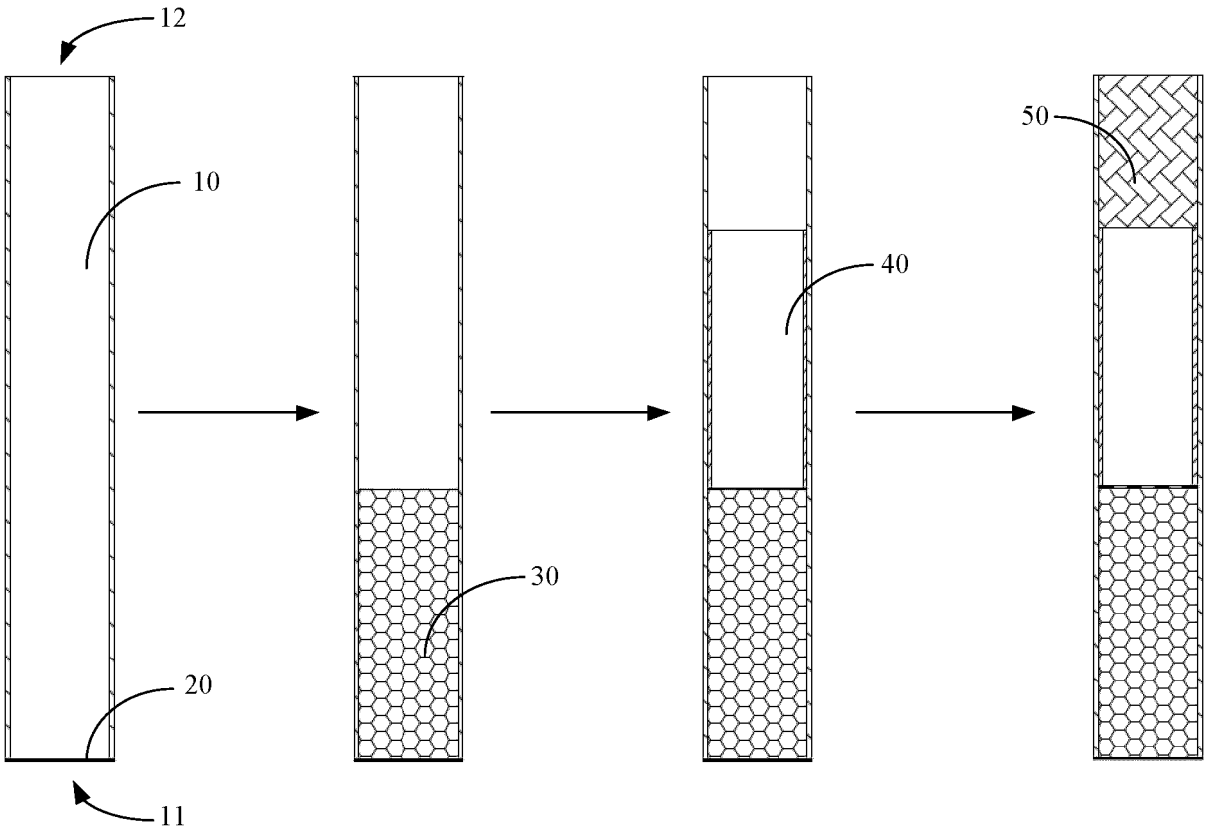

FIG. 3

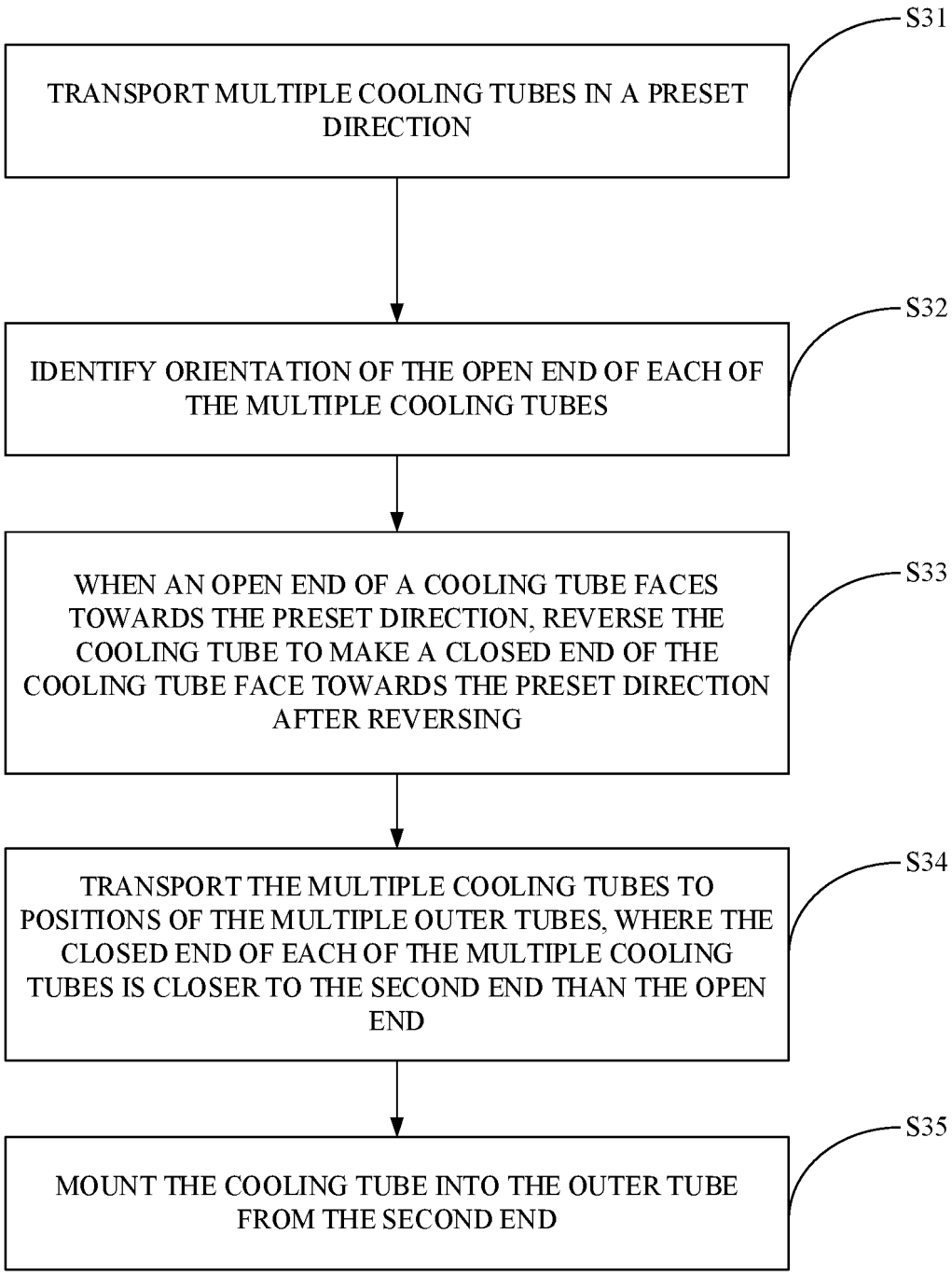
S31
TRANSPORT MULTIPLE COOLING TUBES IN A PRESET DIRECTION
S32
IDENTIFY ORIENTATION OF THE OPEN END OF EACH OF THE MULTIPLE COOLING TUBES
S33
WHEN AN OPEN END OF A COOLING TUBE FACES TOWARDS THE PRESET DIRECTION, REVERSE THE COOLING TUBE TO MAKE A CLOSED END OF THE COOLING TUBE FACE TOWARDS THE PRESET DIRECTION AFTER REVERSING
S34
TRANSPORT THE MULTIPLE COOLING TUBES TO POSITIONS OF THE MULTIPLE OUTER TUBES, WHERE THE CLOSED END OF EACH OF THE MULTIPLE COOLING TUBES IS CLOSER TO THE SECOND END THAN THE OPEN END
S35
MOUNT THE COOLING TUBE INTO THE OUTER TUBE FROM THE SECOND END

FIG. 4

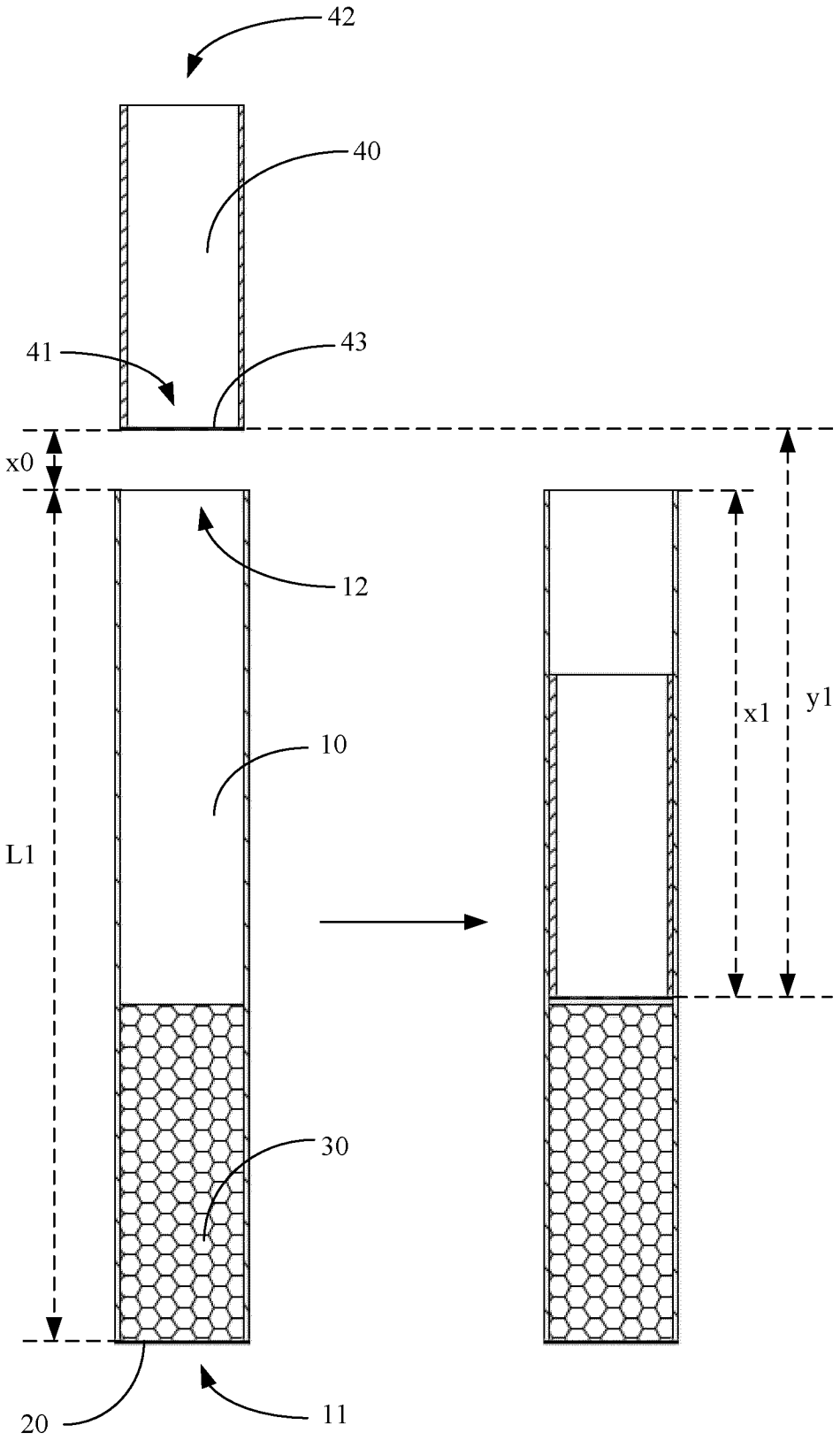

FIG. 5

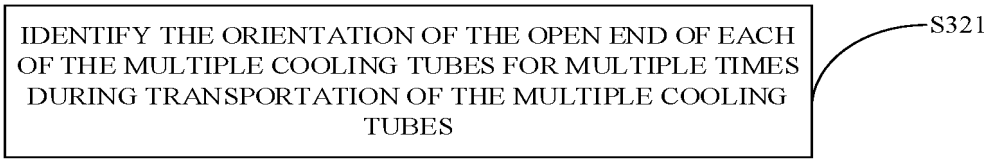
IDENTIFY THE ORIENTATION OF THE OPEN END OF EACH OF THE MULTIPLE COOLING TUBES FOR MULTIPLE TIMES DURING TRANSPORTATION OF THE MULTIPLE COOLING TUBES
S321

FIG. 6

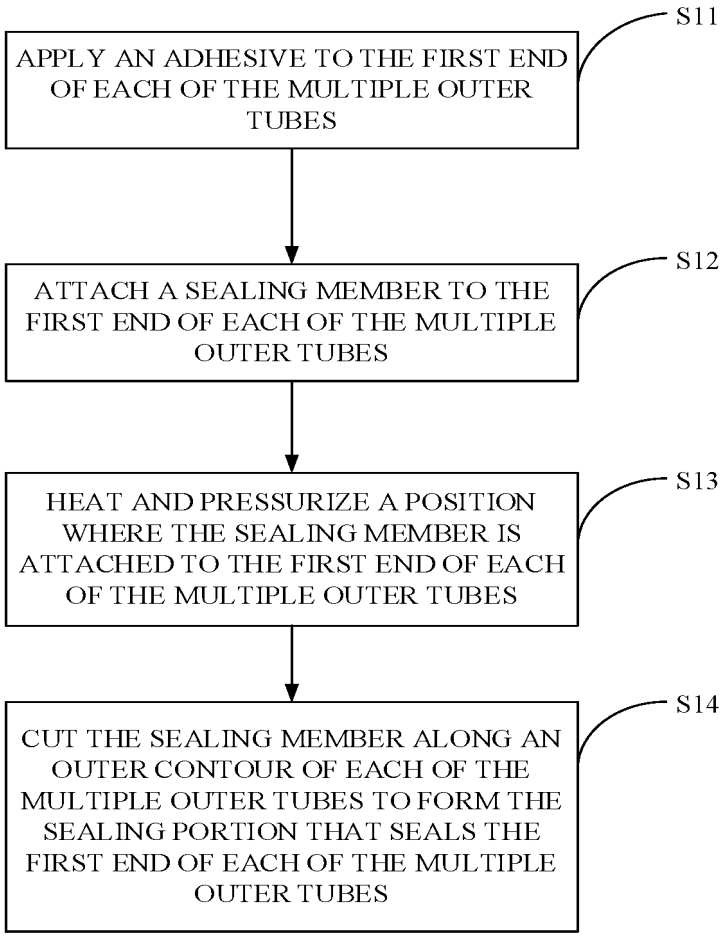
APPLY AN ADHESIVE TO THE FIRST END OF EACH OF THE MULTIPLE OUTER TUBES
S11
ATTACH A SEALING MEMBER TO THE FIRST END OF EACH OF THE MULTIPLE OUTER TUBES
S12
HEAT AND PRESSURIZE A POSITION WHERE THE SEALING MEMBER IS ATTACHED TO THE FIRST END OF EACH OF THE MULTIPLE OUTER TUBES
S13
CUT THE SEALING MEMBER ALONG AN OUTER CONTOUR OF EACH OF THE MULTIPLE OUTER TUBES TO FORM THE SEALING PORTION THAT SEALS THE FIRST END OF EACH OF THE MULTIPLE OUTER TUBES
S14

FIG. 7

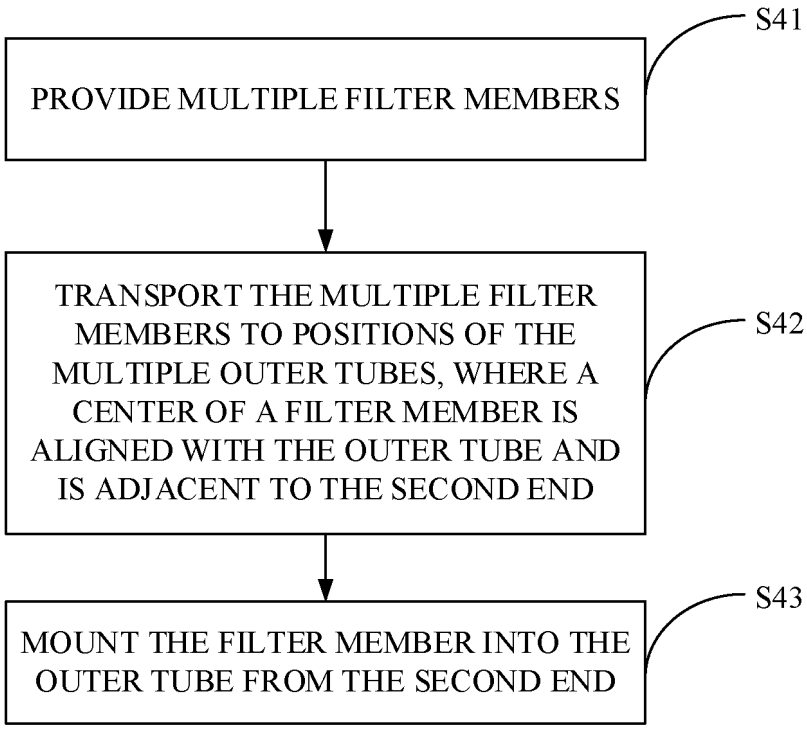
S41
PROVIDE MULTIPLE FILTER MEMBERS
TRANSPORT THE MULTIPLE FILTER MEMBERS TO POSITIONS OF THE MULTIPLE OUTER TUBES, WHERE A CENTER OF A FILTER MEMBER IS ALIGNED WITH THE OUTER TUBE AND IS ADJACENT TO THE SECOND END
S42
MOUNT THE FILTER MEMBER INTO THE OUTER TUBE FROM THE SECOND END
S43

FIG. 8

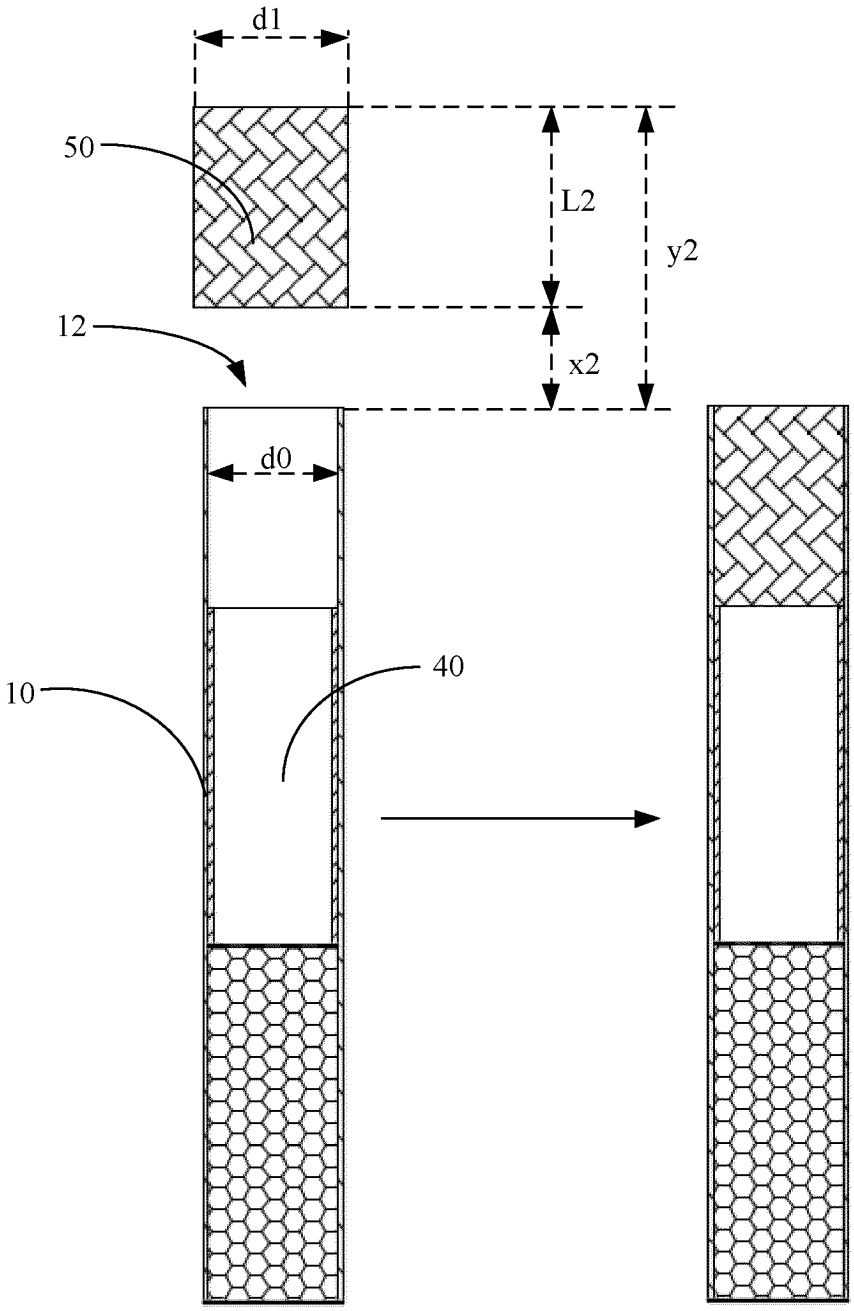

FIG. 9

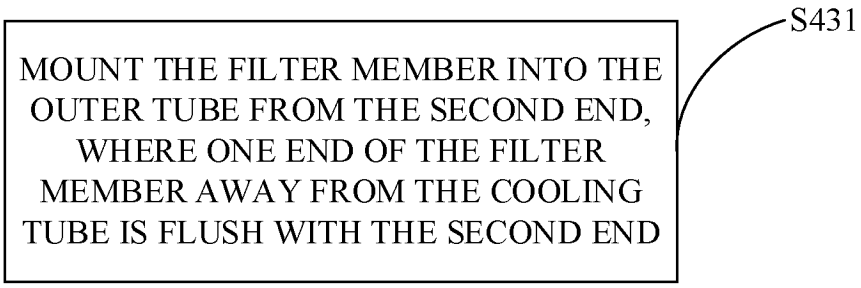
S431
MOUNT THE FILTER MEMBER INTO THE OUTER TUBE FROM THE SECOND END, WHERE ONE END OF THE FILTER MEMBER AWAY FROM THE COOLING TUBE IS FLUSH WITH THE SECOND END

FIG. 10

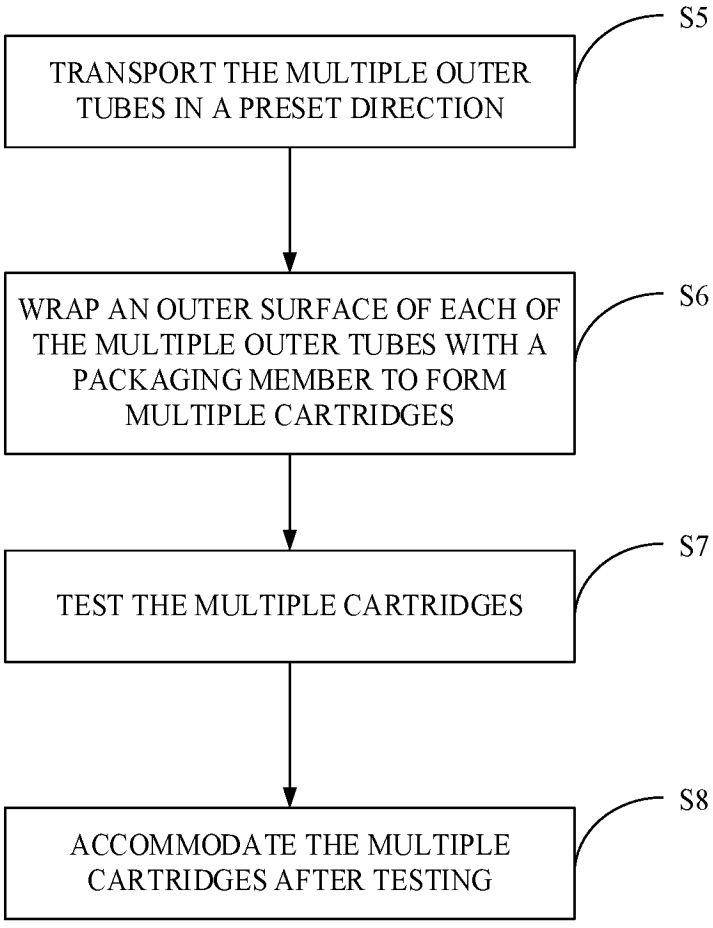
S5
TRANSPORT THE MULTIPLE OUTER TUBES IN A PRESET DIRECTION
S6
WRAP AN OUTER SURFACE OF EACH OF THE MULTIPLE OUTER TUBES WITH A PACKAGING MEMBER TO FORM MULTIPLE CARTRIDGES
S7
TEST THE MULTIPLE CARTRIDGES
S8
ACCOMMODATE THE MULTIPLE CARTRIDGES AFTER TESTING

FIG. 11

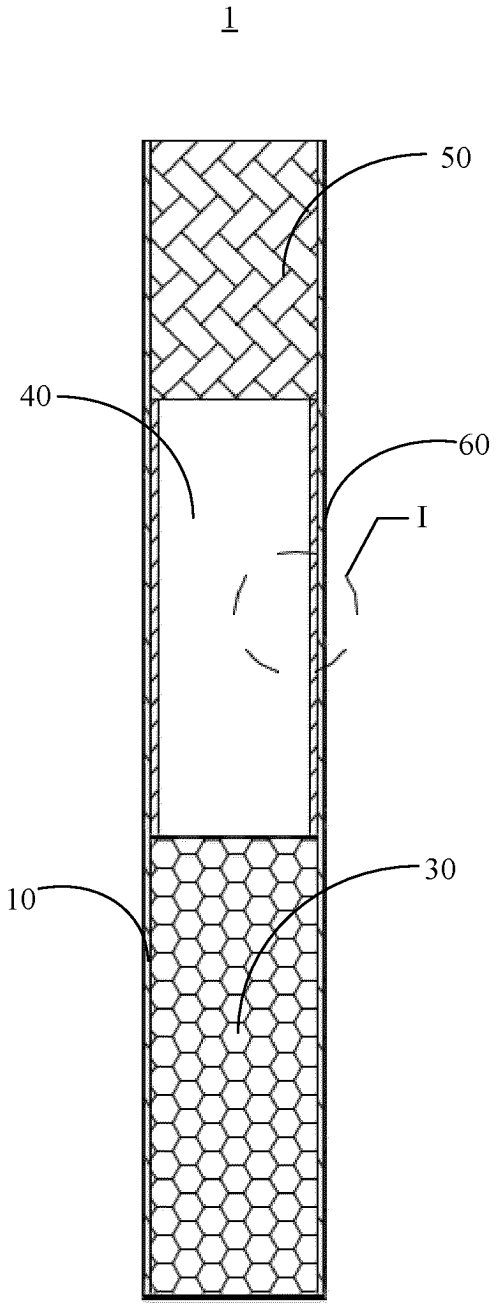

FIG. 12

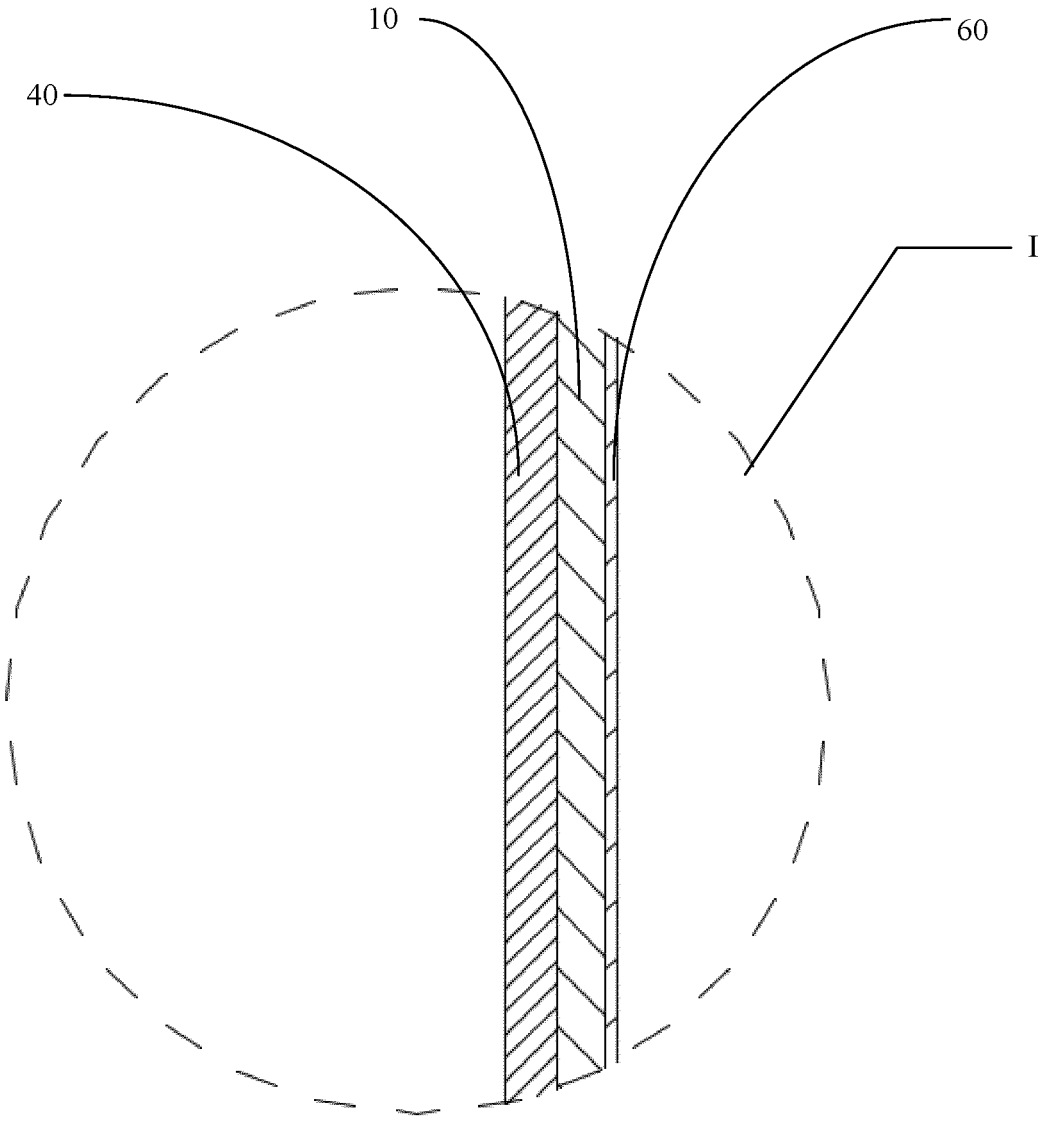

FIG. 13

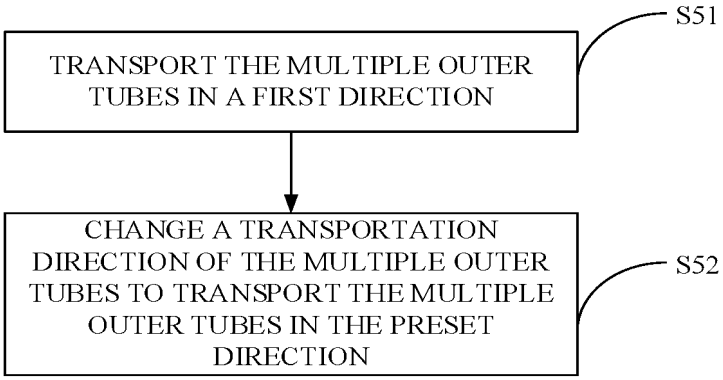
S51
TRANSPORT THE MULTIPLE OUTER TUBES IN A FIRST DIRECTION
CHANGE A TRANSPORTATION DIRECTION OF THE MULTIPLE OUTER TUBES TO TRANSPORT THE MULTIPLE OUTER TUBES IN THE PRESET DIRECTION
S52

FIG. 14

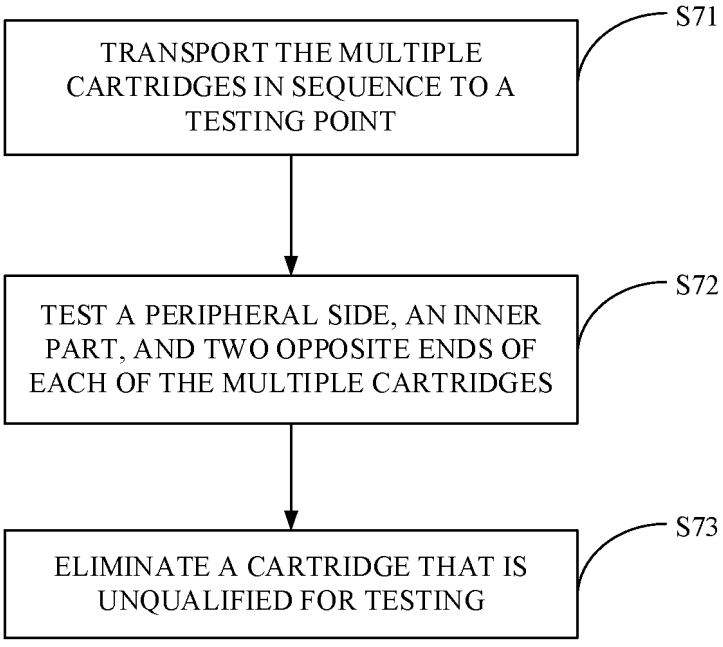
S71
TRANSPORT THE MULTIPLE CARTRIDGES IN SEQUENCE TO A TESTING POINT
S72
TEST A PERIPHERAL SIDE, AN INNER PART, AND TWO OPPOSITE ENDS OF EACH OF THE MULTIPLE CARTRIDGES
S73
ELIMINATE A CARTRIDGE THAT IS UNQUALIFIED FOR TESTING

FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/085623

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/70(2020.01)i; A24F 40/80(2020.01)i; A24F 40/40(2020.01)i; A24F 40/42(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, CNKI, WPI, EPODOC: 乐智, 烟弹, 电子烟, 装填, 组装, 装配, 安装, 管, 筒, 降温, 过滤, 封口, 开口, 检测, 识别, 方向, 朝向, 传送, 输送, 运输, 生产线, 自动化, cigarette cartridge, fill+, assembl+, pipe?, tube?, cool+, filter+, seal+, open+, detect+, identify+, recogni+, distinguish+, direction, orientation, transmit+, transport+, product+ line, automat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 215347041 U (LI HANLIN) 31 December 2021 (2021-12-31) description, paragraphs [0012]-[0015], and figure 1	1-20
Y	CN 205855295 U (GUANGZHOU GEEFULL METAL & PLASTIC PRODUCTS CO., LTD.) 04 January 2017 (2017-01-04) description, paragraphs [0019]-[0024], and figures 1-4	1-20
A	CN 109527639 A (CHINA TOBACCO ANHUI INDUSTRIAL CO., LTD.) 29 March 2019 (2019-03-29) entire document	1-20
A	CN 213281461 U (SHENZHEN XINHUO RUISHENG TECHNOLOGY CO., LTD.) 28 May 2021 (2021-05-28) entire document	1-20
A	CN 111802698 A (YUNNAN CIGOO TECHNOLOGY CO., LTD.) 23 October 2020 (2020-10-23) entire document	1-20

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 December 2022	**15 December 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

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International application No.
PCT/CN2022/085623

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 109454452 A (GUANGDONG SANSAN TECHNOLOGY CO., LTD.) 12 March 2019 (2019-03-12) entire document	1-20
A	JP 2022020618 A (FUTURE TECHNOLOGY K.K.) 01 February 2022 (2022-02-01) entire document	1-20

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/085623

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	215347041	U	31 December 2021	JP	3233480	U	12 August 2021
CN	205855295	U	04 January 2017		None		
CN	109527639	A	29 March 2019	CN	209314938	U	30 August 2019
CN	213281461	U	28 May 2021		None		
CN	111802698	A	23 October 2020	CN	212697652	U	16 March 2021
				WO	2022016714	A1	27 January 2022
				KR	20220013538	A	04 February 2022
				EP	3970519	A1	23 March 2022
				US	2022087325	A1	24 March 2022
				US	11311054	B2	26 April 2022
				JP	2022534827	W	04 August 2022
CN	109454452	A	12 March 2019	CN	209407884	U	20 September 2019
JP	2022020618	A	01 February 2022		None		

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202210302142 **[0001]**