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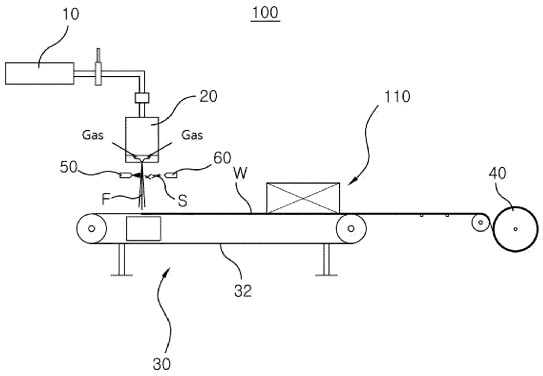
(54) **DEVICE FOR MANUFACTURING POLYETHYLENE TEREPHTHALATE MELT BLOWN FIBER WEB AND MANUFACTURING METHOD USING THE SAME**

(57) There is provided a device for manufacturing a PET melt blown fiber web further including a heat treatment machine that presses and heat-treats a PET melt blown fiber web formed on a forming table, wherein the heat treatment machine includes a porous pressure belt that presses the PET melt blown fiber web toward the forming table and transfers the PET melt blown fiber web to the winder side together with a porous circulation belt of the forming table, a hot air supply chamber that supplies high-temperature hot air to the PET melt blown fiber web to crystallize the PET melt blown fiber web that is pressed and transferred by the porous pressure belt, and a height control means that controls the height of the porous pressure belt for pressing the PET melt blown fiber web.

[FIG. 1]



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present disclosure relates to a device for manufacturing a PET melt brown fiber web and a manufacturing method of a PET melt brown fiber web using the same.

Description of the Related Art

[0002] This section provides background information related to the present disclosure which is not necessarily prior art.

[0003] In general, a melt blown method is to manufacture a fiber web using polypropylene (PP) as a raw material, and the PP melt blown fiber web has been widely used as various high-performance filters, oil absorbent fabrics, insulation materials, sound absorbing materials, and the like.

[0004] However, polypropylene (PP) has a melting point of approximately 160°C due to its characteristics, and has a problem in that it is difficult to be applied in industrial fields that require high heat resistance of 150°C or higher.

[0005] In order to solve these problems, a polyethylene terephthalate (PET) melt blown fiber web having excellent heat resistance and physical properties, excellent recyclability, and a melting point of approximately 255°C has been widely used.

[0006] However, in the case of the PET melt blown fiber web, a crystallization rate is slower than that of other crystalline polymer materials, and shrinkage occurs in a region of approximately 70°C (Tg, near a glass transition temperature), and thus, there was a problem in that it was difficult to apply directly to products without post-processing of heat treatment on the PET melt blown fiber web.

[0007] Here, the reason of the shrinkage is that a crystalline region and an amorphous region exist due to the property of a polymer material, but the amorphous region becomes loose in the glass transition temperature region, and thus, a previously maintained shape is lost and shrinkage occurs.

[0008] The heat treatment of a conventional PET melt blown fiber web is performed by applying hot air at a high temperature of 100°C to 200°C on a forming table where the fiber webs are collected.

[0009] However, during the heat treatment of the conventional PET melt blown fiber web, since hot air is not uniformly transmitted to the PET melt blown fiber web collected on the forming table at a uniform temperature, there is a difference in crystallization rate, and as a result, there were problems in that the manufactured PET melt blown fiber web was not only different in size and thickness, but also formed in an uneven shape.

[0010] In addition, there was another problem in that the thickness of the fiber web manufactured during the heat treatment of the conventional PET melt blown fiber web may not be controlled.

SUMMARY OF THE INVENTION

[0011] This section provides a general summary of the present disclosure and is not a comprehensive disclosure of its full scope or all of its features.

[0012] An object of the present disclosure is to provide a device for manufacturing a PET melt blown fiber web and a manufacturing method of a PET melt blown fiber web using the same capable of promoting the improvement of dimensional stability and productivity by crystallizing the PET melt blown fiber web at a high rate.

[0013] Another object of the present disclosure is to provide a device for manufacturing a PET melt blown fiber web and a manufacturing method of a PET melt blown fiber web using the same capable of controlling the thickness of the manufactured PET melt blown fiber web.

[0014] Technical objects to be achieved in the present disclosure are not limited to the aforementioned objects, and other technical objects not described above will be apparently understood to those skilled in the art from the following disclosure of the present disclosure.

[0015] According to an aspect of the present disclosure, there is provided a device for manufacturing a PET melt blown fiber web including: an extruder that melts and extrudes a PET resin; a die that receives a molten resin extruded from the extruder to spin an ultra-fined PET melt blown fiber in a self-weight direction; a forming table that is provided to be spaced below the die to collect and aggregate the PET melt blown fiber and to form a PET melt blown fiber web; a winder that winds the PET melt blown fiber web; and a blending nozzle for blending a PET short fiber to the PET melt blown fiber spun toward the forming table. The device for manufacturing a PET melt blown fiber web may further include a heat treatment machine that presses and heat-treats the PET melt blown fiber web formed on the forming table. The heat treatment machine may include a porous pressure belt that presses the PET melt blown fiber web toward the forming table and transfers the PET melt blown fiber web to the winder side together with a porous circulation belt of the forming table; a hot air supply chamber that supplies high-temperature hot air to the PET melt blown fiber web to crystallize the PET melt blown fiber web that is pressed and transferred by the porous pressure belt; and a height control means that controls the height of the porous pressure belt for pressing the PET melt blown fiber web.

[0016] In the device for manufacturing the PET melt blown fiber web according to an aspect of the present disclosure, the porous pressure belt may be provided as a belt in the form of a mesh net, and the porous pressure belt may be circulated and rotatably provided on carrier rollers rotatably provided between a pair of belt frames

and a drive roller of a belt drive motor. The porous pressure belt passing through the lower end of the belt frame may be provided to horizontally pass through the carrier rollers provided on both sides of the lower end of the belt frame lower than the lower end of the belt frame to transfer the PET melt blown fiber web to the winder side together with the porous circulation belt while pressing the surface of the PET melt blown fiber web to the porous circulation belt.

[0017] In the device for manufacturing the PET melt blown fiber web according to an aspect of the present disclosure, the hot air supply chamber may be provided between the belt frames so as not to interfere with the porous pressure belt, and filled with hot air blown from a hot air furnace provided outside the heat treatment machine, and in the lower portion of the hot air supply chamber, a plurality of hot air spray nozzles for spraying the hot air to the PET melt blown fiber web may be formed.

[0018] In the device for manufacturing the PET melt blown fiber web according to an aspect of the present disclosure, at least one height control means may be provided on a height control frame fixedly provided to be spaced apart from the upper side of the porous pressure belt. The height control means may include a height control servomotor provided on a gear box provided on the upper surface of the height control frame; and an elevation bar that interlocks with the height control servomotor to elevate the porous pressure belt.

[0019] In the device for manufacturing the PET melt blown fiber web according to an aspect of the present disclosure, a pinion gear may be provided on an output shaft that rotates by the operation of the height control servomotor, the elevation bar may be provided in the gear box to be elevatable. The lower end of the elevation bar may pass through the height control frame to connect onto an outer surface of the belt frame, and a rack gear engaging with the pinion gear may be formed on the elevation bar to extend along a longitudinal direction of the elevation bar.

[0020] According to another aspect of the present disclosure, there is provided a manufacturing method of a PET melt blown fiber web including a PET melt blown fiber spinning step of melting and spinning a PET raw material by a melt-blown method to form the PET melt-blown fiber; a PET melt blown fiber web forming step of collecting and aggregating the PET melt blown fiber seated on the porous circulation belt to form the PET melt blown fiber web; and a PET melt blown fiber web pressing and heat-treating step of supplying high-temperature hot air while pressing the PET melt blown fiber web to crystallize the PET melt blown fiber web.

[0021] In the manufacturing method of the PET melt blown fiber web according to another aspect of the present disclosure, in the PET melt blown fiber spinning step, the PET melt blown fiber may be spun at a temperature of 270 to 330°C at 25 to 60 m^3/min and spun to have a diameter of 2 to 5 μm.

[0022] In the manufacturing method of the PET melt blown fiber web according to another aspect of the present disclosure, in the PET melt blown fiber spinning step, a PET short fiber having a diameter of 15 to 40 μm may be blended with the spun PET melt blown fiber. The PET short fiber may be blended with the PET melt blown fiber in a ratio 3:7.

[0023] In the manufacturing method of the PET melt blown fiber web according to another aspect of the present disclosure, in the PET melt blown fiber web forming step, the porous circulation belt may be transferred at a rate of 1 to 10 m/min, and the PET melt blown fiber web having a weight of 100 to 700 g/m^2 may be formed in the porous circulation belt.

[0024] In the manufacturing method of the PET melt blown fiber web according to another aspect of the present disclosure, in the PET melt blown fiber web pressing and heat-treating step, the porous pressure belt may circulate and rotate at a rate of 1 to 10 m/min along the transfer direction of the PET melt blown fiber web, and the hot air supply chamber may spray high-temperature hot air of 80 to 200°C at a rate of 1 to 10 m^3/min through the hot air spray nozzles.

[0025] In the manufacturing method of the PET melt blown fiber web according to another aspect of the present disclosure, in the PET melt blown fiber web pressing and heat-treating step, the porous pressure belt may be spaced apart from the porous circulation belt at an interval of 1 to 150 mm and press and transfer the PET melt blown fiber web.

[0026] According to exemplary embodiments of the present disclosure, it is possible to crystallize the fiber web uniformly at a high rate by heat-treating the collected fiber web while pressing, and to promote the improvement of productivity of the PET melt blown fiber web by shortening a heat treatment time.

[0027] According to the present disclosure, it is possible to manufacture a PET melt blown fiber web having a uniform thickness by heat-treating the collected fiber web while pressing.

[0028] According to the present disclosure, it is possible to manufacture a PET melt blown fiber web having various thicknesses by controlling the pressing height of the collected fiber web.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The above and other aspects, features and other advantages of the present disclosure will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a diagram schematically illustrating a device for manufacturing a PET melt blown fiber web according to the present disclosure;

FIG. 2 is a diagram schematically illustrating a heat treatment machine illustrated in FIG. 1;

FIG. 3 is a flowchart schematically illustrating a man-

ufacturing method of a PET melt blown fiber web according to the present disclosure; and

FIG. 4 is a flowchart schematically illustrating a PET melt blown fiber spinning step illustrated in FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0030] Hereinafter, an exemplary embodiment of implementing a device for manufacturing a PET melt blown fiber web and a manufacturing method of a PET melt blown fiber web using the same according to the present disclosure will be described in detail with reference to the accompanying drawings.

[0031] However, it may not be said that an exemplary embodiment of the intrinsic technical spirit of the present disclosure is limited to an exemplary embodiment described below, and it is disclosed that the technical spirit includes a scope which may be easily proposed by a method of substitutions or changes for the exemplary embodiment described below based on the intrinsic technical spirit of the present disclosure by those skilled in the art.

[0032] Further, since terms used below are selected for easy description, the terms are not limited to dictionary meanings and should be appropriately interpreted as meanings consistent with the technical spirit of the present disclosure in order to grasp the intrinsic technical spirit of the present disclosure.

[0033] In accompanying drawings, FIG. 1 is a diagram schematically illustrating a device for manufacturing a PET melt blown fiber web according to the present disclosure.

[0034] Referring to FIG. 1, a PET melt blown fiber web manufacturing device 100 according to the present disclosure has substantially the same configuration as conventional melt blown fiber web manufacturing devices (equipment).

[0035] In order words, the PET melt blown fiber web manufacturing device 100 according to the present disclosure includes an extruder 10 that melts and extrudes a polyethylene terephthalate (PET) resin, a die 20 that receives the molten resin extruded from the extruder 10 to spin an ultra-fined PET melt blown fiber F in a self-weight direction, a forming table 30 that is provided separately below the die 20 to collect and aggregate the PET melt blown fiber F and form a PET melt blown fiber web W, and a winder 40 that winds the PET melt blown fiber web W.

[0036] In addition, the PET melt blown fiber web manufacturing device 100 further includes a twin-fluid nozzle 50 that sprays fine water droplets on the PET melt blown fiber F spun toward the forming table 30 like conventional melt blown fiber web manufacturing devices, and a blending nozzle 60 for air-blending a PET short fiber S to the PET melt blown fiber F spun toward the forming table 30.

[0037] Here, the configurations of the extruder 10, the die 20, the forming table 30, the winder 40, the twin-fluid nozzle 50 and the blending nozzle 60 and an operational relationship therebetween are well-known techniques, and thus detailed descriptions thereof are omitted.

[0038] Meanwhile, the PET melt blown fiber web manufacturing device 100 further includes a heat treatment machine 110 that presses and heat-treats the PET melt blown fiber web W collected and aggregated on the forming table 30 unlike conventional general melt blown fiber web manufacturing devices.

[0039] Among the accompanying drawings, FIG. 2 is a diagram schematically illustrating the heat treatment machine illustrated in FIG. 1.

[0040] Referring to FIG. 2, the heat treatment machine 110 of the PET melt blown fiber web manufacturing device 100 according to the present disclosure includes a porous pressure belt 120, a hot air supply chamber 130, and a height control means 140.

[0041] First, the porous pressure belt 120 presses the PET melt blown fiber web W formed on the forming table 30 toward the forming table 30 and transfers the PET melt blown fiber web W to the winder 40 side together with a porous circulation belt 32 of the forming table 30.

[0042] The porous pressure belt 120 is provided as a belt in the form of a mesh net, and provided in a closed loop shape with one end and the other end connected in an endless manner.

[0043] In the present disclosure, the porous pressure belt 120 is not particularly limited, but the porous pressure belt 120 may be provided as, for example, a conventional mesh belt.

[0044] In addition, the porous pressure belt 120 is circulated and rotatably provided on carrier rollers 124 rotatably provided between a pair of belt frames 122 and a drive roller 128 of a belt drive motor 126.

[0045] At this time, the porous pressure belt 120 passing through a lower end of the belt frame 122 is provided to pass horizontally through the carrier rollers 124 provided on both sides of the lower end of the belt frame 122 lower than the lower end of the belt frame 122.

[0046] A face surface of the porous pressure belt 120 passing horizontally through the lower end of the belt frame 122 transfers the PET melt blown fiber web W to the winder 40 side together with the porous circulation belt 32 while pressing the surface of the PET melt blown fiber web W transferred to the winder 40 side by the operation of the porous circulation belt 32 of the forming table 30 toward the porous circulation belt 32 of the forming table 30.

[0047] To this end, the porous pressure belt 120 circulates and rotates along the transfer direction of the PET melt blown fiber web W by the operation of the belt drive motor 126, and the belt drive motor 126 circulates and rotates the porous pressure belt 120 at the same rate as the transfer rate of the porous circulation belt 32 of the forming table 30, preferably at a rate of 1 to 10 m/min.

[0048] In addition, on the face surface of the porous pressure belt 120 passing horizontally through the lower end of the belt frame 122, the pressing position for press-

ing the PET melt blown fiber web W is controlled by the operation of the height control means 140, and as a result, the PET melt blown fiber web W is manufactured to have various thicknesses.

[0049] The hot air supply chamber 130 supplies high-temperature hot air to the PET melt blown fiber web W to crystallize the PET melt blown fiber web W that is pressed and transferred by the porous pressure belt 120.

[0050] The hot air supply chamber 130 is provided between a pair of belt frames 122 so as not to interfere with the circulating and rotating porous pressure belt 120, and connected with a hot air furnace (not illustrated) provided outside the heat treatment machine 110.

[0051] At this time, the inside of the hot air supply chamber 130 is filled with hot air blown from the hot air furnace.

[0052] Further, in the lower portion of the hot air supply chamber 130, a plurality of hot air spray nozzles 132 for spraying the hot air inside the hot air supply chamber 130 toward the PET melt blown fiber web W is formed in a plurality of rows and columns.

[0053] The hot air supply chamber 130 thus provided sprays hot air of 80 to 200°C through the plurality of hot air spray nozzles 132 toward the PET melt blown fiber web W at a rate of 1 to 10 m^3/min. However, since the PET melt blown fiber web W is pressed by the porous pressure belt 120, the hot air sprayed through the plurality of hot air spray nozzles 132 may be transmitted at a uniform temperature to the surface and rear surface of the PET melt blown fiber web W, so that the PET melt blown fiber web W is uniformly crystallized (heat-treated).

[0054] The height control means 140 controls the height of the porous pressure belt 120 for pressing the PET melt blown fiber web W, so that the PET melt blown fiber web W is manufactured in various thicknesses.

[0055] At least one height control means 140 is provided on a height control frame 142 fixedly provided to be spaced apart from the upper side of the porous pressure belt 120. FIG. 2 illustrates a state in which two height control means 140 are provided in the height control frame 142.

[0056] The height control means 140 includes a height control servomotor 146 and an elevation bar 150 that interlocks with the height control servomotor 146 to elevate the porous pressure belt 120.

[0057] The height control servomotor 146 is provided on a gear box 144 provided on the upper surface of the height control frame 142 as illustrated in the drawing.

[0058] At this time, a pinion gear 148 engaging with the elevation bar 150 via the gear box 144 is provided on an output shaft (not illustrated) that rotates by the operation of the height control servomotor 146.

[0059] The elevation bar 150 is provided in the form of a vertically extending bar and is provided in the gear box 144 to be elevatable.

[0060] At this time, the lower end of the elevation bar 150 passes through the height control frame 142, and the lower end of the elevation bar 150 passing through the height control frame 142 is connected to an outer surface of the belt frame 122 so as not to interfere with the porous pressure belt 120.

[0061] In addition, a rack gear 152 engaging with the pinion gear 148 is formed on the elevation bar 150 to extend along a longitudinal direction of the elevation bar 150.

[0062] That is, when the height control servomotor 146 rotates the output shaft to one side or the other side, the pinion gear 148 also rotates to one side or the other side along the output shaft. As the pinion gear 148 rotates to one side or the other side, the elevation bar 150 formed with the rack gear 152 engaging with the pinion gear 148 elevates, and accordingly, the belt frame 122 and the porous pressure belt 120 elevates along the elevation bar 150 and their heights are controlled.

[0063] Preferably, the height control means 140 controls a distance between the porous circulation belt 32 of the forming table 30 and the porous pressure belt 120 at intervals of 1 to 150 mm, so that the porous pressure belt 120 may press and transfer the PET melt blown fiber web W.

[0064] Hereinafter, a manufacturing method of a PET melt blown fiber web using the PET melt blown fiber web manufacturing device formed as described above will be described.

[0065] In the accompanying drawings, FIGS. 3 and 4 illustrate flowcharts schematically illustrating a manufacturing method of a PET melt blown fiber web according to the present disclosure. The manufacturing method of the PET melt blown fiber web according to the present disclosure includes a PET melt blown fiber spinning step (S10), a PET melt blown fiber web forming step (S20), and a PET melt blown fiber web pressing and heat-treating step (S30).

PET melt blown fiber spinning step (S10)

[0066] The PET melt blown fiber spinning step (S10) is a step (S10) of melting and spinning a polyethylene terephthalate (PET) polymer resin by a melt blown method to form a PET melt blown fiber F.

[0067] The PET melt blown fiber F formed in the PET melt blown fiber spinning step (S10) is melt-spun vertically toward the porous circulation belt 32 through the die 20 facing the porous circulation belt 32 of the forming table 30 in the vertical direction.

[0068] Here, the forming table 30 collects and aggregates the PET melt blown fiber F in the subsequent PET melt blown fiber web forming step (S20) to form a PET melt blown fiber web W.

[0069] Meanwhile, when describing the PET melt blown fiber spinning step (S10), the PET melt blown fiber spinning step (S10) includes a PET raw material charging step (S10-1), a PET raw material extruding step (S10-2), and a PET raw material spinning step (S10-3).

[0070] The PET raw material charging step (S10-1) is a step (S10-1) of charging the prepared PET raw material

into a dry hopper (not illustrated) connected to the extruder 10, and in the PET raw material charging step (S10-1), the PET raw material may be charged into the dry hopper through a conventional spring conveyor.

[0071] In addition, the PET raw material charged into the dry hopper is transferred to the extruder 10 provided on the lower side of the dry hopper, but in the process of being transferred from the dry hopper to the extruder 10, the PET raw material may be dried by hot air to have a moisture content of about 0.01 to 1.0%.

[0072] The PET raw material extruding step (S10-2) is a step (S10-2) of melting the PET raw material while receiving and transferring the PET raw material from the dry hopper and extruding the molten PET raw material, and in the PET raw material extruding step (S10-2), the PET raw material may be extruded at a rate of 1,250 g/min while maintaining a temperature of 280 to 300°C.

[0073] Here, when the PET raw material is extruded at a temperature of less than 280°C, not only flowability is lowered and load may be applied, but also there is a problem in that a molecular weight is increased and the physical properties may be distorted. When the PET raw material is extruded at a temperature of more than 300°C, there is a problem that reduction in molecular weight may occur due to thermal decomposition, and the physical properties may deteriorate and yellowing may occur.

[0074] In addition, the extrusion rate of the PET raw material may be set differently according to a melting temperature, but when the extrusion rate of the PET raw material is too slow, the residence time in the extruder becomes longer and the molecular weight is lowered due to thermal decomposition, and when the extrusion rate is too fast, a non-melting phenomenon may occur. Accordingly, the extrusion rate of the PET raw material is preferably 1,250 g/min.

[0075] In addition, the molten PET raw material extruded from the extruder may be supplied to the PET raw material spinning step (S10-3) through a conventional screen changer (not illustrated) and a gear pump (not illustrated).

[0076] The PET raw material spinning step (S10-3) is a step (S10-3) of spinning the molten PET raw material supplied in the PET raw material extruding step (S10-2) in the form of ultra-fine fibers and PET melt blown fibers using high-temperature and high-pressure gas.

[0077] The molten PET raw material supplied to the PET raw material spinning step (S10-3) passes through the die 20 and flows down in the self-weight direction through the spinning nozzle provided at the bottom of the die 20. The molten PET raw material flowing down through the spinning nozzle may be spun in the form of an ultra-fine PET melt blown fiber F by reducing a length and a diameter in the self-weight direction by the high-temperature and high-pressure gas sprayed from the sides of the spinning nozzle.

[0078] Here, the high-temperature and high-pressure gas may be 310 to 330°C, and may be sprayed at 25 to 60 m^3/min, but when the temperature of the high-temperature and high-pressure gas is less than 310°C, the spun PET melt blown fiber F is immediately cooled to become a hard fiber rather than a soft fiber, and when the temperature of the high-temperature and high-pressure gas is more than 330°C, thermal decomposition occurs to cause yellowing of the fiber.

[0079] Preferably, in the PET melt blown fiber spinning step (S10), the PET melt blown fiber F is spun to have a diameter of 2 to 10 μm, but when the diameter of the PET melt blown fiber F is less than 2 μm, workability is poor and it is difficult to form stable process conditions, and when the diameter of the PET melt blown fiber F is more than 10 μm, the sound absorption performance is deteriorated.

[0080] Meanwhile, in the PET melt blown fiber spinning step (S10), although not illustrated, a PET short fiber air-blending step of blending the PET short fiber S may be selectively added.

[0081] The PET short fiber air-blending step is to impart a bulky property to the manufactured PET melt blown fiber web W, and the PET short fiber S may be air-blended with the PET melt blown fiber F spun toward the forming table 30 through the blending nozzle 60.

[0082] Here, the PET short fiber S has a diameter of 15 to 40 μm, but when the diameter of the PET short fiber S is 15 μm, it is difficult to impart a bulky property to the manufactured PET melt blown fiber web W. When the diameter of the PET short fiber S is more than 40 μm, the bulky property is improved, but the area density of the manufactured PET melt blown fiber web W is lowered, so that the sound absorption performance is lowered.

[0083] For example, in order to improve sound absorption performance in a low frequency (1,000 Hz or less) range, the PET melt blown fiber F and the PET short fiber S are blended in a 3:7 ratio, and in order to improve the sound absorption performance in a middle and high frequency (1,000 Hz or more) range, the PET melt blown fiber F and the PET short fiber S are blended in a 7:3 ratio.

[0084] That is, the blending ratio of the PET melt blown fiber F and the PET short fiber S may be varied depending on a used place of the manufactured PET melt blown fiber web, and generally, the PET melt blown fiber F and the PET short fiber S are blended in a 5:5 ratio.

PET melt blown fiber web forming step (S20)

[0085] The PET melt blown fiber web forming step (S20) is a step (S20) of collecting and aggregating the PET melt blown fiber F seated on the porous circulation belt 32 of the forming table 30 to form the PET melt blown fiber web W.

[0086] In the PET melt blown fiber web forming step (S20), the PET melt blown fiber F is collected on the circulating and transferring porous circulation belt 32 to be transferred along the porous circulation belt 32, and the PET melt blown fiber F transferred along the porous circulation belt 32 is coupled by a conventional suction means provided in the forming table 30 to form the PET

melt blown fiber web W.

[0087] Here, the forming table 32 may be spaced apart from a spinning nozzle for melt-spinning the PET melt blown fiber F at an interval of 10 to 100 cm, and the porous circulation belt 32 may be transferred at a rate of 1 to 10 m/min. Accordingly, the PET melt blown fiber web W having a weight of 100 to 700 g/m^2 may be formed on the porous circulation belt 32, but when the separation distance between the forming table 32 and the spinning nozzle and the transfer rate of the porous circulation belt 32 are less than or more than the threshold value, the PET melt blown fiber web W having a weight of 100 to 700 g/m^2 may not be formed.

[0088] For example, in the PET melt blown fiber web forming step (S20), when the transfer rate of the porous circulation belt 32 is set to 5 m/min, a PET melt blown fiber web W having a weight of 400 g/m^2 may be formed.

[0089] In addition, a suction pressure of the suction means in the PET melt blown fiber web forming step (S20) is not particularly limited in the present disclosure, but the suction pressure is set within a range in which the PET melt blown fiber web W is not scattered while the collected PET melt blown fiber web W is not excessively dense.

[0090] In this way, the PET melt blown fiber web W formed in the PET melt blown fiber web forming step (S20) is transferred to the winder 40.

[0091] PET melt blown fiber web pressing and heat-treating step (S30)

[0092] The PET melt blown fiber web pressing and heat-treating step (S30) is a step (S30) of supplying high-temperature hot air while pressing the PET melt blown fiber web W so as not to interfere with the transfer of the PET melt blown fiber web W formed in the preceding PET melt blown fiber web forming step (S20) to crystallize the PET melt blown fiber web W.

[0093] In the PET melt blown fiber web pressing and heat-treating step (S30), the PET melt blown fiber web W formed on the forming table 30 is pressed to the porous circulation belt 32 of the forming table 30 by the porous pressure belt 120 of the heat treatment machine 110. The PET melt blown fiber web W pressed by the porous pressure belt 120 is crystallized by the high-temperature hot air sprayed through the hot air spray nozzles 132 formed in the hot air supply chamber 130 of the heat treatment machine 110.

[0094] At this time, the porous pressure belt 120 rotates at the same rate of 1 to 10 m/min as the transfer rate of the porous circulation belt 32, but circulates and rotates along the transfer direction of the PET melt blown fiber web W.

[0095] In addition, hot air of 80 to 200°C may be sprayed at a rate of 1 to 10 m^3/min from the hot air spray nozzles 132, and preferably, the hot air of 160°C may be sprayed from the hot air spray nozzles 132 at a rate of 6 m^3/min.

[0096] Here, when the high-temperature hot air is less than 80°C, the temperature is lower than a PET glass transition temperature and a crystallization temperature, and as a result, even if the stabilization heat treatment is performed, the crystallization of the amorphous region does not occur, so that the shrinkage occurs at a temperature of 120°C or higher. When the high-temperature hot air is more than 200°C, there may be a problem that the shrinkage may occur severely, and the manufactured PET melt blown fiber web may become hard and yellowed.

[0097] In addition, when the spraying rate of the high-temperature hot air is less than 1 m^3/min, the manufactured PET melt blown fiber web becomes thick in diameter, and is not formed in a fibrous shape, and when the spraying rate of the high-temperature hot air is more than 10 m^3/min, the manufactured PET melt blown fiber web becomes thin in diameter, and is not collected in the forming table 30 but scattered.

[0098] In addition, in the PET melt blown fiber web pressing and heat-treating step (S30), the porous pressure belt 120 is spaced apart from the porous circulation belt 32 of the forming table 30 at an interval of 1 to 150 mm by the height control means 140 of the heat treatment machine 110 and presses and transfers the PET melt blown fiber web W. Accordingly, the PET melt blown fiber web W may be manufactured to have various thicknesses corresponding to the distance between the porous pressure belt 120 and the porous circulation belt 32.

[0099] Meanwhile, nonwoven fabrics (not illustrated) and the like may be heated and pressed on the surface and rear surface of the PET melt blown fiber web W subjected to the PET melt blown fiber web pressing and heat-treating step (S30) .

[0100] According to the present disclosure formed as described above, since the PET melt blown fiber web W is heat-treated while pressing, it is possible to uniformly crystallize a PET melt blown fiber web W at a high rate and to promote the improvement of productivity of the PET melt blown fiber web W due to such a reduction in heat treatment time.

[0101] According to the present disclosure, since the PET melt blown fiber web W is heat-treated while pressing, it is possible to manufacture a PET melt blown fiber web W having a uniform thickness.

[0102] According to the present disclosure, since the pressing height of the PET melt blown fiber web W may be controlled, it is possible to manufacture a PET melt blown fiber web W having various thicknesses.

[0103] While the present disclosure has been shown and described in connection with the exemplary embodiments, it will be apparent to those skilled in the art that modifications and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

Claims

1. A device for manufacturing a PET melt blown fiber

web comprising:

an extruder that melts and extrudes a PET resin;
a die that receives a molten resin extruded from the extruder to spin an ultra-fined PET melt blown fiber in a self-weight direction; a forming table that is provided to be spaced below the die to collect and aggregate the PET melt blown fiber and to form a PET melt blown fiber web; a winder that winds the PET melt blown fiber web; and a blending nozzle for blending a PET short fiber to the PET melt blown fiber spun toward the forming table,
wherein the device for manufacturing the PET melt blown fiber web comprises:

a heat treatment machine that presses and heat-treats the PET melt blown fiber web formed on the forming table,
wherein the heat treatment machine comprises:

a porous pressure belt that presses the PET melt blown fiber web toward the forming table and transfers the PET melt blown fiber web to the winder side together with a porous circulation belt of the forming table;
a hot air supply chamber that supplies high-temperature hot air to the PET melt blown fiber web to crystallize the PET melt blown fiber web that is pressed and transferred by the porous pressure belt; and
a height control means that controls the height of the porous pressure belt for pressing the PET melt blown fiber web.

2. The device for manufacturing the PET melt blown fiber web of claim 1, wherein the porous pressure belt is provided as a belt in the form of a mesh net, and

the porous pressure belt is circulated and rotatably provided on carrier rollers rotatably provided between a pair of belt frames and a drive roller of a belt drive motor,
wherein the porous pressure belt passing through the lower end of the belt frame is provided to horizontally pass through the carrier rollers provided on both sides of the lower end of the belt frame lower than the lower end of the belt frame to transfer the PET melt blown fiber web to the winder side together with the porous circulation belt while pressing the surface of the PET melt blown fiber web to the porous circulation belt.

3. The device for manufacturing the PET melt blown fiber web of claim 2, wherein the hot air supply chamber is provided between the belt frames so as not to interfere with the porous pressure belt, and filled with hot air blown from a hot air furnace provided outside the heat treatment machine, and
in the lower portion of the hot air supply chamber, a plurality of hot air spray nozzles for spraying the hot air to the PET melt blown fiber web is formed.

4. The device for manufacturing the PET melt blown fiber web of claim 2, wherein at least one height control means is provided on a height control frame fixedly provided to be spaced apart from the upper side of the porous pressure belt,

wherein the height control means comprises
a height control servomotor provided on a gear box provided on the upper surface of the height control frame; and
an elevation bar that interlocks with the height control servomotor to elevate the porous pressure belt.

5. The device for manufacturing the PET melt blown fiber web of claim 4, wherein a pinion gear is provided on an output shaft that rotates by the operation of the height control servomotor,

the elevation bar is provided in the gear box to be elevatable, wherein the lower end of the elevation bar passes through the height control frame to connect onto an outer surface of the belt frame, and
a rack gear engaging with the pinion gear is formed on the elevation bar to extend along a longitudinal direction of the elevation bar.

6. A manufacturing method of a PET melt blown fiber web using the device for manufacturing the PET melt blown fiber web of claim 1, comprising:

a PET melt blown fiber spinning step (S10) of melting and spinning a PET raw material by a melt-blown method to form the PET melt-blown fiber;
a PET melt blown fiber web forming step (S20) of collecting and aggregating the PET melt blown fiber seated on the porous circulation belt to form the PET melt blown fiber web; and
a PET melt blown fiber web pressing and heat-treating step (S30) of supplying high-temperature hot air while pressing the PET melt blown fiber web to crystallize the PET melt blown fiber web.

7. The manufacturing method of the PET melt blown fiber web of claim 6, wherein in the PET melt blown fiber spinning step (S10),
the PET melt blown fiber is spun at a temperature of 270 to 330°C at 25 to 60 m^3/min and spun to have

a diameter of 2 to 10 μm.

8. The manufacturing method of the PET melt blown fiber web of claim 6, wherein in the PET melt blown fiber spinning step (S10),

a PET short fiber having a diameter of 15 to 40 μm is blended with the spun PET melt blown fiber,
wherein the PET short fiber is blended with the PET melt blown fiber in a 3:7 ratio.

9. The manufacturing method of the PET melt blown fiber web of claim 6, wherein in the PET melt blown fiber web forming step (S20),

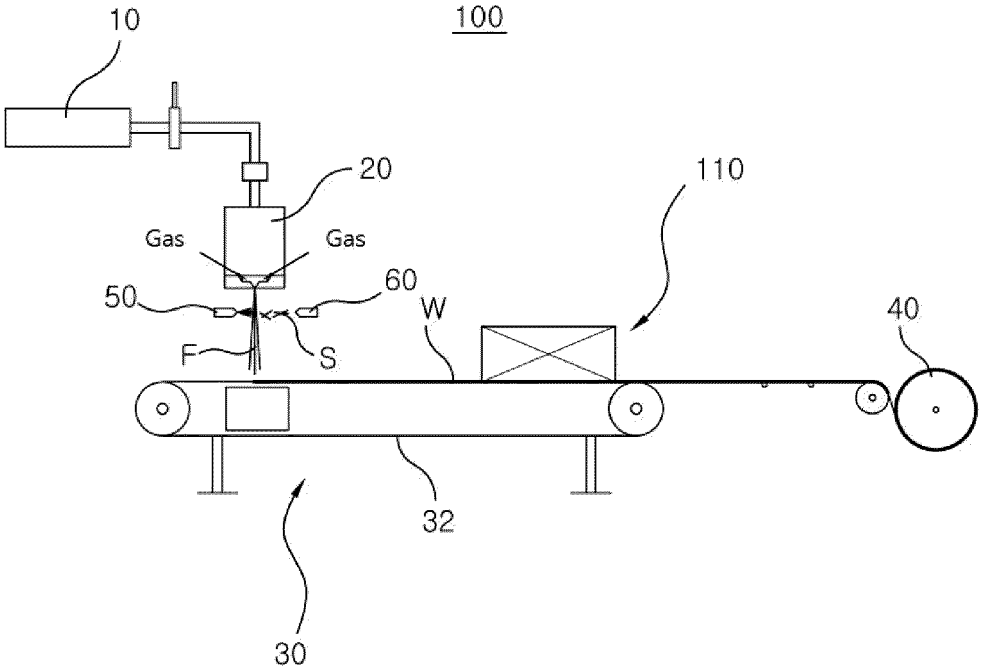
the porous circulation belt is transferred at a rate of 1 to 10 m/min, and
the PET melt blown fiber web having a weight of 100 to 700 g/m^2 is formed in the porous circulation belt.

10. The manufacturing method of the PET melt blown fiber web of claim 6, wherein in the PET melt blown fiber web pressing and heat-treating step (S30),

the porous pressure belt circulates and rotates at a rate of 1 to 10 m/min, and circulates and rotates along the transfer direction of the PET melt blown fiber web, and
the hot air supply chamber sprays high-temperature hot air of 80 to 200°C at a rate of 1 to 10 m^3/min through the hot air spray nozzles.

11. The manufacturing method of the PET melt blown fiber web of claim 10, wherein in the PET melt blown fiber web pressing and heat-treating step (S30),
the porous pressure belt is spaced apart from the porous circulation belt at an interval of 1 to 150 mm and presses and transfers the PET melt blown fiber web.

[FIG. 1]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W
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F
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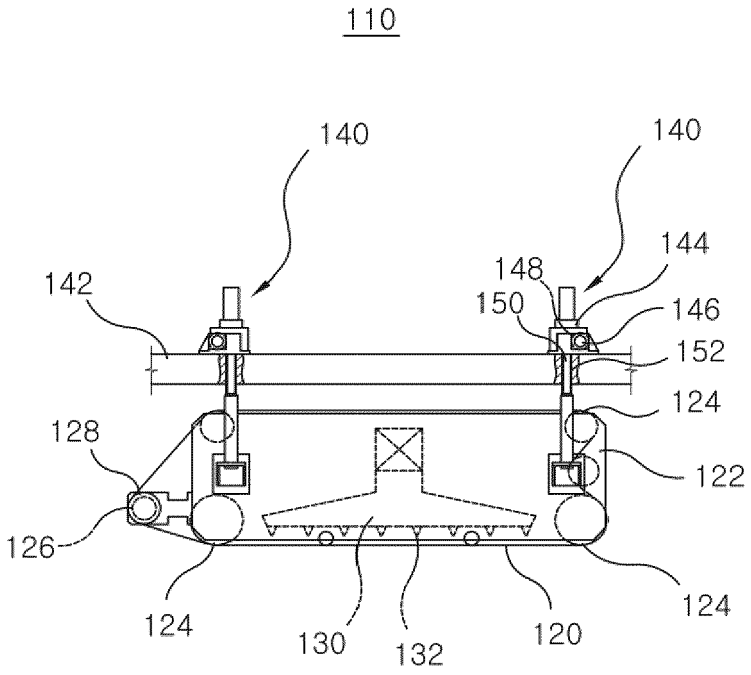
32
30

[FIG. 2]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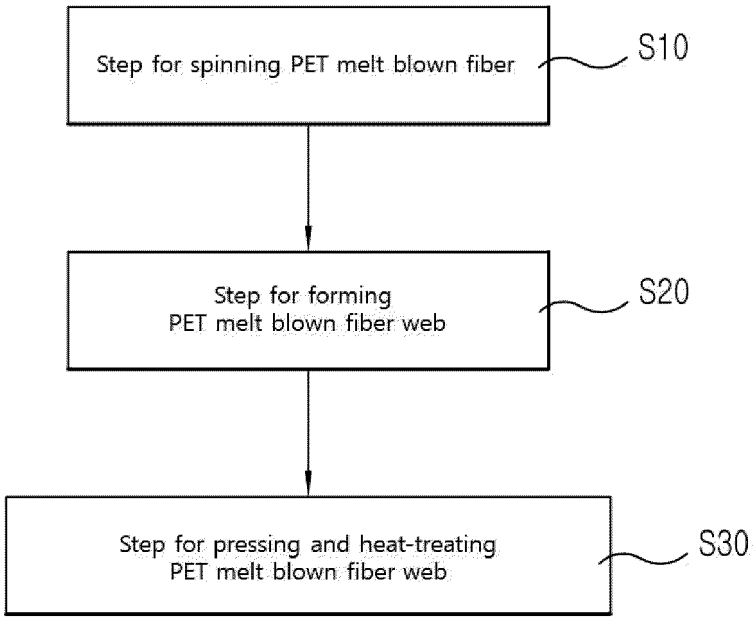
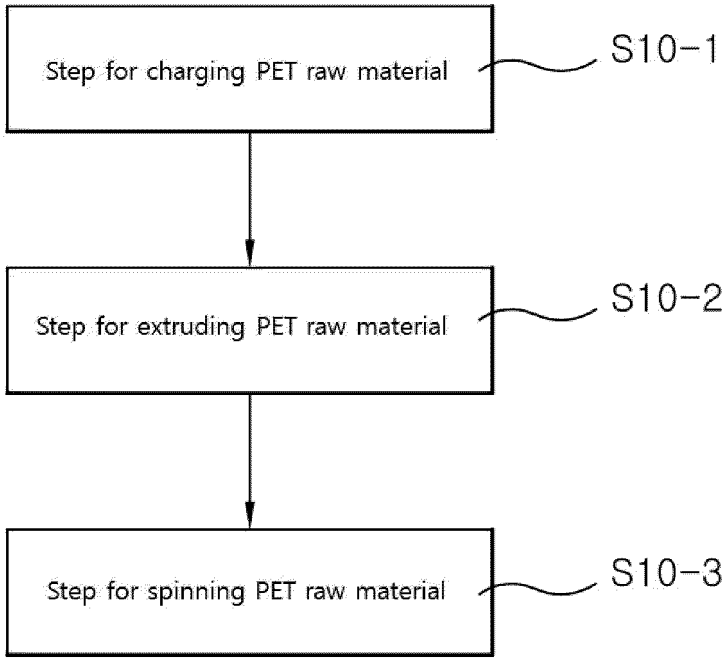
[FIG. 3]


Step for spinning PET melt blown fiber
S10
Step for forming
PET melt blown fiber web
S20
Step for pressing and heat-treating
PET melt blown fiber web
S30

[FIG. 4]


Step for charging PET raw material
S10-1
Step for extruding PET raw material
S10-2
Step for spinning PET raw material
S10-3

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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 6814

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 March 2024	Koning, Erik

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 6814

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 March 2024	Koning, Erik

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