

A Continuous Alumina Fiber Spunlace Paper Preparation Device and Process

Technical Field

The invention relates to a device and a process for preparing continuous alumina fiber spunlace paper, belonging to the technical field of textile materials.

Technical Background

Alumina fiber is a high-performance ceramic fiber with high tensile strength, elastic modulus and good electrical insulation properties. It can maintain good chemical stability in an oxidizing atmosphere. It also has the advantages of low thermal conductivity, low thermal expansion coefficient and good thermal shock resistance. It is mainly used in refractory materials, structural reinforcement materials and environmental protection recycling fields.

In recent years, with the continuous updating and iteration of high-temperature end components, alumina felt is also pursuing lightweight, and gradually evolved into products such as alumina fiber paper. Alumina fiber paper is lightweight, has excellent high temperature resistance and can be cut into various shapes and used to make flange gaskets or other high-temperature insulation fields. Its molding process is generally to chop the alumina fibers, make them into slurry, add binders and dispersants, and finally form them. However, this kind of alumina fiber paper formed by chopped fibers and binders has poor surface flatness, high surface density, and lacks continuous fibers. When stretched by external force, it is easy to cause the chopped fibers to break and fail or the binder to debond. The molding strength is insufficient, which affects the subsequent practical application.

Therefore, it is of great significance to study a high tensile strength, ultra-thin continuous alumina fiber spunlace paper.

Summary of the Invention

[Technical problem]

At present, the alumina fiber paper formed by chopped fibers and binders has poor surface flatness, high surface density, and lacks continuous fibers. When subjected to external tension, the chopped fibers are easily broken or the binder debonds. The molding strength is insufficient, affecting subsequent practical applications. Alumina fibers have problems such as high brittleness and low

elongation, which makes it difficult to prepare continuous alumina fiber paper.

[Technical solutions]

To solve the above problems, the present invention provides a device and process for preparing continuous alumina fiber spunlace paper. The present invention adopts a prepolymerization method to prepare alumina continuous fibers and uses a spunlace process to reduce damage to the fibers. Finally, the preparation of continuous alumina fiber paper is achieved by controlling the drying temperature to meet the performance requirements of ultra-lightness and high tensile strength.

The first object of the present invention is to provide a continuous alumina fiber spunlace paper preparation device, comprising a storage tank, the storage tank is connected to a spinneret through a pipeline, a stretcher is arranged below the spinneret, a plurality of spinneret holes are arranged in the spinneret, and the material in the storage tank passes through the plurality of spinneret holes of the spinneret and enters the stretcher for stretching; a negative pressure fan is arranged below the stretcher, a belt is arranged between the stretcher and the negative pressure fan, a conveyor is arranged below the belt, a high-temperature furnace, a spunlace machine and a dryer are arranged on one side of the stretcher, and the conveyor drives the belt between the stretcher and the negative pressure fan to pass through the high-temperature furnace, the spunlace machine and the dryer in sequence.

In one embodiment of the present invention, a plurality of spunlace heads is arranged in the spunlace machine and the plurality of spunlace heads are located at the upper and lower ends of the belt.

In one embodiment of the present invention, the storage tank is connected to a screw extruder and the screw extruder is used to transport the material in the storage tank to the spinneret through the pipeline.

In one embodiment of the present invention, a safety valve and a metering pump are provided on the pipeline; a winding device is provided at the end of the conveyor and the winding device is used to wind up the prepared continuous alumina fiber paper.

The second object of the present invention is to provide a process for preparing continuous alumina fiber spunlace paper, wherein the process adopts the continuous alumina fiber spunlace paper preparation device and comprises the following steps:

(1) Using the prepolymerization method, aluminosilicate polymer and water are used as raw materials to polymerize aluminosilicate compounds, which are dissolved in an organic solvent and then

silicate is added to prepare a spinnable mixture;

(2) The mixture prepared in step (1) is conveyed to a metering pump through a screw extruder to reach a spinneret, spun by the spinneret, formed in a drafter, and dried to obtain alumina filaments, which are sucked into a belt by a negative pressure formed by a negative pressure fan at the bottom of the device to form a mesh;

(3) The fibers formed into a web in step (2) are transported to a high-temperature furnace via a conveyor for sintering, and then transported to a spunlacing machine by a conveyor for spunlacing, and then dried to obtain continuous alumina fiber paper, and finally rolled up by a winding device to obtain a finished product.

In one embodiment of the present invention, the aluminoxane polymer in step (1) is alkyl aluminium, the silicate is silicate ester, and the organic solvent is ether.

In one embodiment of the present invention, the screw speed of the screw extruder in step (2) is 70-100rpm; the diameter of the spinneret hole is 0.5-0.8mm; the speed of the metering pump in step (2) is 0.1-0.3rpm; the stretching tension of the stretcher in step (2) is controlled between 10-15N; the speed of the negative pressure fan in step (2) is 500-700rpm; the negative pressure is 200-300Pa; the length of the alumina filament in step (2) is 13-18cm; the drying temperature in step (2) is 120-140°C.

In one embodiment of the present invention, the conveyor speed in step (3) is 0.6-1m/min; and the sintering temperature in step (3) is 1000-1300°C.

In one embodiment of the present invention, the thickness of the continuous alumina fiber paper in step (3) is 0.1-0.5mm; the basis weight is 30-40g/m²; and the winding speed in step (3) is 0.6-1m/min.

In one embodiment of the present invention, the number of spunlacing heads in step (3) is 7-12, the spunlacing pressure is 60-120Bar, the spunlacing distance is 10-15mm, the spunlacing diameter is 1-2mm, the spunlacing density is 20-30/cm², the spunlacing process in step (3) is front and back spunlacing, and the drying temperature in step (3) is 100-110°C.

Beneficial Effects

(1) The present invention adopts a prepolymerization method and a continuous fiber forming device. The prepared alumina fiber filaments are difficult to break and are 20% longer than ordinary alumina filaments. Continuous alumina fiber paper can be prepared.

(2) The spunlace process adopted in the present invention is simple and convenient. A plurality

of spunlace heads is arranged in the spunlace machine. The plurality of spunlace heads is located at the upper and lower ends of the belt. Spunlace on both sides ensures that both sides of the continuous alumina fiber paper have good flatness, causes less damage to the continuous alumina fibers, introduces less impurities during the spunlace process, and has a smooth surface after spunlace on both sides.

(3) Compared to ordinary chopped fiber paper, the tensile strength of the continuous alumina fiber paper prepared by the present invention is increased by more than 38.7%; due to the low content of binder, the basis weight can be reduced by 13.2%, achieving an ultra-light and thin effect, which can avoid the short fiber breakage and failure or binder debonding caused by external tension, and has high molding strength without affecting subsequent practical applications.

(4) The pipeline of the present invention is provided with a safety valve and a metering pump, which can observe and adjust the capacity and flow rate of the material in the pipeline at any time.

(5) The present invention adjusts the internal temperature of the stretcher to dry it, thereby ensuring that the precursor alumina fiber is stably formed; the continuous alumina filaments are pulled through the mesh inside the stretcher, thereby ensuring that the continuous alumina fiber filaments pass stably.

(6) The negative pressure of the negative pressure fan of the present invention causes the continuous alumina filaments at the bottom of the drafter to be cut off and fall onto the belt to be gradually laid into a mesh, and then transported to a high-temperature furnace by a conveyor for sintering.

(7) The drying machine provided in the present invention can effectively remove the moisture brought by the spunlacing machine.

Brief Description of Drawings

FIG1 is a schematic structural diagram of a device for preparing continuous alumina fiber spunlace paper according to the present invention;

FIG2 is a schematic diagram showing the positional relationship between the spunlacing head and the continuous alumina fiber paper in the spunlacing machine of the present invention;

FIG3 is a flow chart of a process for preparing continuous alumina fiber spunlace paper according to the present invention.

Among them: 1. Storage tank; 2. Safety valve; 3. Metering pump; 4. Continuous alumina fiber;

5. Drafting device; 6. Negative pressure fan; 7. High temperature furnace; 8. Spunlace machine; 9. Dryer; 10. Collecting device; 11. Spunlace head; 12. Continuous alumina fiber paper; 13. Belt; 14. Conveyor; 15. Spinning die.

5 Detailed Description

The following will be combined with the drawings in the embodiments of the present invention to clearly and completely describe the technical solutions in the embodiments of the present invention. Obviously, the embodiments described are part of the embodiments of the present invention, not all of the embodiments. Based on the embodiments of the present invention, all other
10 embodiments obtained by ordinary technicians in this field without creative work are within the scope of protection of the present invention.

In the present invention, unless otherwise clearly specified and limited, the terms "connected", "connection", and "fixed" should be understood in a broad sense, for example, it can be a fixed connection, a detachable connection, or an integral connection; it can be a mechanical connection or
15 an electrical connection; it can be a direct connection or an indirect connection through an intermediate medium, it can be the internal connection of two elements or the interaction relationship between two elements. For ordinary technicians in this field, the specific meanings of the above terms in the present invention can be understood according to specific circumstances.

In the present invention, unless otherwise clearly specified and limited, a first feature being
20 "above" or "below" a second feature may include that the first and second features are in direct contact or may include that the first and second features are not in direct contact but are in contact through another feature between them. Moreover, a first feature being "above", "over" and "on" a second feature includes that the first feature is directly above and obliquely above the second feature, or simply indicates that the first feature is higher in level than the second feature. A first
25 feature being "below", "under" and "beneath" a second feature includes that the first feature is directly below and obliquely below the second feature, or simply indicates that the first feature is lower in level than the second feature.

Example 1

30 As shown in Figures 1 and 2, this embodiment provides a continuous alumina fiber spunlace paper preparation device, including a storage tank 1, the storage tank 1 is connected to a spinneret 15

through a pipeline, a drafter 5 is arranged below the spinneret 15, and a plurality of spinneret holes are arranged in the spinneret 15. The material in the storage tank 1 passes through the plurality of spinneret holes of the spinneret 15 and enters the drafter 5 for drafting to form continuous alumina fiber 4 filaments; a negative pressure fan 6 is arranged below the drafter 5, a belt 13 is arranged
5 between the drafter 5 and the negative pressure fan 6, a conveyor 14 is arranged below the belt 13, a high-temperature furnace 7, a spunlace machine 8 and a dryer 9 are arranged on one side of the drafter 5, and the conveyor 14 drives the belt 13 between the drafter 5 and the negative pressure fan 6 to pass through the high-temperature furnace 7, the spunlace machine 8 and the dryer 9 in sequence.

Furthermore, the spunlace machine 8 is provided with a plurality of spunlace heads 11, which
10 are located at the upper and lower ends of the belt 13, and spunlace the front and back sides of the continuous aluminium oxide fiber paper 12 to ensure that both sides have good flatness. Specifically, the continuous aluminium oxide fiber paper 12 is located above the belt 13, and the belt 13 is located above the conveyor 14. One row of the plurality of spunlace heads 11 is located above the continuous aluminium oxide fiber paper 12, facing the front side of the continuous aluminium oxide fiber paper
15 12; another row of the plurality of spunlace heads 11 is located inside the conveyor 14, facing the back side of the continuous aluminium oxide fiber paper 12. Since mesh holes are provided on the belt 13 and the conveyor 14, the spunlace heads 11 located below the continuous aluminium oxide fiber paper 12 can also spunlace the back side of the continuous aluminium oxide fiber paper 12.

Optionally, the storage tank 1 is connected to a screw extruder (not shown in FIG1), and the
20 screw extruder is used to transport the material in the storage tank 1 to the spinneret 15 through the pipeline. Optionally, the screw speed of the screw extruder is 70-100rpm.

Furthermore, the pipeline is provided with a safety valve 2 and a metering pump 3, which can observe and adjust the capacity and flow rate of the material in the pipeline at any time. Optionally, the speed of the metering pump is 0.1-0.3r/min; safety valve 2 is a solenoid valve or an electric valve.

Optionally, a winding device 10 is provided at the end of the conveyor 14, and the collecting
25 device 10 is used to wind up the prepared continuous alumina fiber paper 12. Optionally, the collecting device 10 is a roller.

Optionally, the diameter of the spinneret hole is 0.5-0.8mm.

Optionally, the stretching tension of stretcher 5 is controlled between 10-15N.

Optionally, the rotation speed of the negative pressure fan 6 is 500-700rpm; the negative
30 pressure is 200-300Pa.

Optionally, the conveyor speed is 0.6-1m/min.

Optionally, the number of spunlace heads is 7-12, the spunlace pressure is 60-120Bar, the spunlace distance is 10-15mm, the spunlace diameter is 1-2mm, and the spunlace density is 20-30/cm².

5 Optionally, the thickness of the continuous alumina fiber paper 12 is 0.1-0.5mm.

Example 2

In FIG3, this embodiment provides a process for preparing continuous alumina fiber spunlace paper, and the process adopts a continuous alumina fiber spunlace paper preparation device provided
10 in Example 1, and comprises the following steps:

(1) Using the prepolymerization method, aluminoxane polymer and water are used as raw materials to polymerize aluminoxane compounds, which are dissolved in an organic solvent and then silicate is added to prepare a spinnable mixture;

(2) The mixture prepared in step (1) is conveyed to a metering pump through a screw extruder
15 to reach a spinneret, spun by the spinneret, formed in a drafter, and dried to obtain alumina precursor fiber filaments, which are sucked into a belt by a negative pressure formed by a negative pressure fan at the bottom of the device to form a mesh;

(3) The fibers formed into a mesh in step (2) are transported to a high-temperature furnace via a conveyor for sintering, and then transported to a spunlacing machine by a conveyor for spunlacing,
20 and then dried to obtain continuous alumina fiber paper, and finally rolled up by a collecting device to obtain a finished product.

Optionally, the aluminoxane polymer in step (1) is alkyl aluminium, the silicate is silicate ester, and the organic solvent is ether;

Optionally, the screw speed of the screw extruder in step (2) is 70-100rpm, preferably 90rpm;

25 Optionally, the spinneret hole diameter in step (2) is 0.5-0.8mm;

Optionally, the speed of the metering pump in step (2) is 0.1-0.3rpm;

Optionally, the stretching tension of the stretcher in step (2) is controlled between 10-15N;

Optionally, the speed of the negative pressure fan in step (2) is 500-700rpm; the negative pressure is 200-300Pa;

30 Optionally, the length of the alumina filaments in step (2) is 13-18cm;

Optionally, the drying temperature in step (2) is 120-140°C; preferably 130°C;

Optionally, the conveyor speed in step (3) is 0.6-1m/min;

Optionally, the sintering temperature in step (3) is 1000-1300°C;

Optionally, the number of the spunlace heads in step (3) is 7-12, the spunlace pressure is 60-120Bar, the spunlace distance is 10-15mm, the spunlace diameter is 1-2mm, and the spunlace density is 20-30/cm²;

Optionally, the spunlace process in step (3) is front and back spunlace;

Optionally, the drying temperature in step (3) is 100-110°C, preferably 105°C;

Optionally, the continuous alumina fiber paper in step (3) has a thickness of 0.1-0.5mm and a basis weight of 30-40g/m²;

Optionally, the winding speed in step (3) is 0.6-1m/min;

Example 3

A preparation process of 0.5mm thick continuous alumina fiber spunlace paper:

Alkylaluminium and water are used as raw materials to polymerize aluminoxane compounds, which are dissolved in ether solvents, and then silicates are added to make viscous spinnable mixture. Next, the mixture is loaded into the storage tank, the machine is turned on, and the screw extruder starts to run at a speed of 70rpm. At this time, the blended materials begin to pass through the safety valve to the metering pump, and the speed of the metering pump is 0.3rpm. The diameter of the spinneret hole is adjusted to 0.05mm and the material is waited to be ejected from the spinneret hole.

Adjust the internal temperature of the drafter and heat it up at a constant rate of 20°C/min. Keep the temperature constant at 130°C to dry it and ensure the stable formation of the precursor alumina fiber. The continuous alumina filament is pulled through the mesh inside the drafter, and the tension is controlled between 10-15N to ensure the continuous alumina filament passes stably.

Turn on the negative pressure fan, adjust the speed of the negative pressure fan to 500rpm, and the negative pressure to 200Pa. Due to the negative pressure, the continuous alumina filaments at the bottom of the drafter are cut off and fall onto the belt to gradually form a mesh. Adjust the conveyor speed to 0.6m/min and transport it to the high temperature furnace for sintering.

The temperature in the high-temperature furnace is adjusted to 1000°C. The layered mesh precursor continuous alumina fiber conveyed by the conveyor is sintered and formed, and then sent to the spunlace machine via the conveyor. The number of spunlace heads is adjusted to 12, the spunlace pressure is 100Bar, the spunlace distance is 10mm, the spunlace diameter is 1mm; the

spunlace density is $25/\text{cm}^2$ and the front and back sides are spunlace to ensure that both sides have good flatness. After the spunlace is completed, it is conveyed to the dryer and the temperature of the dryer is adjusted to 105°C to remove the moisture caused by the spunlace process. Finally, it is rolled up by the winding device at a speed of $1\text{m}/\text{min}$.

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Example 4

A preparation process of 2mm thick continuous alumina fiber spunlace paper:

Alkylaluminium and water are used as raw materials to polymerize aluminosiloxane compounds, which are dissolved in ether solvents, and then silicates are added to make viscous spinnable mixture.

10 Next, the mixture is loaded into the storage tank, the machine is turned on, and the screw extruder starts to run at a speed of 70rpm. At this time, the mixture begins to pass through the safety valve to the metering pump, and the speed of the metering pump is 0.3rpm. The diameter of the spinneret hole is adjusted to 0.05mm, and the material is waited for to be ejected from the spinneret hole.

Adjust the internal temperature of the drafter, heat it up at a constant rate of $20^\circ\text{C}/\text{min}$ and keep
15 it constant at 130°C to dry it, in order to ensure the stable formation of the precursor alumina fiber. The continuous alumina filament is pulled through the mesh inside the drafter, and the tension is controlled between 10-15N to ensure the continuous alumina filament passes stably.

Turn on the negative pressure fan, adjust the speed of the negative pressure fan to 500rpm, and the negative pressure to 200Pa. Due to the negative pressure, the continuous alumina filaments at the
20 bottom of the drafter are cut off and fall onto the belt to gradually form a mesh. Adjust the conveyor speed to $1\text{m}/\text{min}$ and transport it to the high temperature furnace for sintering.

The temperature in the high-temperature furnace is adjusted to 1000°C . The layered mesh precursor continuous alumina fiber conveyed by the conveyor is sintered and formed, and then sent to the spunlace machine via the conveyor. The number of spunlace heads is adjusted to 12, the
25 spunlace pressure is 100Bar, the spunlace distance is 10mm, the spunlace diameter is 1mm; the spunlace density is $30/\text{cm}^2$, and the front and back sides are spunlace to ensure that both sides have good flatness. After the spunlace is completed, it is conveyed to the dryer, and the temperature of the dryer is adjusted to 105°C to remove the moisture caused by the spunlace process. Finally, it is rolled up by the winding device at a speed of $1\text{m}/\text{min}$.

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Comparative Example 1

The speed of the negative pressure fan in Example 3 is adjusted to 700rpm, the negative pressure is adjusted to 300Pa, and the others remain unchanged. By changing the negative pressure, the alumina fiber cutting rate is increased, and the length of the alumina filaments is controlled between 10-13cm to form alumina filaments with shorter lengths. The conveyor speed is adjusted to 1.2m/min, and it is spunlace formed to obtain 0.5mm continuous oxidized fiber spunlace paper and the continuous alumina fiber spunlace paper prepared in Example 3 for tensile breaking strength comparison. The specific test refers to the international standard ISO 9073-3-1989 "Textiles - Test methods for non-woven fabrics - Part 3: Determination of tensile strength and elongation" method to determine the tensile breaking strength of non-woven fabrics. The comparison results of the tensile breaking strength of the 0.5mm continuous oxidized fiber spunlace paper obtained in Comparative Example 1 and the continuous alumina fiber spunlace paper prepared in Example 3 are shown in Table 1 below:

Table 1

Example	Tensile strength at break (N/cm)	Basis weight (g/m ²)
Example 3	232	30
Comparative Example 1	216	31
Difference (%)	7.4	3.2

The results in Table 1 show that the tensile strength of the continuous alumina fiber spunlace paper prepared in Example 3 is 7.4% higher than that in Comparative Example 1. This is because the continuous alumina fibers in Comparative Example 1 are slightly shorter than those in Example 3 and the load capacity is insufficient when subjected to tensile external force, resulting in a lower tensile strength.

Comparative Example 2

The chopped alumina fiber paper purchased from Suzhou Alsay Inorganic Materials Co., Ltd., with a specification of 900*600*2mm, was compared with Example 4 in tensile strength. The comparison results are shown in Table 2 below:

Table 2

Example	Tensile strength at break (N/cm)	Basis weight (g/m ²)
Example 4	351	46
Comparative Example 2	253	53
Difference (%)	38.7	13.2

As can be seen from Table 2, the tensile breaking strength of continuous alumina fiber spunlace paper is 38.7% higher than that of the currently commercially available chopped alumina fiber paper. This is because the mechanical properties of continuous alumina filaments are better than those of chopped fibers. With the superposition of fiber layers, the overall mechanical properties of alumina fiber paper are enhanced. The overall basis weight of continuous alumina fiber spunlace paper is 13.2% lower than that of the currently commercially available chopped alumina fiber paper. This is because chopped alumina fiber papers are not formed by alumina fibers in an integrated manner and includes binders and other impurities. Continuous alumina fiber spunlace paper is made of continuous fiber layers and the interlayer toughness is increased by the spunlace process, composed of alumina fibers alone. Therefore, the continuous alumina fiber spunlace paper has low density and an ultra-light and thin effect.

Comparative Example 3

The spunlace process parameters in Example 3 were adjusted to adjust the spunlace pressure to 90Bar, the spunlace diameter to 1.5mm, and the spunlace density to 20/cm², and other parameters remained the same as in Example 3 to obtain a 0.5mm thick continuous alumina fiber spunlace paper. The tensile strength test was compared with that of Example 3 according to the test standard of Comparative Example 1.

Comparative Example 4

The spunlace process parameters in Example 3 were adjusted to adjust the spunlace pressure to 110Bar, the spunlace diameter to 0.6mm, the spunlace density to 30/cm², and the others remained unchanged from Example 3 to obtain a continuous alumina fiber spunlace paper with a thickness of 0.5mm. The tensile strength test was compared with that of Example 3 according to the test standard of Comparative Example 1. The tensile strength test comparison results of the continuous alumina

fiber spunlace paper obtained in Example 3, Comparative Examples 3 and Comparative Examples 4 are shown in Table 3 below:

Table 3

Example	Tensile strength at break (N/cm)	Difference (%)
Example 3	235	-
Comparative Example 3	206	12.3
Comparative Example 4	213	9.4

Comparative Example 3 decreased by 12.3% compared with Example 3, mainly because the spunlace diameter was increased and the spunlace density was reduced in Comparative Example 3. The larger spunlace diameter caused greater damage to the alumina fiber, the smaller spunlace density, the fewer fibers in the vertical direction, and the insufficient strength between the alumina fiber paper layers. The combination of these two factors led to a decrease in its tensile breaking strength.

Compared with Example 3, the strength of Comparative Example 4 decreased by 9.4%, mainly due to the increase in spunlace pressure and spunlace density. The increase in spunlace pressure will increase the damage to the alumina fibers, but since the spunlace diameter is reduced to 0.6mm, the damage to the fibers is less than that in Comparative Example 3. As the spunlace density increases, the number of alumina fibers introduced between the layers increases and so does the damage to the alumina fibers. Under a combination of various factors, the tensile breaking strength of Comparative Example 4 is slightly lower than that of Comparative Example 1, but the decline is milder than that of Comparative Example 4.

Although the present invention has been disclosed as above in the preferred embodiment, it is not intended to limit the present invention. Anyone familiar with this technology, without departing from the essence and scope of the present invention, can make various changes and modifications. Therefore, the scope of protection of the present invention should be based on the definition of the claims.

Claims

1. A continuous alumina fiber spunlace paper preparation device, characterized in that it comprises a material storage tank (1), the material storage tank (1) is connected to a spinneret (15) through a pipeline, a drafter (5) is arranged below the spinneret (15), a plurality of spinneret holes are arranged in the spinneret (15), and the material in the material storage tank (1) enters the drafter (5) through the plurality of spinneret holes of the spinneret (15) for drafting; a negative pressure fan (6) is arranged below the drafter (5), a belt (13) is arranged between the drafter (5) and the negative pressure fan (6), a conveyor (14) is arranged below the belt (13), a high-temperature furnace (7), a spunlace machine (8) and a dryer (9) are arranged on one side of the drafter (5), and the conveyor (14) drives the belt (13) between the drafter (5) and the negative pressure fan (6) to pass through the high-temperature furnace (7), the spunlace machine (8) and the dryer (9) in sequence.

2. The continuous alumina fiber spunlace paper preparation device according to claim 1, characterized in that a plurality of spunlace heads (11) is arranged in the spunlace machine (8), and the plurality of spunlace heads (11) is located at the upper and lower ends of the belt (13).

3. The continuous alumina fiber spunlace paper preparation device according to claim 2, characterized in that the storage tank (1) is connected to a screw extruder, and the screw extruder is used to transport the material in the storage tank (1) to the spinneret (15) through the pipeline.

4. The continuous alumina fiber spunlace paper preparation device according to claim 3, characterized in that a safety valve (2) and a metering pump (3) are provided on the pipeline; and a collecting device (10) is provided at the end of the conveyor (14), and the collecting device (10) is used to wind up the prepared continuous alumina fiber (4) paper.

5. A process for preparing continuous alumina fiber spunlace paper, characterized in that the process adopts the continuous alumina fiber spunlace paper preparation device according to claim 4, and comprises the following steps:

(1) using the prepolymerization method, aluminoxane polymer and water are used as raw materials to polymerize aluminoxane compounds, which are dissolved in an organic solvent and then silicate is added to prepare a spinnable mixture;

(2) the mixture prepared in step (1) is conveyed to a metering pump (3) through a screw extruder to reach a spinneret (15), spun by the spinneret (15), formed in a drafter (5), and dried to obtain alumina filaments, which are sucked into a belt (13) by a negative pressure formed by a negative pressure fan (6) at the bottom of the device to form a mesh;

(3) the fibers formed into a web in step (2) are conveyed to a high-temperature furnace (7) by a conveyor (14) for sintering, and then conveyed to a spunlacing machine (8) by a conveyor (14) for spunlacing, and then dried to obtain continuous alumina fiber paper (12), and finally collected by a rolling device (10) to obtain a finished product.

5 6. The process for preparing continuous alumina fiber spunlace paper according to claim 5, characterized in that the aluminosilicate polymer in step (1) is alkyl aluminium, the silicate is silicate ester, and the organic solvent is ether.

7. The process for preparing continuous alumina fiber spunlace paper according to claim 5, characterized in that the screw speed of the screw extruder in step (2) is 70-100rpm; the diameter of
10 the spinneret hole is 0.5-0.8mm; the speed of the metering pump (3) in step (2) is 0.1-0.3r/min; the drafting tension of the drafter (5) in step (2) is controlled between 10-15N; the speed of the negative pressure fan (6) in step (2) is 500-700rpm; the negative pressure is 200-300Pa; the length of the alumina filaments in step (2) is 13-18cm; the drying temperature in step (2) is 120-140°C.

8. The process for preparing continuous alumina fiber spunlace paper according to claim 5,
15 characterized in that the speed of the conveyor (14) in step (3) is 0.6-1m/min; and the sintering temperature in step (3) is 1000-1300°C.

9. The process for preparing continuous alumina fiber spunlace paper according to claim 5, characterized in that the thickness of the continuous alumina fiber paper (12) in step (3) is 0.1-0.5 mm; the surface density is 30-40g/m²; and the winding speed in step (3) is 0.6-1 m/min.

20 10. The process for preparing continuous alumina fiber spunlace paper according to claim 5, characterized in that the number of spunlace heads (11) in step (3) is 7-12, the spunlace pressure is 60-120Bar, the spunlace distance is 10-15mm, the spunlace diameter is 1-2mm, the spunlace density is 20-30/cm²; the spunlace process in step (3) is front and back spunlace; the drying temperature in step (3) is 100-110°C.

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