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(71) Applicant: **Zhengzhou Zhongyuan Spandex Engineering Technology**
Zhengzhou, Henan 450001 (CN)

(72) Inventors:
- **YUAN, Zutao**
  Zhengzhou
  Henan 450001 (CN)
- **ZHANG, Yunqi**
  Zhengzhou
  Henan 450001 (CN)

(74) Representative: **dompatent von Kreisler Selting Werner -**
Partnerschaft von Patent- und Rechtsanwälten mbB
Deichmannhaus am Dom
Bahnhofsvorplatz 1
50667 Köln (DE)

(54) ELASTIC FIBRE DRY SPINNING MECHANISM AND MAINTENANCE CONTROL METHOD FOR SPINNING ASSEMBLY

(57) An elastic fibre dry spinning mechanism and a maintenance control method for a spinning assembly. The elastic fibre dry spinning mechanism comprises: a spinning assembly (1), comprising a temperature control portion (13) and a spinneret portion (14) detachably overlapped with each other; and a rotary movement control portion, used for allowing the spinning assembly to lift and drop, move horizontally and rotate around the horizontal movement direction, so as to change the facing direction of the spinning assembly into a facing direction facilitating the maintenance of the spinneret portion. The spinning mechanism and the maintenance control method therefor achieve convenient, quick and efficient maintenance such as online replacement of a spinneret portion.

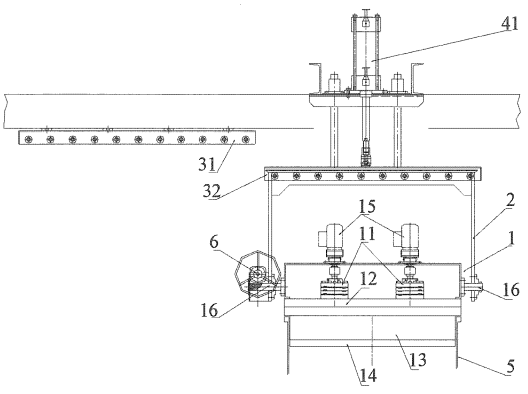

Fig. 1

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Description

Field of the Invention

[0001] The present invention relates to elastic fiber spinning technology, and in particular to an elastic fiber dry spinning mechanism and a maintenance control method for a spinning assembly.

Background of the Invention

[0002] In the dry spinning production of elastic fibers such as spandex, in order to ensure the quality of products, a spinneret portion in a spinning assembly needs to be replaced regularly. The general replacement period is 15 days to 30 days. During the replacement of the spinneret portion, the production must be interrupted, and the normal production can be recovered only after the spinneret portion which is cleaned and checked out to be qualified is replaced. The replacement work of the spinneret portion is one of the most important daily works in the dry spinning production of the elastic fibers such as spandex.

[0003] The traditional spinning assembly is as shown in Fig. 5, a metering device 1a communicates with polymer solution channels of a temperature control portion 3a through metal hoses 2a, spinneret portions 4a are arranged in the polymer solution channels of the temperature control portion 3 a, a polymer solution for elastic fiber dry spinning is allocated into multiple beams of equal solution flows after being accurately metered by the metering device, the beams of the solution flows communicate with the spinneret portions arranged in the polymer solution channels of the temperature control portion through the metal hoses, and the beams of the polymer solution are sprayed into a spinning box through the spinneret portions.

[0004] If the spinneret portion of the above-mentioned spinning assembly needs to be replaced, the metal hose and the spinneret portion need to be disconnected, the whole temperature control portion provided with the spinneret portion therein is disassembled, the portions of the temperature control portion including the spinneret portion are installed on the spinning assembly after being cleaned and checked out to be qualified, and then the production can be recovered. In the above-solution, the disassembly and assembly works of the temperature control portion provided with the spinneret portion therein are tedious, the cleaning range is large, and the replacement time is long, thereby affecting the operation efficiency of the equipment and reducing the production efficiency.

Summary of the Invention

[0005] A brief overview of the present invention is given below to provide a basic understanding of certain aspects of the present invention. It should be understood that this summary is not an exhaustive overview of the present invention. It is not intended to determine the critical or important part of the present invention, nor is it intended to limit the scope of the present invention. The purpose is simply to give some concepts in a simplified form as a prelude to the more detailed description of the later discussion.

[0006] Embodiments of the present invention provide an elastic fiber dry spinning mechanism and a maintenance control method for a spinning assembly.

[0007] In one aspect, the embodiments of the present invention provide an elastic fiber dry spinning mechanism, including:

a spinning assembly, including a temperature control portion and a spinneret portion, which are detachably overlapped with each other; and

a rotary movement control portion used for driving the spinning assembly to ascend and descend, translate and rotate around a translation direction so as to change the orientation of the spinning assembly into an orientation facilitating the maintenance of the spinneret portion.

In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the spinneret portion includes a rectangular plate, multiple rows of spinneret orifices are arranged on the rectangular plate, and at least one nozzle is arranged in one of the spinneret orifices.

[0008] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the spinning assembly further includes: at least one metering device and an interface conversion portion, and the metering device, the interface conversion portion, the temperature control portion and the spinneret portion are sequentially overlapped with each other.

[0009] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the spinning assembly further includes: at least one metering driving device used for driving the at least one metering device.

[0010] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the elastic fiber dry spinning mechanism further includes: a moving bracket used for providing support for the ascending and descending, translation and/or rotation of the spinning assembly.

[0011] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the spinning assembly is rotatably connected with the moving bracket through at least one rotating shaft.

[0012] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotary

movement control portion includes a first lifting driving mechanism used for driving the spinning assembly and the moving bracket to ascend and descend together.

[0013] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the first lifting driving mechanism drives the spinning assembly and the moving bracket to ascend and descend together from the upper side or the lower side of the spinning assembly.

[0014] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the moving bracket is provided with at least one moving bracket guiding portion extending along a lifting direction; and the rotary movement control portion includes a second lifting driving mechanism used for driving the spinning assembly to ascend and descend along the moving bracket guiding portion.

[0015] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the second lifting driving mechanism drives the spinning assembly to ascend and descend along the moving bracket guiding portion from the upper side or the lower side of the spinning assembly.

[0016] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the moving bracket guiding portion is provided with at least one limiting hole for limiting the spinning assembly after lifting the spinning assembly to a certain position through the cooperation with a limiting member.

[0017] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotary movement control portion includes: a first slide rail parallel to a first axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the first slide rail after ascending and descending to a certain position.

[0018] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotary movement control portion further includes: a moving slide rail parallel to the first axis direction of the spinneret portion, the moving slide rail ascends or descends together with the spinning assembly or ascends or descends together with the spinning assembly and the moving bracket, and the moving slide rail limits the spinning assembly or the spinning assembly and the moving bracket to translate together with the first slide rail when ascending and descending to a position flush with the first slide rail.

[0019] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotary movement control portion includes: a second slide rail parallel to a second axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the second slide rail after ascending and descending to a certain position.

[0020] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotary movement control portion includes a rotation driving mechanism having a self locking function and used for driving the spinning assembly to rotate around the translation direction and to realize self lock at multiple rotation angles.

[0021] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the rotation driving mechanism having the self locking function includes: an electric or manual reduction gear having a self locking function.

[0022] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the reduction gear having the self locking function includes a turbine vortex reducer.

[0023] In combination with any elastic fiber dry spinning mechanism provided by one aspect of the embodiments of the present invention, optionally, the orientation facilitating the maintenance of the spinneret portion is an upward orientation.

[0024] On another aspect, the embodiments of the present invention further provide a maintenance control method for a spinning assembly based on the any elastic fiber dry spinning mechanism provided by the embodiments of the present invention, and the maintenance control method for the spinning assembly includes:

driving the spinning assembly to ascend to separate the spinning assembly from a spinning box below the spinning assembly;

driving the spinning assembly to translate to stagger the spinning assembly to the spinning box; and

driving the spinning assembly to rotate around a translation direction to change the orientation of the spinning assembly into an orientation facilitating the maintenance of the spinneret portion.

[0025] In combination with any maintenance control method for the spinning assembly provided by the other aspect of the embodiments of the present invention, optionally, after the orientation of the spinning assembly is changed into the orientation facilitating the maintenance of the spinneret portion, the maintenance control method for the spinning assembly further includes: separating the spinneret portion from the temperature control portion, and detachably overlapping another spinneret portion with the temperature control portion.

[0026] In combination with any maintenance control method for the spinning assembly provided by the other aspect of the embodiments of the present invention, optionally, after the other spinneret portion is overlapped with the temperature control portion in a detachable man-

ner, the maintenance control method for the spinning assembly further includes: driving the spinning assembly to rotate around the translation direction to change the orientation of the spinning assembly into an orientation facilitating the spinning of the other spinneret portion into the spinning box; driving the spinning assembly to translate to align the spinning assembly to the spinning box up and down; and driving the spinning assembly to descend to connect the spinning assembly with the spinning box.

[0027] In the technical solutions provided by the embodiments of the present invention, the temperature control portion and the spinneret portion contained in the elastic fiber dry spinning assembly are two portions which are detachably overlapped with each other, in a maintenance process of the spinning assembly, the entirety of the spinning assembly is driven to ascend and descend, translate and rotate around the translation direction through the rotary movement control portion to change the orientation of the spinning assembly into the orientation facilitating the maintenance of the spinneret portion, and then the spinneret portion and the temperature control portion only need to be separated and disassembled instead of disassembling the entirety of the spinning assembly, thereby reducing the range of assemblies requiring cleaning, replacement and other maintenance and reducing the workload of cleaning, replacement and other maintenance. In addition, another standby spinneret portion can be replaced, so that the online replacement and other maintenance of the spinneret portion are convenient, quick and efficient, and the influence on spinning production is little. The replaced spinneret portion can be performed with cleaning, assembly replacement and other offline maintenance, thereby avoiding the influence of the time necessary for the offline maintenance of the portion on the online spinning production, accordingly the spinning production interruption time necessary for the maintenance is shortened, and the production efficiency is improved.

Brief Description of the Drawings

[0028] To illustrate technical solutions in the embodiments of the present invention or in the prior art more clearly, a brief introduction on the accompanying drawings which are needed in the description of the embodiments or the prior art is given below. Apparently, the accompanying drawings in the description below are merely some of the embodiments of the present invention, based on which other drawings can be obtained by those of ordinary skill in the art without any creative effort.

Fig. 1 is a schematic diagram of an optional structure of an elastic fiber dry spinning mechanism provided by an embodiment of the present invention;

Fig. 2a to Fig. 2g are state examples of different phases in a maintenance control process of a spinning assembly of the elastic fiber dry spinning mechanism as shown in Fig. 1;

Fig. 3 is a schematic diagram of an optional structure of another elastic fiber dry spinning mechanism provided by an embodiment of the present invention;

Fig. 4a to Fig. 4g are state examples of different phases in a maintenance control process of a spinning assembly of the elastic fiber dry spinning mechanism as shown in Fig. 3;

Fig. 5 is a schematic diagram of a structure of an elastic fiber dry spinning assembly provided by the prior art.

Reference signs:

[0029]

1-spinning assembly; 11-metering device; 12-interface conversion portion; 13-temperature control portion; 14-spinneret portion; 15-metering driving device; 16-rotating shaft; 2-moving bracket; 21-moving bracket guiding portion; 22- stop pin; 31-first slide rail; 32-moving slide rail; 33-second slide rail; 41-first lifting driving mechanism; 42-second lifting driving mechanism; 5-spinning shaft; 6-rotation driving mechanism;

1a-metering device; 2a-metal hose; 3a-temperature control portion; 4a-spinneret portion.

[0030] It should be understood by those skilled in the art that the elements in the accompanying drawings are shown for simplicity and clarity only and are not necessarily drawn to scale. For example, the dimensions of some elements in the accompanying drawings may be magnified relative to those of other elements in order to help to improve the understanding of the embodiments of the present invention.

Detailed Description of the Embodiments

[0031] In order that the purposes, technical solutions and advantages of the present invention are clearer, a clear and complete description of the technical solutions in the embodiments of the present invention will be given below through characters and/or in combination with the accompanying drawings. Apparently, the embodiments described below are merely a part, but not all, of the embodiments of the present invention. For the sake of clarity and conciseness, not all the features of the actual implementation are described in the specification. However, it should be understood that many implementation-specific decisions must be made in the development process of any such practical embodiments so as to achieve the specific objectives of the developer, for example, to meet those constraints associated with systems and business, and these restrictions may vary depending on the implementation. In addition, it should be appreciated that while the development work may be very complex and time consuming, this development work is only a routine task

for those skilled in the art benefited by the contents of the present disclosure.

[0032] It should also be noted herein that the elements and features described in one accompanying drawing or one embodiment of the present invention may be combined with the elements and features shown in one or more other drawings or embodiments. In order to avoid obscuring the present invention due to unnecessary details, only device structures and/or processing steps closely related to the solutions according to the present invention are described in the accompanying drawings and the description, and the representation and description of assemblies and processes having little relationship with the present invention and known to those of ordinary skill in the art are omitted. All of the other embodiments, obtained by those of ordinary skill in the art based on the embodiments in the present invention without any creative effort, fall into the protection scope of the present invention.

[0033] It may be understood by those skilled in the art that terms such as "first", "second" and the like in the present invention are merely used for distinguishing different steps, devices or modules, and neither represent any particular technical meaning nor represent a necessary logical order therebetween.

[0034] The embodiment of the present invention provides an elastic fiber dry spinning mechanism, including: a spinning assembly and a rotary movement control portion; the spinning assembly includes a temperature control portion and a spinneret portion, which are detachably overlapped with each other; and the rotary movement control portion is used for driving the spinning assembly to ascend and descend, translate and rotate around a translation direction so as to change the orientation of the spinning assembly into an orientation facilitating the maintenance of the spinneret portion.

[0035] The ascending and descending include up and down movements of ascending or descending relative to a certain reference position of the spinning assembly, and if a center axis of the spinning assembly is a vertical direction, the ascending and descending are up and down movements of a vertical plane relative to a certain reference position of the spinning assembly. The translation includes horizontal movement relative to left and right sides of a certain reference position of the spinning assembly, if the center axis of the spinning assembly is the vertical direction, the translation is the movement on a horizontal plane relative to a certain reference position of the spinning assembly, which can be left and right movement along the long axis direction of the spinneret portion, or can be front and back movement along the short axis direction of the spinneret portion, and so on. The orientation facilitating the maintenance of the spinneret portion can include, but not limited to, an upward orientation of the spinneret portion, and the maintenance can include, but not limited to, cleaning and/or replacement, etc.

[0036] In a dry spinning production process of elastic fibers such as spandex, the spinning assembly is usually disposed above a spinning box, and the spinneret portion is close to the spinning box. The spinning box can include, but not limited to, a spinning shaft, nozzles of the spinneret portion face to the interior of the spinning shaft, and a polymer solution for the elastic fibers is sprayed into the spinning shaft through the nozzles of the spinneret portion to perform such subsequent procedure processing of the elastic fibers, such as solvent evaporation, and so on. The polymer solution for elastic fiber dry spinning has certain chemical corrosion and viscosity and the like, the solution or impurities and the like will be accumulated in the nozzles of the spinneret portion to a certain extent after long time use, and the nozzles may be even blocked by serious accumulation. Therefore, the spinneret portion usually requires regular maintenance after a certain maintenance period.

[0037] For example, corresponding to the situation that the spinning box is located below the spinning assembly, the spinneret portion is downward (i.e., the nozzles of the spinneret portion spin into the spinning shaft below) in a normal spinning working state, and when the spinneret portion is downward, it is inconvenient for cleaning, replacement and other maintenance. The rotary movement control portion can drive the spinning assembly to ascend to separate the spinning assembly from the spinning box below the spinning assembly, drive the spinning assembly to translate to stagger the spinning assembly to the spinning box, and drive the spinning assembly to rotate around the translation direction to change the orientation of the spinning assembly into the orientation facilitating the maintenance of the spinneret portion, for example, drive the spinning assembly to rotate around the translation direction to a position where the spinneret portion is upward. In this way, the spinneret portion can be separated from the temperature control portion, and another spinneret portion (e.g., a standby spinneret portion) is detachably overlapped with the temperature control portion. After the replacement is completed, the rotary movement control portion can perform reverse movement or rotation according to the original movement track, for example, the spinning assembly is driven to rotate around the translation direction to change the orientation of the spinning assembly into an orientation facilitating the spinning of the other spinneret portion into the spinning box (e.g., the nozzle of the spinneret portion is downward); the spinning assembly is driven to translate to align the spinning assembly to the spinning box up and down; and the spinning assembly is driven to descend to connect the spinning assembly with the spinning box, and then the spinning assembly can recover to the original working state.

[0038] Therefore, in the technical solution provided by the embodiment of the present invention, the temperature control portion and the spinneret portion contained in the elastic fiber dry spinning assembly are two portions which are detachably overlapped with each other, in a maintenance process of the spinning assembly, the en-

tirety of the spinning assembly is driven to ascend and descend, translate and rotate around the translation direction through the rotary movement control portion to change the orientation of the spinning assembly into the orientation facilitating the maintenance of the spinneret portion, and then the spinneret portion and the temperature control portion only need to be separated and disassembled instead of disassembling the entirety of the spinning assembly, thereby reducing the range of assemblies requiring cleaning, replacement and other maintenance and reducing the workload of cleaning, replacement and other maintenance. In addition, the other standby spinneret portion can be replaced, so that the online replacement time is short, and the influence on the spinning production is little. The replaced spinneret portion can be performed with cleaning, assembly replacement and other offline maintenance, thereby avoiding the influence of the time necessary for the offline maintenance of the portion on the online spinning production, accordingly the spinning production interruption time necessary for the maintenance is shortened, and the production efficiency is improved.

[0039] Optionally, in the technical solution provided by the embodiment of the present invention, the spinneret portion includes a rectangular plate, multiple rows of spinneret orifices are arranged on the rectangular plate, and at least one nozzle (Nozzle) is arranged in one of the spinneret orifices. Specifically, each row of spinneret orifices can include a plurality of spinneret orifices arranged along the length direction of the rectangular plate at intervals, and one or more nozzles can be arranged in each spinneret orifice. The temperature control portion can include a box body for the flow of a temperature control medium, multiple rows of polymer solution passages isolated from each other are arranged on the box body, the polymer solution passages correspondingly communicate with the spinneret orifices, and the polymer solution for elastic fibers is transmitted to the corresponding spinneret orifices by the polymer solution passages and is ejected by the nozzles in the corresponding spinneret orifices. The spinneret portion in the solution can be matched with a spinning box including a rectangular spinning shaft, which is conducive to ejecting more fiber tows from a limited space so as to improve the yield. According to the actual production demands of the elastic fibers, the spinneret portion can be an entirety to be conveniently disassembled and assembled on the whole; or the spinneret portion can include a plurality of spliced spinneret sub-portions, and the solution can better satisfy the block disassembly and assembly of the spinneret portions of spinning assemblies with high unit capacity. With the continuous improvement of the unit capacity of the elastic fibers such as spandex, the production interruption time necessary for the maintenance by the traditional maintenance means in the background art is longer and longer, which seriously affects the continuous operation of the equipment and reduces the production efficiency, and the advantages of the technical solution provided by the embodiment of the present invention will be more obvious, such as small maintenance range, fast spinneret portion replacement, short interruption time, high efficiency, etc.

[0040] Optionally, the spinning assembly further includes: at least one metering device and an interface conversion portion, and the metering device, the interface conversion portion, the temperature control portion and the spinneret portion are sequentially overlapped with each other. The spinning assembly provided by the solution has a small volume and a compact structure, when the spinneret portion requires maintenance, the metering device, the interface conversion portion, the temperature control portion and the spinneret portion can be lifted, translated and rotated around the translation direction as an entirety, so that the orientation of the spinneret portion is the orientation facilitating the maintenance, and thus the convenience of maintenance and control is improved.

[0041] Optionally, the spinning assembly further includes: at least one metering driving device used for driving the metering device. In the solution, when the spinneret portion requires maintenance, the metering driving device, the metering device, the interface conversion portion, the temperature control portion and the spinneret portion can be lifted, translated and rotated around the translation direction as an entirety, so that the orientation of the spinneret portion is the orientation facilitating the maintenance, and thus the convenience of maintenance and control is improved.

[0042] Optionally, the elastic fiber dry spinning mechanism provided by the embodiment of the present invention further includes: a moving bracket used for providing support for the ascending and descending, translation and/or rotation of the spinning assembly. In the solution, as the moving bracket provides the support, it is conducive to improving the stability of the overall ascending and descending, overall translation and/or overall rotation of the spinning assembly. The specific structure of the moving bracket can be flexibly designed according to actual demands, and this is not limited in the embodiment of the present invention.

[0043] Optionally, the spinning assembly is rotatably connected with the moving bracket through at least one rotating shaft. For example, one or more rotating shafts can be arranged on the spinning assembly, and the spinning assembly is connected with the moving bracket through the rotating shaft, so that the entirety of the spinning assembly can rotate on the moving bracket under the drive of the rotary movement control portion, and the rotation stability is good.

[0044] Optionally, the rotary movement control portion includes a first lifting driving mechanism used for driving the spinning assembly and the moving bracket to ascend and descend together. The first lifting driving mechanism can include, but not limited to, a lifting cylinder, and under the action of a driving force provided by the first lifting driving mechanism, the spinning assembly and the mov-

ing bracket can ascend and descend together as an entirety so as to provide the stability of lifting movement. The manner of the first lifting driving mechanism to provide the driving force can be flexibly determined according to the demand of actual equipment layout, or a lifting mechanism supporting a certain driving mode can be flexibly selected to serve as the first lifting driving mechanism according to the demand of actual equipment layout. For example, the first lifting driving mechanism can drive the spinning assembly and the moving bracket to ascend and descend together from the upper side of the spinning assembly. In the solution, the spinning assembly and the moving bracket are driven to ascend and descend together as an entirety through the push-pull driving force of the first lifting driving mechanism, and the lifting driving mechanism can be flexibly deployed by fully using the upper side space of the spinning assembly. As another example, the first lifting driving mechanism can drive the spinning assembly and the moving bracket to ascend and descend together from the lower side of the spinning assembly. In the solution, the spinning assembly and the moving bracket are driven to ascend and descend together as an entirety through the extension and contraction of a driving arm of the first lifting driving mechanism, and the lifting driving mechanism can be flexibly deployed by fully using the lower side space of the spinning assembly.

[0045] Optionally, the moving bracket is provided with at least one moving bracket guiding portion extending along a lifting direction; and the rotary movement control portion includes a second lifting driving mechanism used for driving the spinning assembly to ascend and descend along the moving bracket guiding portion. The second lifting driving mechanism can include, but not limited to, a lifting cylinder, and under the action of the driving force provided by the second lifting driving mechanism, the spinning assembly can ascend and descend along the moving bracket guiding portion so as to provide the stability of lifting movement. The manner of the second lifting driving mechanism to provide the driving force can be flexibly determined according to the demand of actual equipment layout, or a lifting mechanism supporting a certain driving mode can be flexibly selected to serve as the second lifting driving mechanism according to the demand of actual equipment layout. For example, the second lifting driving mechanism can drive the spinning assembly to ascend and descend along the moving bracket guiding portion from the lower side of the spinning assembly. In the solution, the spinning assembly is driven to ascend and descend along the moving bracket guiding portion through the extension and contraction of the driving arm of the second lifting driving mechanism, and the lifting driving mechanism can be flexibly deployed by fully using the lower side space of the spinning assembly. As another example, the second lifting driving mechanism can drive the spinning assembly to ascend and descend along the moving bracket guiding portion from the upper side of the spinning assembly. In the solution, the spinning assembly is driven to ascend and descend along the moving bracket guiding portion through the push-pull driving force of the second lifting driving mechanism, and the lifting driving mechanism can be flexibly deployed by fully using the upper side space of the spinning assembly.

[0046] Further optionally, the moving bracket guiding portion is provided with at least one limiting hole for limiting the spinning assembly after lifting the spinning assembly to a certain position through the cooperation with a limiting member. The shape and the dimension of the limiting hole can be designed according to actual demands, and the implementation is very flexible. The limiting member can include, but not limited to, a stop pin adapted to the limiting hole, and the like. In the solution, the spinning assembly is limited when the same is lifted to a certain position by means of the limiting hole and the limiting member, and then the spinning assembly is translated, the solution is simple and easy to implement and is conducive to improving the operation stability.

[0047] Optionally, the rotary movement control portion includes: a first slide rail parallel to a first axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the first slide rail after ascending and descending to a certain position. For example, the spinneret portion can include a long axis extending along its length direction and a short axis extending along its width direction. The first axis can be the long axis, and the solution is conducive to moving the spinning assembly or the spinning assembly and the moving bracket into a space extending along the length direction of the spinneret portion and then performing rotation control on the spinning assembly in the space; or the first axis can be the short axis, and the solution is conducive to moving the spinning assembly or the spinning assembly and the moving bracket into a space extending along the width direction of the spinneret portion and then performing rotation control on the spinning assembly in the space. In the above-mentioned solution, the spatial characteristics can be flexibly adapted to improve the operation convenience. Further optionally, the rotary movement control portion further includes: a moving slide rail parallel to the first axis direction of the spinneret portion, the moving slide rail ascends or descends together with the spinning assembly or ascends or descends together with the spinning assembly and the moving bracket, and the moving slide rail limits the spinning assembly or the spinning assembly and the moving bracket to translate together with the first slide rail when ascending and descending to a position flush with the first slide rail, and the solution is conducive to further improving the translation stability of the spinning assembly (or the spinning assembly and the moving bracket).

[0048] Optionally, the rotary movement control portion includes: a second slide rail parallel to a second axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the second slide rail after ascending and descending to a certain position. The second axis can be a short axis, and the solution is

conducive to moving the spinning assembly or the spinning assembly and the moving bracket into a space extending along the width direction of the spinneret portion and then performing rotation control on the spinning assembly in the space; or the second axis can be a long axis, and the solution is conducive to moving the spinning assembly or the spinning assembly and the moving bracket into a space extending along the length direction of the spinneret portion and then performing rotation control on the spinning assembly in the space. In the above-mentioned solution, the spatial characteristics can be flexibly adapted to improve the operation convenience.

[0049] Optionally, the rotary movement control portion includes a rotation driving mechanism having a self locking function and used for driving the spinning assembly to rotate around the translation direction and to realize self lock at multiple rotation angles. For example, in the embodiment of the present invention, a rotation driving mechanism having a self locking function of any angle on the rotation direction can be selected to improve the convenience of maintaining the spinning assembly from different angles.

[0050] Further optionally, the rotation driving mechanism having the self locking function includes: an electric or manual reduction gear having a self locking function; the manual reduction gear can control the rotation angle through, but not limited to, a hand wheel and in other manners, the control is convenient, and the cost is low; the electric reduction gear can realize the electric control of the rotation angle in combination with, but not limited to, a braking device and in other manners, and the control is convenient and is relatively accurate. The reduction gear having the self locking function can include, but not limited to, a turbine vortex reducer, the movement and power between two alternating axes can be effectively transferred by the turbine vortex reducer to improve the efficiency, the self lock can be realized at any angle on the rotation direction to improve the rotation stability, even if the rotation angle is manually controlled, it is quite labor-saving, and the operation is convenient.

(1) An optional technical solution of the embodiment of the present invention is further illustrated below in combination with Fig. 1 to Fig. 2g by taking it as an example that the spinning assembly includes the metering driving device, the metering device, the interface conversion portion, the temperature control portion and the spinneret portion; and for the spinning assemblies with other structures, the implementation is similar, and is not described redundantly in the embodiment of the present invention.

[0051] As shown in Fig. 1, an elastic fiber dry spinning mechanism provided by the embodiment of the present invention includes a spinning assembly 1, a moving bracket 2 and a rotary movement control portion. The spinning assembly 1 includes: at least one metering device 11, an interface conversion portion 12, a temperature control portion 13, a spinneret portion 14 and at least one metering driving device 15, the metering device 11, the interface conversion portion 12, the temperature control portion 13, the spinneret portion 14 and the metering driving device 15 are sequentially overlapped into an entirety with a relatively fixed position up and down, and at least the temperature control portion 13 and the spinneret portion 14 are detachable. A rotating shaft 16 is arranged at both ends of the spinning assembly 1, the spinning assembly 1 is connected with the moving bracket 2 through the rotating shaft 16, and thus the entirety of the spinning assembly 1 can rotate on the moving bracket 2. The rotary movement control portion includes a first lifting driving mechanism 41, a first slide rail 31, a moving slide rail 32 and a rotation driving mechanism 6, the first slide rail 31 and the moving slide rail 32 are relatively arranged on the long axis direction of the spinneret portion 14, and the moving slide rail 32 can ascend and ascend together with the spinning assembly 1 and the moving bracket 2.

[0052] When the spinning assembly 1 is in a normal spinning working state, the spinneret portion 14 is arranged at the top of the spinning box and communicates with a spinning shaft 5, and the spinneret portion 14 is downward, as shown in Fig. 2a. When the spinneret portion 14 needs to be replaced, the spinning production is interrupted.

[0053] The first lifting driving mechanism 41 drives the entirety of the moving slide rail 32, the moving bracket 2 and the spinning assembly 1 to ascend to a position as high as the first slide rail 31 along the vertical direction, as shown in Fig. 2b. A driving force (the driving force can be manually applied, for example, thrust; or can be applied by an external power mechanism and the like) of translating along the long axis direction of the spinneret portion is applied to the entirety of the moving bracket 2 and the spinning assembly 1, so that the entirety of the moving bracket 2 and the spinning assembly 1 translates onto the first slide rail 31 along the moving slide rail 32, as shown in Fig. 2c. The spinning assembly 1 completely staggers to the spinning shaft after completely moving onto the first slide rail 31 as shown in Fig. 2d. The rotation driving mechanism 6 can include, but not limited to, a manual turbine vortex reducer, and the rotation driving mechanism 6 outputs the power to the rotating shaft 16, so that the entirety of the spinning assembly rotates on the moving bracket 2, as shown in Fig. 2e and Fig. 2f. After rotating to a certain angle, the orientation of the spinneret portion of the spinning assembly is an orientation facilitating the maintenance, for example, the spinneret portion of the spinning assembly is turned over to be upward after positive rotation for 180 degrees, as shown in Fig. 2g. Therefore, the spinneret portion 14 can be disassembled, and another spinneret portion 14 is replaced.

[0054] After the spinneret portion 14 is replaced, the rotation driving mechanism 6 outputs the power to the rotating shaft 16, so that the entirety of the spinning as-

sembly reversely rotates on the moving bracket 2, the orientation of the spinneret portion of the spinning assembly rotating to a certain angle is an orientation facilitating the spinning toward the spinning shaft 5, for example, the spinneret portion of the spinning assembly is turned over to be downward after reverse rotation for 180 degrees. Then, a driving force of translating along the long axis direction of the spinneret portion is applied to the entirety of the moving bracket 2 and the spinning assembly 1, so that the entirety of the moving bracket 2 and the spinning assembly 1 translates onto the moving slide rail 32 along the first slide rail 31, and the spinning assembly 1 is aligned to the spinning shaft up and down after completely moving onto the moving slide rail 32. Thereafter, the first lifting driving mechanism 41 drives the entirety of the moving slide rail 32, the moving bracket 2 and the spinning assembly 1 to descend along the vertical direction until the spinneret portion 14 is connected with the spinning shaft 5.

[0055] In this way, the replacement maintenance of the spinneret portion 14 is accomplished, the spinning production of the elastic fibers can be recovered, and cleaning, assembly replacement and other subsequent offline maintenance can be performed on the disassembled spinneret portion 14 subsequently. Therefore, in the solution, spinneret portion and the temperature control portion only need to be separated and disassembled instead of disassembling the entirety of the spinning assembly, thereby reducing the range of assemblies requiring cleaning, replacement and other maintenance and reducing the workload of cleaning, replacement and other maintenance. In addition, the online maintenance time is short, the influence on spinning production is little, and the production efficiency is improved.

(2) Thereafter, another optional technical solution of the embodiment of the present invention is further illustrated below in combination with Fig. 3 to Fig. 4g by taking it as an example that the spinning assembly includes the metering driving device, the metering device, the interface conversion portion, the temperature control portion and the spinneret portion; and for the spinning assemblies with other structures, the implementation is similar, and is not described redundantly in the embodiment of the present invention.

[0056] As shown in Fig. 3, an elastic fiber dry spinning mechanism provided by the embodiment of the present invention includes a spinning assembly 1, a moving bracket 2 and a rotary movement control portion. The spinning assembly 1 includes: at least one metering device 11, an interface conversion portion 12, a temperature control portion 13, a spinneret portion 14 and at least one metering driving device 15, the metering device 11, the interface conversion portion 12, the temperature control portion 13, the spinneret portion 14 and the metering driving device 15 are sequentially overlapped into an entirety with a relatively fixed position up and down, and at least the temperature control portion 13 and the spinneret portion 14 are detachable. A rotating shaft 16 is arranged at both ends of the spinning assembly 1, the spinning assembly 1 is connected with the moving bracket 2 through the rotating shaft 16, and thus the entirety of the spinning assembly 1 can rotate on the moving bracket 2. A moving bracket guiding portion 21 is respectively arranged on both sides of the moving bracket 2, and the spinning assembly 1 can ascend and descend along the moving bracket guiding portion 21; a plurality of limiting holes can be arranged on the moving bracket guiding portion 21 at intervals, for example, a stopper pin 22 and other limiting member is inserted into the limiting hole at a corresponding height to limit the lifting direction of the spinning assembly. The rotary movement control portion includes a second lifting driving mechanism 42, a second slide rail 33 and a rotation driving mechanism 6, and the second slide rail 33 is arranged along the short axis direction of the spinneret portion 14.

[0057] When the spinning assembly 1 is in a normal spinning working state, the spinneret portion 14 is arranged at the top of the spinning box and communicates with a spinning shaft 5, and the spinneret portion 14 is downward, as shown in Fig. 4a. When the spinneret portion 14 needs to be replaced, the spinning production is interrupted.

[0058] The second lifting driving mechanism 42 drives the spinning assembly 1 to ascend to a position along the vertical direction, as shown in Fig. 4b, and the stop pin 22 is inserted into the limiting hole formed in the corresponding height of the moving bracket guiding portion 21 to limit the spinning assembly 1 as shown in Fig. 4c. A driving force (the driving force can be manually applied, for example, thrust; or can be applied by an external power mechanism and the like) of translating along the short axis direction of the spinneret portion is applied to the entirety of the moving bracket 2 and the spinning assembly 1, so that the entirety of the moving bracket 2 and the spinning assembly 1 translates along the second slide rail 31 until the spinning assembly 1 staggers to the spinning shaft, as shown in Fig. 4d to Fig. 4e. Thereafter, the rotation driving mechanism 6, such as a manual turbine vortex reducer, outputs the power to the rotating shaft 16, so that the entirety of the spinning assembly rotates on the moving bracket 2, after rotating to a certain angle, the orientation of the spinneret portion of the spinning assembly is an orientation facilitating the maintenance as shown in Fig. 4f to Fig. 4g, for example, the spinneret portion of the spinning assembly is obliquely upward relative to the horizontal direction after positive rotation for certain degrees, for example, the spinneret portion of the spinning assembly is upward after positive rotation for 180 degrees. Therefore, the spinneret portion 14 can be disassembled, and another spinneret portion 14 is replaced.

[0059] After the spinneret portion 14 is replaced, the rotation driving mechanism 6 outputs the power to the

rotating shaft 16, so that the entirety of the spinning assembly reversely rotates on the moving bracket 2, the orientation of the spinneret portion of the spinning assembly rotating to a certain angle is an orientation facilitating the spinning toward the spinning shaft 5, for example, the spinneret portion of the spinning assembly is turned over to be downward after reverse rotation for certain angles, for example, the spinneret portion of the spinning assembly is turned over to be downward after reverse rotation for 180 degrees. Then, a driving force of translating along the short axis direction of the spinneret portion is applied to the entirety of the moving bracket 2 and the spinning assembly 1, so that the entirety of the moving bracket 2 and the spinning assembly 1 translates onto the a position where the spinning assembly 1 is aligned to the spinning shaft up and down. Thereafter, the stop pin 22 inserted into the limiting hole of the moving bracket guiding portion 21 is taken out, the second lifting driving mechanism 42 drives the entirety of the moving bracket 2 and the spinning assembly 1 to descend along the vertical direction until the spinneret portion 14 is connected with the spinning shaft 5.

[0060] In this way, the replacement maintenance of the spinneret portion 14 is accomplished, the spinning production of the elastic fibers can be recovered, and cleaning, assembly replacement and other subsequent offline maintenance can be performed on the disassembled spinneret portion 14 subsequently. Therefore, in the solution, the spinneret portion and the temperature control portion only need to be separated and disassembled instead of disassembling the entirety of the spinning assembly, thereby reducing the range of assemblies requiring cleaning, replacement and other maintenance and reducing the workload of cleaning, replacement and other maintenance. In addition, the online maintenance time is short, the influence on spinning production is little, and the production efficiency is improved.

[0061] In the above embodiments of the present invention, the serial numbers of the embodiments are merely illustrative and do not represent the merits of the embodiments. The descriptions of the various embodiments each have a focus, and portions not detailed in a specific embodiment may be found in relevant descriptions of other embodiments.

[0062] In embodiments such as the device and the method of the present invention, it is apparent that the assembly or steps can be recombined after being decomposed, combined and/or decomposed. These decompositions and/or recombinations shall be considered as equivalent solutions of the present invention. Meanwhile, in the above description of the specific embodiments of the present invention, the features described and/or illustrated for one embodiment can be used in one or more other embodiments in the same or similar manners, combined with the features in other embodiments, or replace the features in other embodiments.

[0063] It should be emphasized that the term "including/comprising" as used herein refers to the presence of a feature, an element, a step or an assembly, but does not exclude the presence or addition of one or more other features, elements, steps or assemblies.

[0064] Finally, it should be noted that although the present invention and its advantages have been described in detail above, it should be understood that various changes, substitutions and variations can be made without departing from the spirit and scope of the present invention as defined by the appended claims. Moreover, the scope of the present invention is not limited to the specific embodiments of the processes, equipment, means, methods and steps described in the specification. It will be readily understood by those of ordinary skill in the art from the disclosed contents of the present invention that, functions basically the same as the corresponding embodiments herein can be used and executed or processes, equipment, means, methods or steps to be developed at present and in the future and having basically the same results can be obtained depending on the present invention. Accordingly, the appended claims are intended to include such processes, equipment, means, methods or steps within their scopes.

Claims

1. An elastic fiber dry spinning mechanism, comprising:

   a spinning assembly, comprising a temperature control portion and a spinneret portion, which are detachably overlapped with each other; and a rotary movement control portion used for driving the spinning assembly to ascend and descend, translate and rotate around a translation direction so as to change the orientation of the spinning assembly into an orientation facilitating the maintenance of the spinneret portion.

2. The elastic fiber dry spinning mechanism of claim 1, wherein the spinneret portion comprises a rectangular plate, multiple rows of spinneret orifices are arranged on the rectangular plate, and at least one nozzle is arranged in one of the spinneret orifices.

3. The elastic fiber dry spinning mechanism of claim 1 or 2, wherein the spinning assembly further comprises: at least one metering device and an interface conversion portion, and the metering device, the interface conversion portion, the temperature control portion and the spinneret portion are sequentially overlapped with each other.

4. The elastic fiber dry spinning mechanism of claim 3, wherein the spinning assembly further comprises: at least one metering driving device used for driving the at least one metering device.

5. The elastic fiber dry spinning mechanism of any one

of claims 1-4, further comprising:

a moving bracket used for providing support for the ascending and descending, translation and/or rotation of the spinning assembly.

6. The elastic fiber dry spinning mechanism of claim 5, wherein the spinning assembly is rotatably connected with the moving bracket through at least one rotating shaft.

7. The elastic fiber dry spinning mechanism of claim 5, wherein the rotary movement control portion comprises a first lifting driving mechanism used for driving the spinning assembly and the moving bracket to ascend and descend together.

8. The elastic fiber dry spinning mechanism of claim 7, wherein the first lifting driving mechanism drives the spinning assembly and the moving bracket to ascend and descend together from the upper side or the lower side of the spinning assembly.

9. The elastic fiber dry spinning mechanism of any one of claims 5-8, wherein the moving bracket is provided with at least one moving bracket guiding portion extending along a lifting direction; and
the rotary movement control portion comprises a second lifting driving mechanism used for driving the spinning assembly to ascend and descend along the moving bracket guiding portion.

10. The elastic fiber dry spinning mechanism of claim 9, wherein the second lifting driving mechanism drives the spinning assembly to ascend and descend along the moving bracket guiding portion from the upper side or the lower side of the spinning assembly.

11. The elastic fiber dry spinning mechanism of claim 9, wherein the moving bracket guiding portion is provided with at least one limiting hole for limiting the spinning assembly after lifting the spinning assembly to a certain position through the cooperation with a limiting member.

12. The elastic fiber dry spinning mechanism of any one of claims 5-11, wherein the rotary movement control portion comprises: a first slide rail parallel to a first axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the first slide rail after ascending and descending to a certain position.

13. The elastic fiber dry spinning mechanism of claim 12, wherein,
the rotary movement control portion further comprises: a moving slide rail parallel to the first axis direction of the spinneret portion, the moving slide rail ascends or descends together with the spinning assembly or ascends or descends together with the spinning assembly and the moving bracket, and the moving slide rail limits the spinning assembly or the spinning assembly and the moving bracket to translate together with the first slide rail when ascending and descending to a position flush with the first slide rail.

14. The elastic fiber dry spinning mechanism of any one of claims 5-11, wherein the rotary movement control portion comprises: a second slide rail parallel to a second axis direction of the spinneret portion and used for limiting the spinning assembly to translate along the second slide rail after ascending and descending to a certain position.

15. The elastic fiber dry spinning mechanism of any one of claims 1-14, wherein the rotary movement control portion comprises a rotation driving mechanism having a self locking function and used for driving the spinning assembly to rotate around the translation direction and to realize self lock at multiple rotation angles.

16. The elastic fiber dry spinning mechanism of claim 15, wherein the rotation driving mechanism having the self locking function comprises: an electric or manual reduction gear having a self locking function.

17. The elastic fiber dry spinning mechanism of claim 16, wherein the reduction gear having the self locking function comprises a turbine vortex reducer.

18. The elastic fiber dry spinning mechanism of any one of claims 1-17, wherein the orientation facilitating the maintenance of the spinneret portion is an upward orientation.

19. A maintenance control method for a spinning assembly based on the elastic fiber dry spinning mechanism of any one of claims 1-18, comprising:

driving the spinning assembly to ascend to separate the spinning assembly from a spinning box below the spinning assembly;
driving the spinning assembly to translate to stagger the spinning assembly to the spinning box; and
driving the spinning assembly to rotate around a translation direction to change the orientation of the spinning assembly into an orientation facilitating the maintenance of the spinneret portion.

20. The method of claim 19, wherein after the orientation of the spinning assembly is changed into the orientation facilitating the maintenance of the spinneret portion, the method further comprises: separating

the spinneret portion from the temperature control portion, and detachably overlapping another spinneret portion with the temperature control portion.

21. The method of claim 19 or 20, wherein after the other spinneret portion is overlapped with the temperature control portion in a detachable manner, the method further comprises:

driving the spinning assembly to rotate around the translation direction to change the orientation of the spinning assembly into an orientation facilitating the spinning of the other spinneret portion into the spinning box;
driving the spinning assembly to translate to align the spinning assembly to the spinning box up and down; and
driving the spinning assembly to descend to connect the spinning assembly with the spinning box.

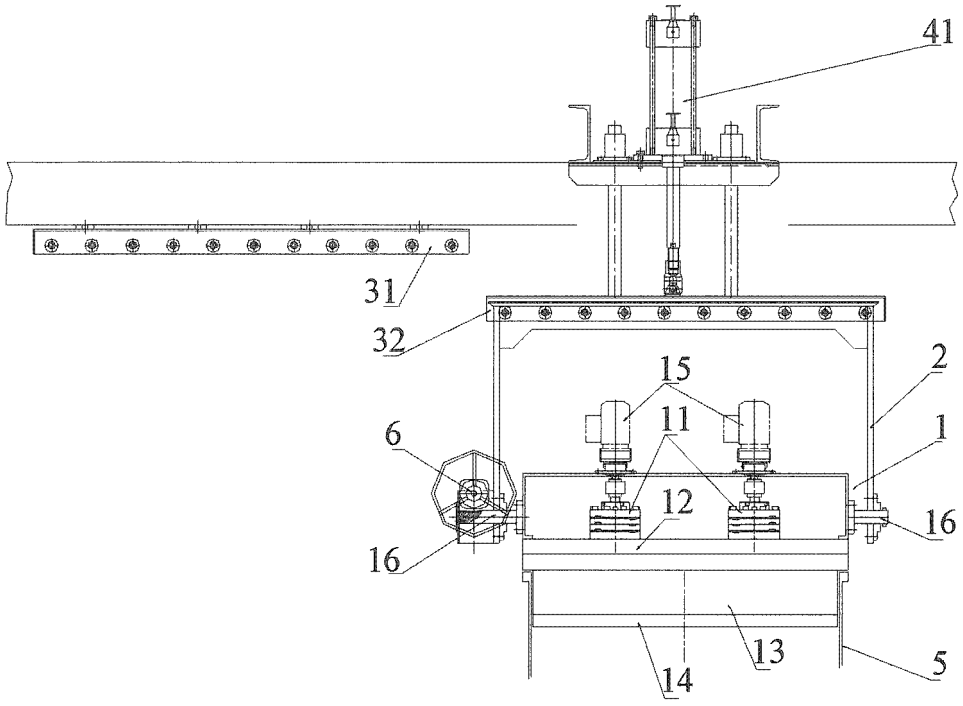

Fig. 1

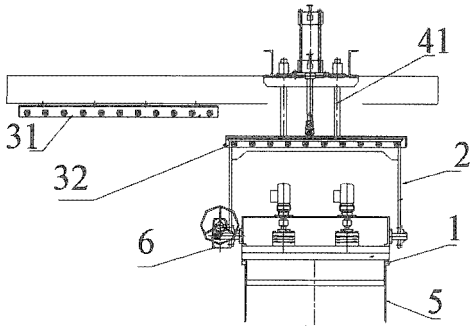

Fig. 2a

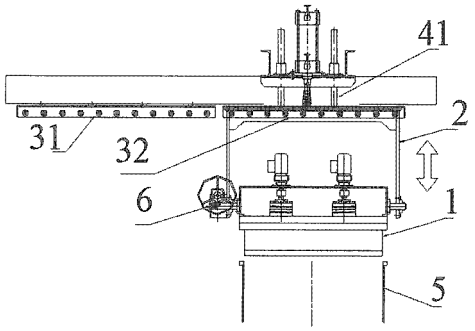

Fig. 2b

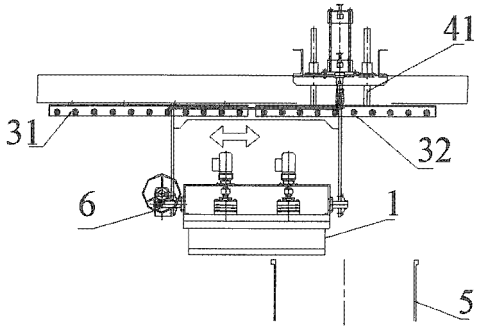

Fig. 2c

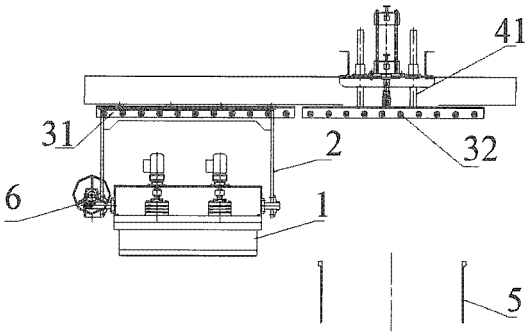

Fig. 2d

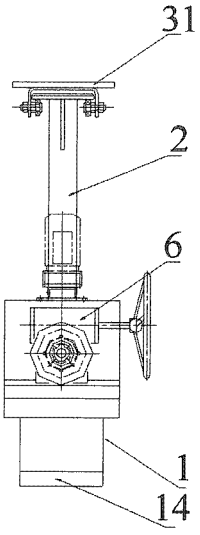

Fig. 2e

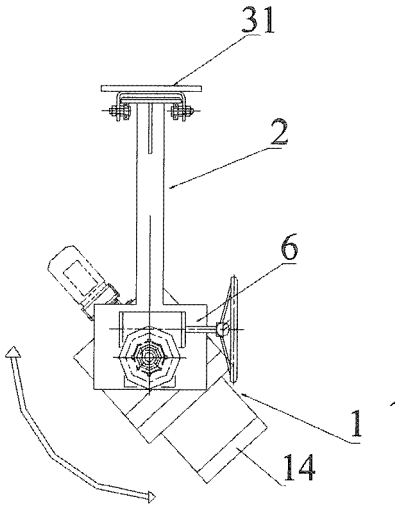

Fig. 2f

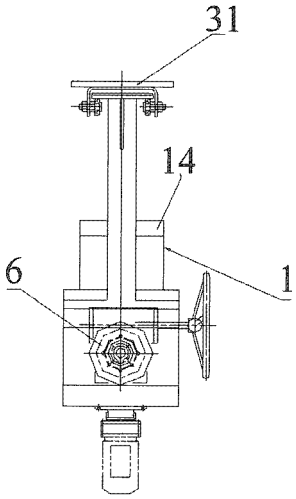

Fig. 2g

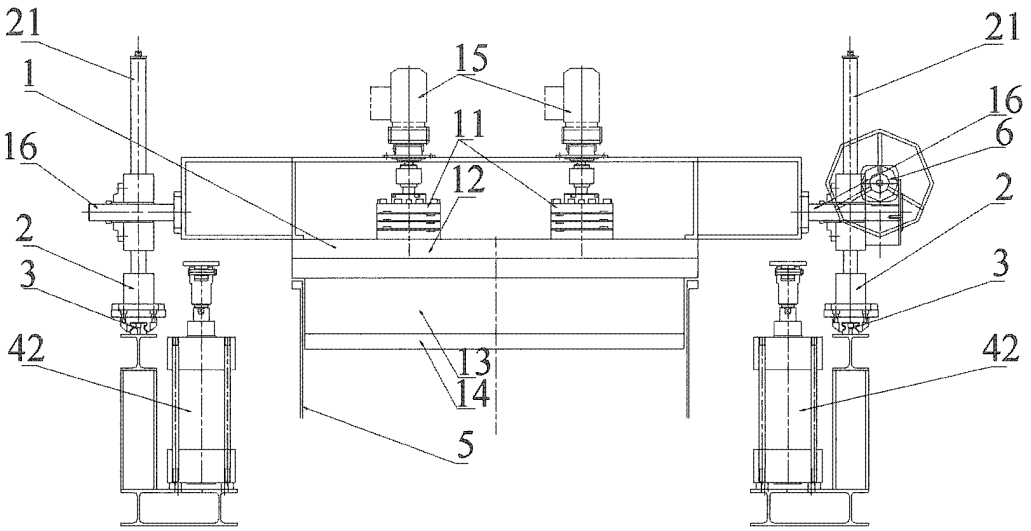

Fig. 3

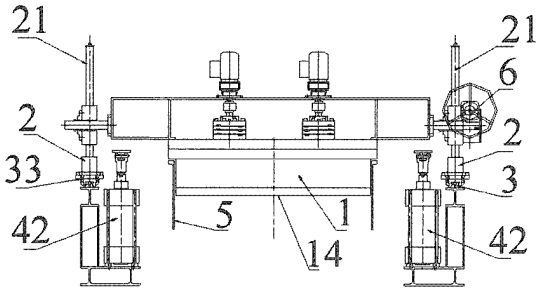

Fig. 4a

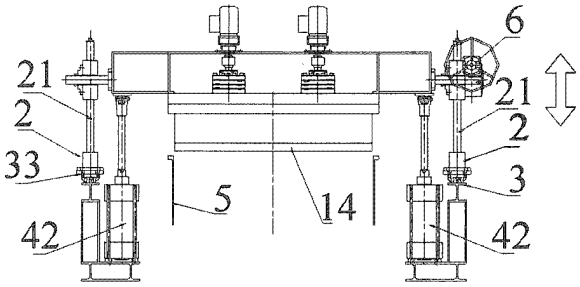

Fig. 4b

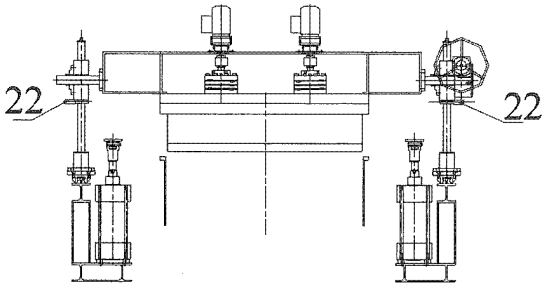

Fig. 4c

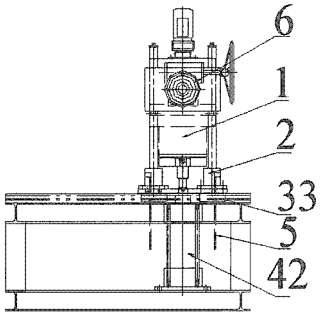

Fig. 4d

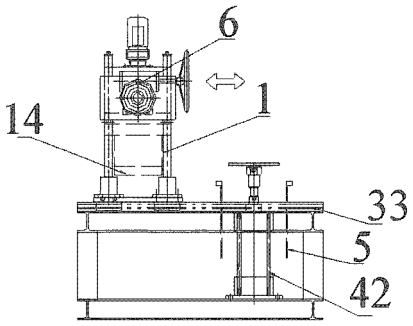

Fig. 4e

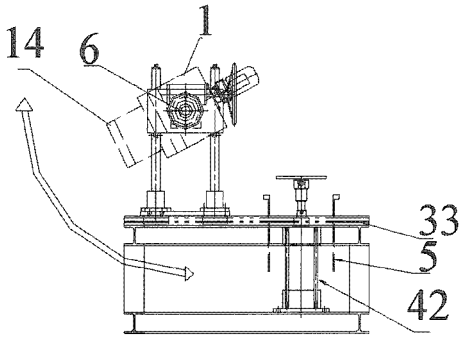

Fig. 4f

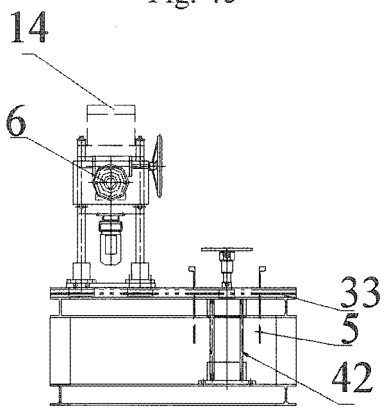

Fig. 4g

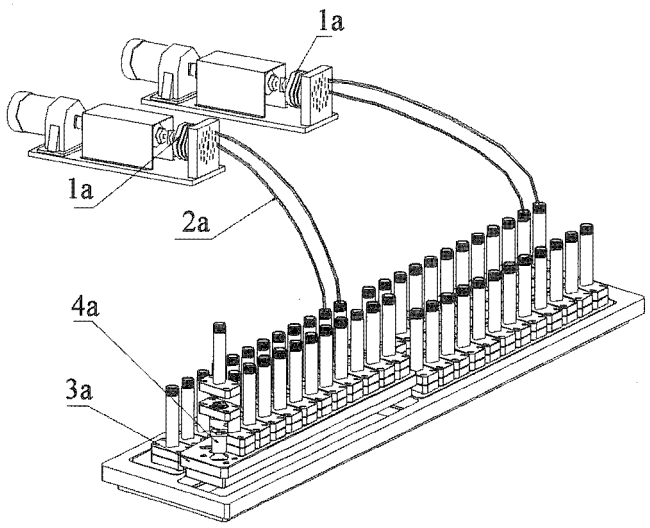

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/071435

A. CLASSIFICATION OF SUBJECT MATTER

D01D 4/00 (2006.01) i; D01D 4/02 (2006.01) n; D01D 5/04 (2006.01) n; D01D 5/18 (2006.01) n

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)

D01D

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)

CNABS; CNTXT; SIPOABS; EPODOC; WPI: component, spinning box, spinneret, box, manifold, translat+, mov+, mobil+, spin+, pack, lift, rotat+, up, down

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 204509518 U (ZHENGZHOU ZHONGYUAN SPANDEX ENGINEERING TECHNOLOGY CO., LTD.), 29 July 2015 (29.07.2015), the whole document	1-21
E	CN 104831366 A (ZHENGZHOU ZHONGYUAN SPANDEX ENGINEERING TECHNOLOGY CO., LTD.), 12 August 2015 (12.08.2015), the whole document	1-21
A	CN 203728970 U (ANJI FENGYUAN TEXTILE CO., LTD.), 23 July 2014 (23.07.2014), description, paragraphs [0014]-[0016], and figure 1	1-21
A	JP 609907 A (TORAY INDUSTRIES), 19 January 1985 (19.01.1985), the whole document	1-21
A	US 6210141 B1 (NORDSON CORP.), 03 April 2001 (03.04.2001), the whole document	1-21
A	CN 203846155 U (ZHEJIANG DERUN CHEMICAL FIBER CO., LTD.), 24 September 2014 (24.09.2014), the whole document	1-21
A	CN 101831719 A (JIANGSU SHENTAI SCIENCE AND TECHNOLOGY DEVELOPMENT CO., LTD.), 15 September 2010 (15.09.2010), the whole document	1-21

☐ 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
22 October 2015 (22.10.2015)	**30 October 2015 (30.10.2015)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **WANG, Han** Telephone No.: (86-10) **62085483**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2015/071435

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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CN 104831366 A	12 August 2015	None	
CN 203728970 U	23 July 2014	None	
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		JPS 609907 A	19 January 1985
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		DE 69937265 D1	22 November 2007
		EP 0936000 B1	10 October 2007
		JP 4326620 B2	09 September 2009
		DE 69937265 T2	10 July 2008
		EP 0936000 A2	18 August 1999
		EP 0936000 A3	02 May 2001
CN 203846155 U	24 September 2014	None	
CN 101831719 A	15 September 2010	CN 101831719 B	09 May 2012

Form PCT/ISA/210 (patent family annex) (July 2009)