

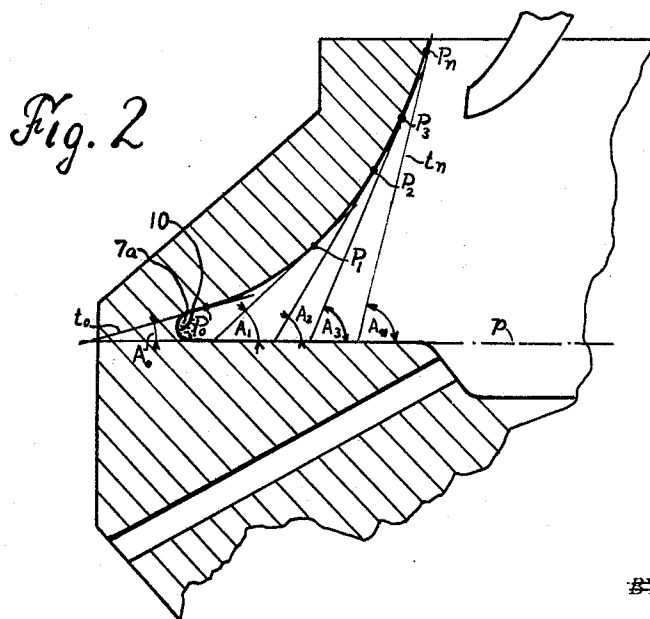
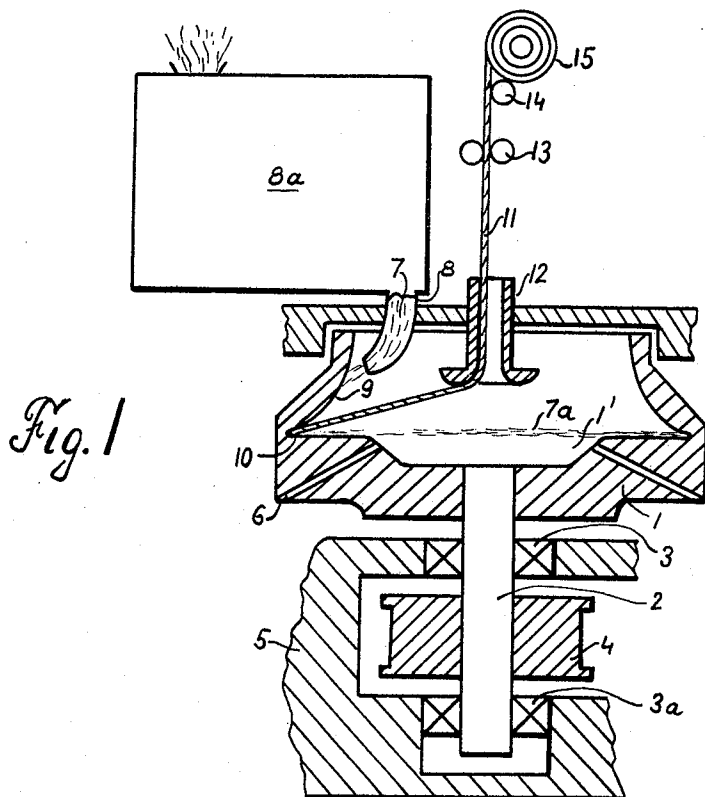
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APPARATUS FOR CONTINUOUS RINGLESS SPINNING OF TEXTILE FIBERS
IN A ROTATING SPINNING CHAMBER IN WHICH UNDERPRESSURE
IS MAINTAINED

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APPARATUS FOR CONTINUOUS RINGLESS SPINNING OF TEXTILE FIBERS IN A ROTATING SPINNING CHAMBER IN WHICH UNDERPRESSURE IS MAINTAINED

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5 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for continuous ringless spinning of textile fibers in a rotating spinning chamber in which underpressure is maintained and in which separated fibers fed onto the inner surface of the peripheral wall of the spinning chamber slip along this surface onto an annular collecting surface to collect on the latter in form of a fibrous ribbon to be spun into a yarn, and wherein the inner surface of the peripheral wall is a surface of revolution having in axial cross-section the form of a curve, the tangents to successive points of which include with a plane normal to the axis of revolution angles which gradually decrease from a point most distant from the collecting surface to a point closest to the latter.

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for continuous ringless spinning of textile fibers by means of a rotating spinning chamber in which underpressure is maintained and in which separated fibers fed onto the inner surface of the peripheral wall of the spinning chamber slip along this inner surface onto an annular collecting surface at which the fibers collect in form of a ribbon to be spun in a known manner into a yarn which is withdrawn from the interior of the spinning chamber.

Various spinning chambers of the aforementioned kind are known in the art which are provided with air escape openings or bores serving for creating the necessary underpressure in the chamber, and in these known spinning chambers the inner surface of the peripheral wall onto which separated fibers are fed to slip thereon to the collecting surface, is usually a frustoconical surface coaxially with the axis of rotation of the spinning chamber and having its largest diameter adjacent the collecting surface so that the separated fibers fed against the inner surface of the peripheral wall of the spinning chamber will slide under the influence of the underpressure in the interior of the spinning chamber as well as under the influence of the centrifugal forces, acting thereon during fast rotation of the spinning chamber about its axis, toward the collecting surface and collect on the latter in form of a ribbon. This ribbon is continuously doffed by the end portion of a yarn rotating with the spinning chamber and being simultaneously twisted, whereby, under simultaneous withdrawal the fiber band is formed in known manner into a yarn.

These known spinning chambers in which the inner surface of the peripheral wall of the spinning chamber onto which the separate fibers are fed to slide down toward the collecting surface is a frustoconical surface has however the disadvantage that the fibrous ribbon forming at the collecting surface is wider than the resultant diameter of the produced yarn. This results in difficulties in properly rolling up the wide fibrous ribbon into a yarn and, in the event that the fibers have not been sufficiently

separated in the separating mechanism, the possibility of forming slubs in the yarn is also increased. There is also a certain possibility that the rolling up of the ribbon will take place at points beyond the collecting surface. All these factors contribute to an increased number of yarn breakage during the spinning operation.

It is an object of the present invention to overcome these shortcomings of spinning chambers of the aforementioned kind.

It is a further object of the present invention to form the inner surface of the peripheral wall of the spinning chamber along which the separated fibers slide onto the collecting surface in such a manner so as to reduce the width of the fibrous ribbon forming on the collecting surface and to facilitate rolling of the fibrous band into a yarn.

SUMMARY OF THE INVENTION

With these objects in view the spinning apparatus according to the present invention for continuous ringless spinning of textile fibers mainly comprises a spinning chamber rotatable about its axis and having an annular collecting surface on which separated fibers fed into the spinning chamber are adapted to collect under the influence of centrifugal forces to be spun into a yarn and a peripheral wall having an inner slip surface which is in the form of a surface of revolution having in axial cross-section the form of a curve, the tangents to successive points of which include, with a plane normal to the axis of rotation of the spinning chamber, angles which gradually decrease from a point most distant from the collecting surface toward a point closest thereto, means for supporting the spinning chamber rotatable about its axis, means for creating an underpressure in the spinning chamber, means for feeding separated fibers against the forementioned slip surface, and means for withdrawing spun yarn from the collecting surface.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic axial cross-section of the ringless spinning apparatus according to the present invention; and

FIG. 2 is a partial axial cross-section of the spinning apparatus shown in FIG. 1, drawn to an enlarged scale, and showing the tangents to successive points of the slip surface.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and more specifically to FIG. 1 of the same, it will be seen that the apparatus according to the present invention for continuous ringless spinning of textile fibers mainly comprises a spinning chamber 1 mounted for rotation about its axis on a shaft 2, which is journaled in anti-friction bearings 3 and 3a. The bearings 3 and 3a are in turn mounted axially spaced from each other on the frame 5 of the apparatus, only partially shown in FIG. 1, and a pulley 4 fixed to the shaft 2 intermediate the bearings 3 and 3a serves to transmit a drive from a drive motor, not shown, to the shaft 2 for rotating the latter and the spinning chamber 1 connected thereto about the axis of the shaft 2. The spinning chamber 1 is provided with a plurality of air escape bores 6 extending in substantially radial direction outwardly from a central cavity 1' in the bottom wall of

the spinning chamber to create during fast rotation of the spinning chamber about its axis an underpressure in the interior of the spinning chamber. Separated fibers 7 are fed from a separating mechanism 8a, of any construction well known in the art, through a curved passage 8 onto the inner surface 9 of the peripheral wall of the spinning chamber and the fibers 7 slide under the influence of centrifugal force along the inner surface 9 onto a collecting surface 10 at the lower end of the surface 9, whereby the fibers are simultaneously straightened, at the collecting surface 10 the fibers collect in form of a ribbon 7a which is spun in a known manner into a yarn 11, and the latter is withdrawn through the withdrawing funnel 12 out of the spinning chamber 1 by means of withdrawing rollers 13 rotating in opposite directions and engaging the yarn at opposite sides thereof, and subsequently the yarn 11 is wound on a bobbin 15 by means of a transverse roller 14. Checking means for checking the presence of yarn may also be provided, but such checking means are not shown in the drawing, nor described in detail, since they do not form part of the present invention.

The slip surface 9 onto which the separated fibers are fed by the separating mechanism 8a and along which the fibers slide down onto the collecting surface 10 is a surface of revolution, coaxial with the axis of the spinning chamber 1, and having in axial cross-section the form of a curve the tangents $t_1 \dots t_0$ to successive points $P_1, P_2 \dots P_0$ include with a plane p normal to the axis of rotation of the spinning chamber angles $A_1, A_2 \dots A_0$ which gradually decrease from the point P_1 most distant from the collecting surface 10 to a point P_0 closest to the latter, as best shown in FIG. 2. The collecting surface 10 itself is preferably an annular surface having in axial cross-section a substantially semicircular contour blending into the lower end of the slip surface 9, and the upper surface of the bottom wall of the spinning chamber, which is substantially normal to the axis thereof.

The above described apparatus will operate in the following manner:

Separated fibers 7 are fed from the separating mechanism 8a through the passage 8 into the interior of the spinning chamber 1. Due to the rotation of the spinning chamber about its axis, and under the simultaneous action of the underpressure therein, the separated fibers 7 are projected against the slip surface 9 and owing to the advantageous shape of the latter, the fibers are accelerated and simultaneously straightened as they slide onto the collecting surface 10, where the fibers are collected in a ribbon 7a which is rolled up onto itself into a yarn 11, which is subsequently continuously withdrawn through the funnel 12 and wound onto the bobbin 15 in the manner as described above.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of apparatus for continuous ringless spinning of textile fibers in a rotating spinning chamber differing from the types described above.

While the invention has been illustrated and described as embodied in an apparatus for continuous ringless spinning of textile fibers in a rotating spinning chamber, wherein the inner surface of the peripheral wall of the spinning chamber is a surface of revolution having in axial

cross-section the form of a curve, the tangents to successive points of which include, with a plane normal to the axis of revolution, angles which gradually decrease from a point most distant from the collecting surface to a point closest to the latter, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. An apparatus for continuous ringless spinning of textile fibers comprising a spinning chamber rotatable about its axis, said spinning chamber having an annular collecting surface on which separated fibers fed into the spinning chamber are adapted to collect under the influence of centrifugal forces to be spun into a yarn, and a peripheral wall having an inner slip surface, said slip surface being a surface of revolution having in axial cross-section the form of a curve, the tangents to successive points of which include, with a plane normal to the axis of rotation of the spinning chamber, angles which gradually decrease from a point most distant from the collecting surface to a point closest to the latter; means for supporting said spinning chamber rotatably about its axis; means for creating an underpressure in said spinning chamber; means for feeding separated fibers against a region of said slip surface distant from said collecting surface; and means for withdrawing spun yarn from said collecting surface out of the interior of the spinning chamber.

2. An apparatus as defined in claim 1, wherein said spinning chamber is rotatable about a vertical axis.

3. An apparatus as defined in claim 2, wherein said means for creating underpressure in said spinning chamber comprise a plurality of substantially radially extending bores through a wall portion of said spinning chamber below said collecting surface.

4. An apparatus as defined in claim 3, wherein said spinning chamber has a bottom wall formed with a central depression, said bores communicating at the inner ends thereof with said depression and leading from said depression to the outer surface of said spinning chamber.

5. An apparatus as defined in claim 4, wherein said collecting surface has in axial cross-section a substantially semi-circular contour blending into the lower end of said slip surface and the upper surface of said bottom wall.

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