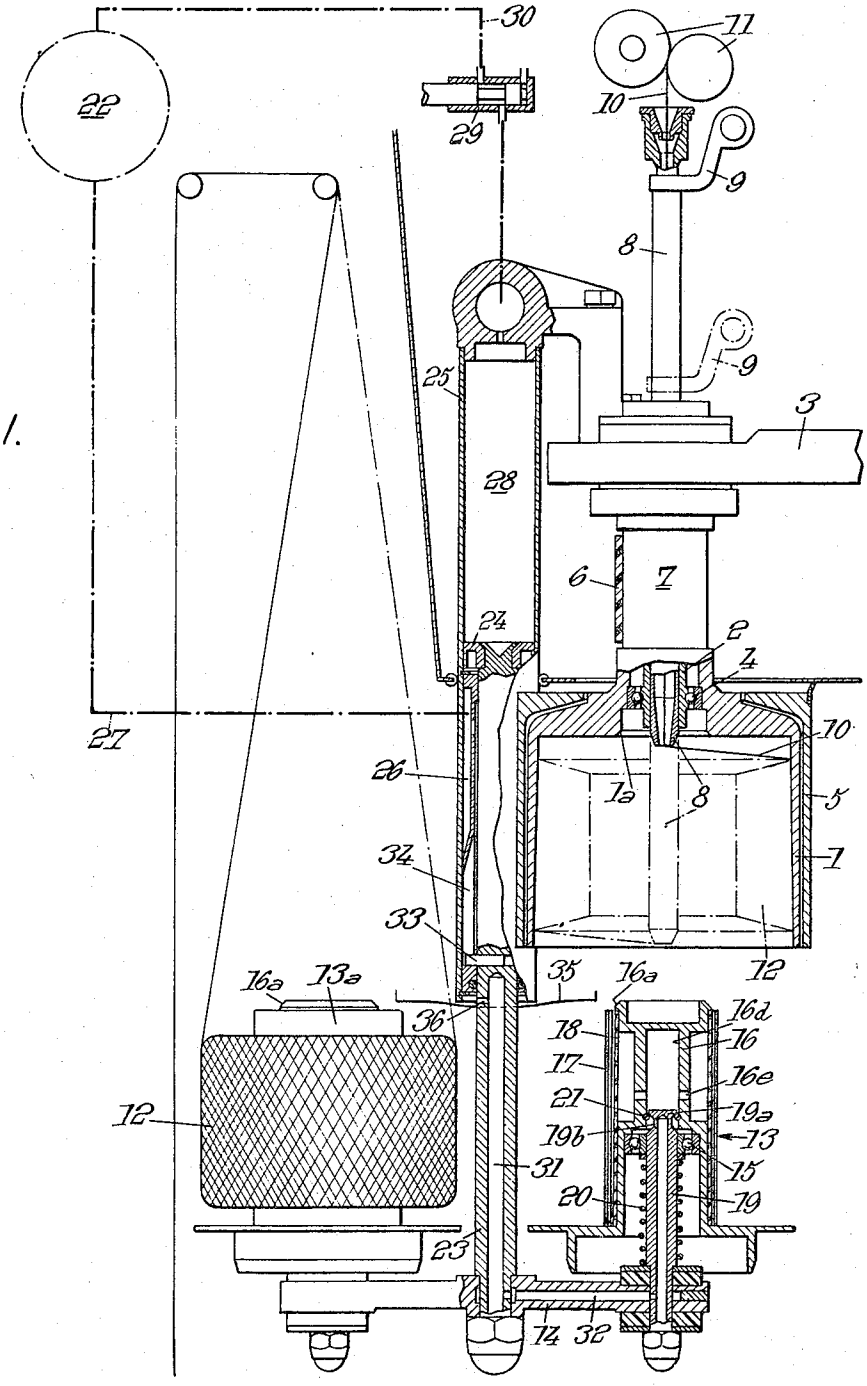
Sept. 12, 1967 L. VIGNON 3,340,685

CENTRIFUGAL YARN SPINNING MECHANISM

Filed Dec. 22, 1965 2 Sheets-Sheet 1

Fig. 1.



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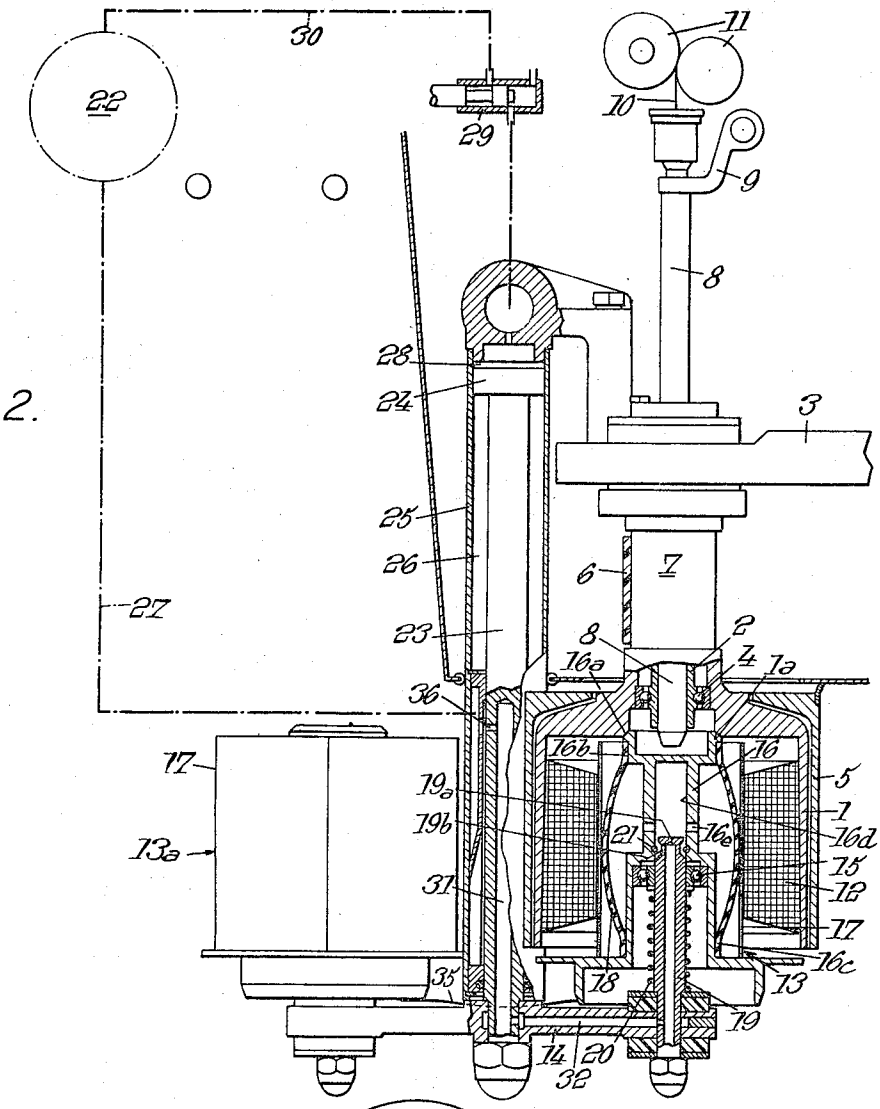
Filed Dec. 22, 1965 2 Sheets-Sheet 2

Fig. 2.



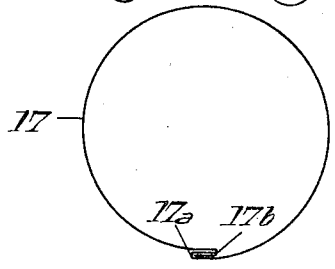


Fig. 3.

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CENTRIFUGAL YARN SPINNING MECHANISM

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Claims priority, application Switzerland, Dec. 24, 1964, 47,664/64
10 Claims. (Cl. 57—34)

The invention relates to a yarn spinning mechanism comprising a spinning pot mounted for rotation about a yarn spinning axis and adapted to spin a hollow yarn package by centrifugal force. The invention is more especially, but not exclusively concerned with a mechanism of this kind for spinning a yarn of discontinuous fibrous material.

The chief object of the present invention is to provide a mechanism of this kind which is better adapted to meet the requirements of practice than those used up to this time for the same purpose.

The yarn spinning mechanism according to the present invention comprises a yarn guide extending through the spinning pot and reciprocable along the spinning axis for guiding the yarn into the pot and an expansible yarn package pivotally mounted on a support about a pivot axis, parallel to said spinning axis, and adapted to be introduced into said spinning pot for removing the yarn package thereof.

The support is such that the pivot axis is adapted to be aligned with the yarn spinning axis at least at the end of the expansible spool travel into the spinning pot.

The spinning pot and the expansible spool are provided with respective clutch surfaces adapted to cooperate together at the end of the spool travel into the spinning pot.

Another feature of the present invention consists in constituting an expansible yarn package spool by a spool body and a sheet of resilient plastic material spiral wound about said spool body and adapted to be kept by its own resiliency in a contracted condition against the wall of said spiral body and to expand radially from this wall under the effect of the centrifugal force.

Still another feature of the present invention consists in providing the expansible yarn package spool with means for holding said sheet in an expanded position when the spool is slowed down.

Preferred embodiments of the present invention will be hereinafter described with reference to the appended drawings, given merely by way of example, and in which:

FIGURE 1 is a diagrammatical view, with parts in elevation and parts in vertical section, of a yarn spinning mechanism at the beginning of the formation of the yarn package;

FIGURE 2 is a diagrammatical view, with parts in elevation and parts in vertical section, of a yarn spinning mechanism when the yarn package is going to be removed from the pot and,

FIGURE 3 shows a plan view of an element of the spinning mechanism of FIGURES 1 and 2.

The yarn spinning mechanism comprises a fixed frame **3** from which a tube **2** extends downwardly, and a spinning pot **1** located in a casing **5** and pivotally mounted on tube **2** through a ball bearing **4**.

The spinning pot **1** is driven in rotation about the spinning axis by an endless belt **6** applied against a cylindrical surface **7** of pot **1**.

A yarn guide **8** for guiding the yarn **10** into pot **1** extends therethrough and has a reciprocating motion along the spinning axis with respect to pot **1**. The yarn guide **8** is driven in its reciprocating motion by a driving mechanism **9** between two extreme positions shown respectively on FIGURE 1 in solid lines in dash-and-dot lines.

The yarn **10** is fed vertically downwardly to pot **1** through guide **8** by a feed device **11** and is carried against the inner wall of pot **1** by an air vortex created by the rotary motion of pot **1**. In this manner yarn **10** is driven by the centrifugal force and the reciprocating motion of yarn guide **8**, to form a hollow yarn package **12** along the inner cylindrical wall of pot **1**.

The removing device is constituted by an expansible yarn package spool **13** adapted to be introduced into pot **1** for removing the yarn package **12** therefrom.

In mechanisms of this kind used up to this time, the yarn package spool **13** did not pivot and the hollow yarn package **12** was removed from pot **1** when it was stopped. This solution has many disadvantages and in particular with a yarn made of discontinuous fibrous material. The twist of the yarn created by the stopping of pot **1** may cause construction of the hollow yarn package which is then lost.

In order to eliminate these disadvantages, in the present invention the yarn package spool **13** is pivotally mounted on a support **14**, about a pivot axis. This pivot axis is parallel to the spinning axis and must be aligned therewith at least at the end of the expansible spool travel into spinning pot **1**.

Pot **1** and the expansible yarn package spool **13** are provided with respective clutch surfaces **1***a* and **16***a*, which are adapted to cooperate at the end of the spool travel into the spinning pot **1**.

Expansible spool **13** comprises a spool body **16** and a sheet **17** of resilient plastic material spiral wound about said spool body.

The spool body **16** is pivotally mounted through a ball bearing **15** on a tube **19** rigid with support **14** and has the conical clutch surface **16***a* at its upper end adapted to cooperate with the corresponding clutch surface **1***a* of pot **1**, in order to drive spool body **16** in rotation by pot **1**.

The sheet **17** is kept by its own resiliency in a contracted condition against the wall of central body **16** and expands radially from this wall under the effect of the centrifugal force, as shown by FIGURE 2.

In order to hold sheet **17** in an expanded position when spool **13** is slowed down, an inflatable sleeve **18** is placed between spool body **16** and sheet **17**. The inflatable sleeve **18** is made of a tube coaxial with spool body **16**, the two extremities of tube **18** being tightly fixed to respective smooth cylindrical surfaces **16***b* and **16***c* of spool body **16**.

The space limited by spool body **16** and sleeve **18** is fluid tight and can be connected to a fluid pressure source **22** by means operative when said clutch surfaces, respectively **1***a* and **16***a*, come into contact with each other.

Said last mentioned means are constituted in the following manner:

The spool body **16** and its ball bearing **15** are mounted slidably on tube **19**, a spring **20** is wound about tube **19** and adapted to push spool body **16** upwardly through ball bearing **15**, but to yield when support **14** is moved upward above the position for which clutch surface *1a* and **16***a* are into contact.

The displacement of spool body **16** with respect to tube **19** has for its effect to connect said fluidtight space with the inside of tube **19**, which can be connected with fluid pressure source **22**. For this purpose, the cylindrical wall **16***d* of spool body **16**, in which can slide tube **19**, is provided with a valve seat **21** constituting an abutment for the upper part **19***a* of the tube **19** which is adapted to act as a check valve opening in the direction which pushes spool body **16** upwardly under the action of spring **20**; for connecting tube **19** with the fluid tight space, tube **19** is provided with orifices **19***b* under valve **19***a* and the

wall 16*d* of central body 16 is also provided with orifices 16*e*.

Pneumatic means fed by fluid pressure source 22 cause the displacement of support 14.

Said pneumatic means comprise a cylinder 25 mounted vertically on frame 3 and in which is located a piston 24. Piston 24 is made rigid by rod 23 with support 14 and separates cylinder 25 into, on the one hand, an annular chamber 26 continuously connected with fluid pressure source 22 through a pipe 27 and, on the other hand, a chamber 28 of circular section which can be connected through a distributor 29 and a pipe 30 either with fluid pressure source 22 (as shown by FIG. 1) or with the atmosphere (as shown by FIG. 2).

FIGURE 1 shows chamber 28 connected with fluid pressure source 22. Because of the difference between the cross sections of chambers 26 and 28 and of the weight of the movable assembly comprising support 14, rod 23 and piston 24, this assembly is in its lower position.

FIGURE 2 shows chamber 28 connected with the atmosphere. Because of the pressure difference between chambers 26 and 28, said assembly is driven to its higher position. In this higher position fluid pressure source 22 is connected with tube 19 through a passage 31 provided along rod 23 through a passage 32 provided in support 14.

In order to permit the reeling off of the yarn from yarn package 12, support 14 carries two spools 13 and 13*a* symmetrically disposed about the axis of cylinder 25. Rod 23 is provided with a split pin 33 cooperating with either of the two helical grooves 34 provided in cylinder 25 in such manner that support 14 rotates through 180° every time that the movable assembly goes down.

In order to deflate the sleeve 18 which is to be introduced into pot 1, use is made of the rotation of the movable assembly on the one hand by providing an inclined surface 35 adapted, by contact, with surface 16*a*, to lower that of said two spool bodies 16 which passes from the unwinding position (on the left of FIGURES 1 and 2) to the position in which the axis of the yarn package spool is in line with the pot axis (on the right of FIGURES 1 and 2), and on the other hand by providing rod 23 with an orifice 36 connecting passage 31 with the atmosphere only when the movable assembly is in its lower position.

The lowering of spool body 16, resulting from its contact with inclined surface 35, opens check valve 19*a* and connects the inside of sleeve 18 with the atmosphere through orifice 36.

Finally, FIGURE 3 shows that sheet 17 is provided with hooks 17*a* and 17*b* adapted to come into contact when the diameters of sleeve 18 and sheet 17 reach their maximum values. These hooks permit of limiting the expansion of sleeve 18 when the yarn is nearly reeled off.

The working of this yarn mechanism is as follows: The yarn 10 of fibrous material to be spun is fed downward by the feed mechanism 11 through yarn guide 8, into the spinning pot 1.

During the constitution of hollow yarn package 12 along the inner wall of spinning pot 1, chambers 26 and 28 are connected with fluid pressure source 22 and the movable assembly is in its lower position shown by FIGURE 1.

Tube 19 and the inside of removing device 13 are separated from each other by the contact of check valve 19*a* with valve seat 21. Spool 13*a* carries a yarn package 12 in the course of being reeled off and the other spool 13 is in line with pot 1.

When the constitution of the hollow yarn package 12 in pot 1 is nearly achieved and the yarn package 12 is nearly reeled off, the hooks 17*a* and 17*b* associated with the unreeling package come into contact with each other and the speed of rotation of pot 1 is reduced to avoid unbalance. Then distributor 29 is driven from its position shown in FIGURE 1 into the other position shown in

FIGURE 2 connecting chamber 28 with the atmosphere. The movable assembly is lifted and during a first period the clutch surface 16*a* of spool body 16 comes into contact with the clutch surface 1*a* of pot 1. The spool 13 and its sheet 17 are driven in rotation with a speed equal to that of pot 1, and sheet 17 is expanded under the effect of the centrifugal force and it is applied against the inner wall of the yarn hollow package 12 in such manner that it takes the same form as it.

During a second period, as shown by FIGURE 2, the movable assembly keeps being lifted while spool body 16 stops because of the contact of clutch surface 16*a* with clutch surface 1*a* of pot 1. This relative displacement of support 14 with respect to spool body 16 has for its effect to separate check valve 19*a* from valve seat 21.

Air under pressure coming from annular chamber 26 enters sleeve 18 through tube 19 and inflates said sleeve 19, while pot 1 is still rotating. While sleeve 18 exerts pressure on sheet 17, pot 1 is stopped and sleeve 18 keeps sheet 17 in expanded position and thus prevents the constriction of yarn package 12.

After this, distributor 29 is driven to the position shown by FIGURE 1, wherein chamber 28 is connected to air pressure source 22 and causes the lowering of the movable assembly.

At the end of the lowering stroke the movable assembly pivots through 180° about the axis of cylinder 25 and closes valve 19*a*.

All the elements of the spinning mechanism, except spools 12, 12*a*, are at that moment in their position of FIGURE 1, the two spools having exchanged their position.

Sleeve 18, which is now in line with pot 1 has been deflated, during the rotation of the movable assembly, by inclined surface 35. All operations above described can now start again.

While the above description discloses what are deemed to be practical and efficient embodiments of the present invention, said invention is not limited thereto and there might be changes made in the arrangement, disposition and form of the parts, without departing from the principle of the invention as comprehended within the scope of the appended claims.

What I claim is:

1. A yarn spinning mechanism which comprises, in combination:

a frame,

a spinning pot journalled in said frame about a spinning axis,

means for feeding yarn along said axis,

a yarn guide adapted to receive yarn from said feeding means and extending through said spinning pot, for guiding said yarn thereinto, said yarn guide being reciprocable along said spinning axis,

means for rotating said pot to spin, by centrifugal force, the yarn into a hollow yarn package,

support means operatively connected with said frame to slide with respect thereto in a direction parallel to said axis,

and an expansible yarn package spool pivotally mounted on said support means about a pivot axis parallel to said spinning axis, said spool being adapted to be introduced into said spinning pot for removing the yarn package therefrom, said support means being such that said pivot axis can be aligned with said spinning axis at least at the end of the expansible spool travel into the spinning pot,

said spinning pot and expansible spool being provided with respective clutch surfaces adapted to cooperate together at the end of the spool travel into the spinning pot.

2. A yarn spinning mechanism according to claim 1 wherein said expansible yarn package spool comprises,

a spool body,

a sheet of a resilient plastic material spiral wound about said spool body,

said sheet being adapted to be kept by its own resiliency in a contracted condition against the wall of said spool body, and to expand radially from said wall under the effect of the centrifugal force.

3. A yarn spinning mechanism according to claim 2, further comprising means for holding said sheet in an expanded position when the spool is slowed down.

4. A yarn spinning mechanism according to claim 3 wherein said means for holding said sheet in an expanded position when the spool is slowed down, comprise an inflatable sleeve located between said spool body and said sheet.

5. A yarn spinning mechanism according to claim 2, further comprising means for holding said sheet in an expanded position when the spool is slowed down, said last mentioned means comprising:

an inflatable sleeve located between said spool body and said sheet, said inflatable sleeve consisting of a tube coaxial with said spool body, the two extremities of said tube being tightly fixed to smooth cylindrical surfaces of said spool body in such manner that said spool body and said tube limit a fluid tight space,

a fluid pressure source,

and means responsive to the contact of the two clutch surfaces of said pot and of said spool body respectively, for connecting said fluid pressure source to said fluid tight space.

6. A yarn spinning mechanism according to claim 5 wherein said means for connecting said fluid pressure source to said fluid tight space comprise:

a second tube rigid with said support means and adapted to be temporarily connected to said fluid pressure source, said spool body being carried pivotally and slidably by said second tube,

a spring wound about said second tube and adapted to push said spool body toward the clutch surface of said spinning pot,

and means operative when the two clutch surfaces of said spool body and said pot come into contact with each other, for connecting the inside of the second tube with the fluid tight space.

7. A yarn spinning mechanism according to claim 5 which further comprises pneumatic means fed with fluid from said fluid pressure source and adapted to move said support means with respect to said pot.

8. A yarn spinning mechanism according to claim 5 wherein said support means are pivotally carried by said frame about another pivot axis and further comprise at least one other expansible spool, said spools being regularly distributed about said other pivot axis and adapted to be introduced in turn into said pot.

9. A yarn spinning mechanism according to claim 8 which further comprises pneumatic means fed with fluid from said fluid pressure source and adapted to move said support means with respect to said pot, and wherein said pneumatic means comprise,

a cylinder rigidly carried by said frame,

a piston movable in said cylinder and rigid with said support means,

and means for rotating said piston at the end of its travel removing one of said spools from said pot, in order to exchange said spools.

10. A yarn spinning mechanism according to claim 9 and which further comprises distributor means operatively connected with said piston and said cylinder to deflate said fluid tight space when said support means are in the most distant position from said spinning pot.

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FRANK J. COHEN, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,340,685 September 12, 1967

Louis Vignon

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, line 7, for "Switzerland" read -- Luxemburg --; column 2, line 19, for "construction" read -- constriction --; line 60, for "surface 2a" read -- surfaces 1a --.

Signed and sealed this 6th day of May 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

Commissioner of Patents