Dec. 8, 1953 J. J. HAYTHORNTHWAITE 2,661,589

DOFFING MECHANISM FOR RING SPINNING, DOUBLING, AND TWISTING MACHINES

Filed April 24, 1951 5 Sheets-Sheet 1

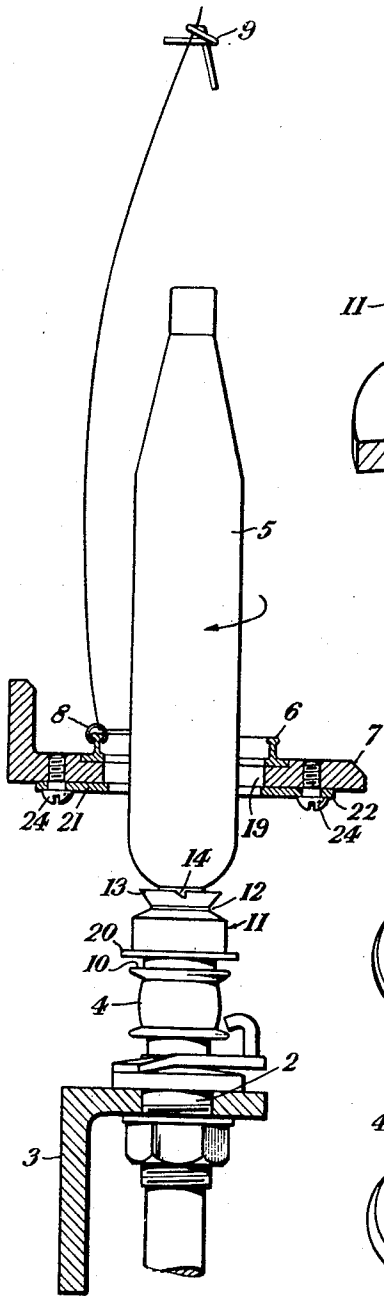


Fig. 1.

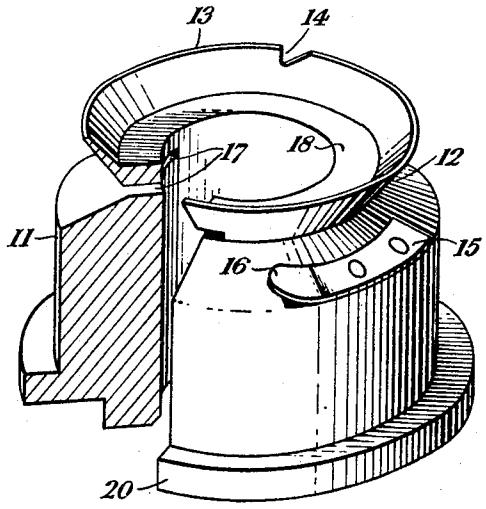


Fig. 2.

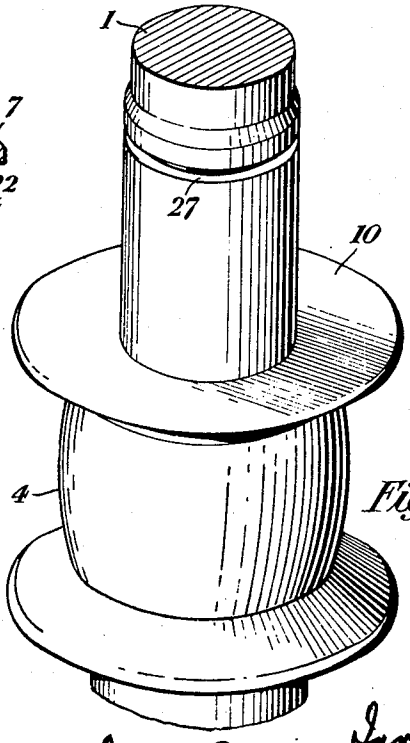


Fig. 3.

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Filed April 24, 1951

5 Sheets-Sheet 2

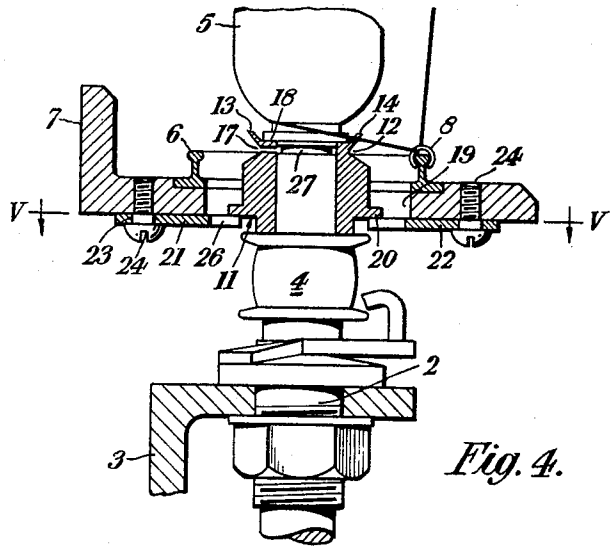


Fig. 4.

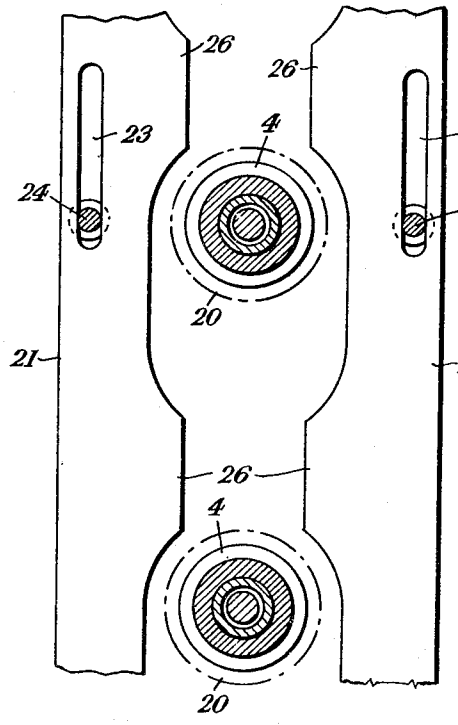


Fig. 5.

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Dec. 8, 1953 J. J. HAYTHORNTHWAITE 2,661,589

DOFFING MECHANISM FOR RING SPINNING, DOUBLING, AND TWISTING MACHINES

Filed April 24, 1951 5 Sheets-Sheet 3

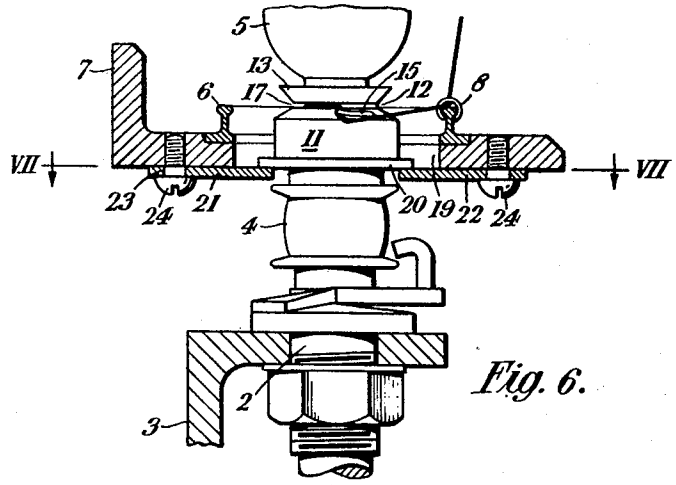


Fig. 6.

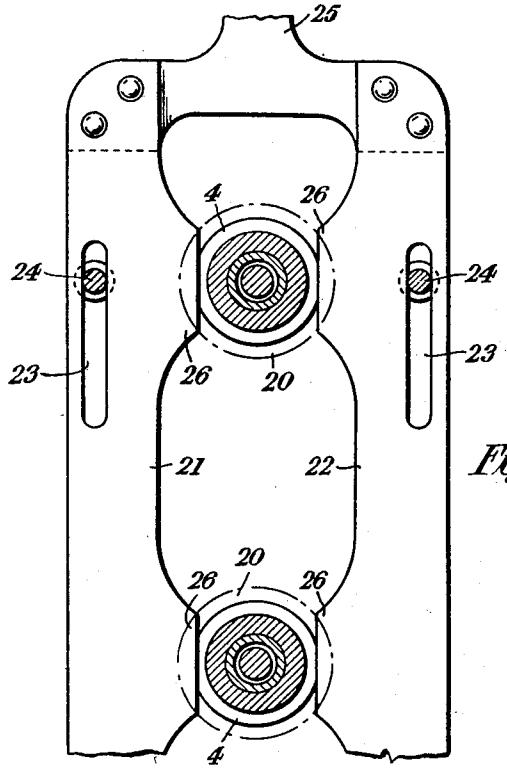


Fig. 7.

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Dec. 8, 1953 J. J. HAYTHORNTHWAITE 2,661,589

DOFFING MECHANISM FOR RING SPINNING, DOUBLING, AND TWISTING MACHINES

Filed April 24, 1951 5 Sheets-Sheet 4

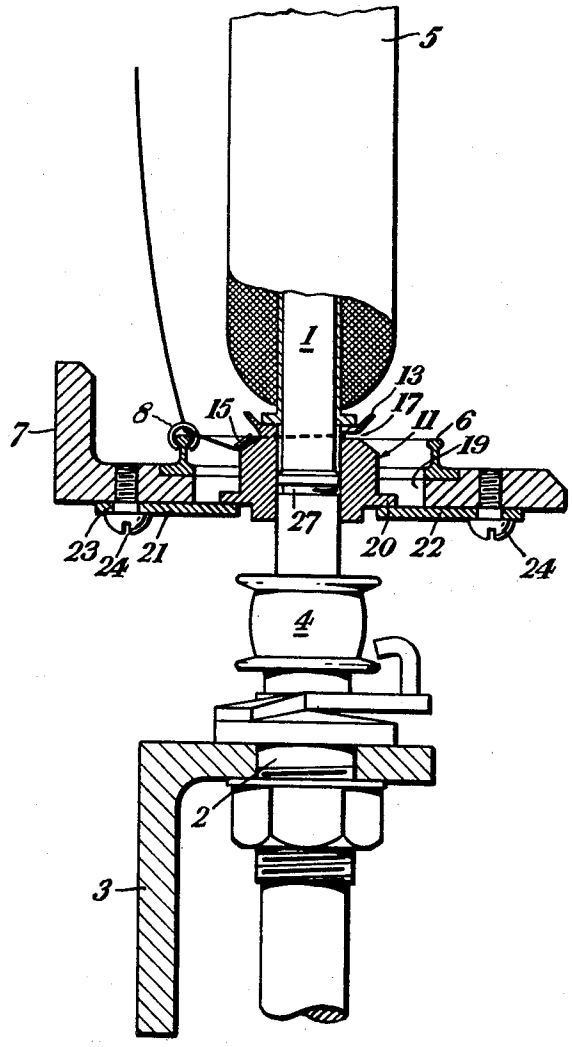


Fig. 8.

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Dec. 8, 1953 J. J. HAYTHORNTHWAITE 2,661,589

DOFFING MECHANISM FOR RING SPINNING, DOUBLING, AND TWISTING MACHINES

Filed April 24, 1951 5 Sheets-Sheet 5

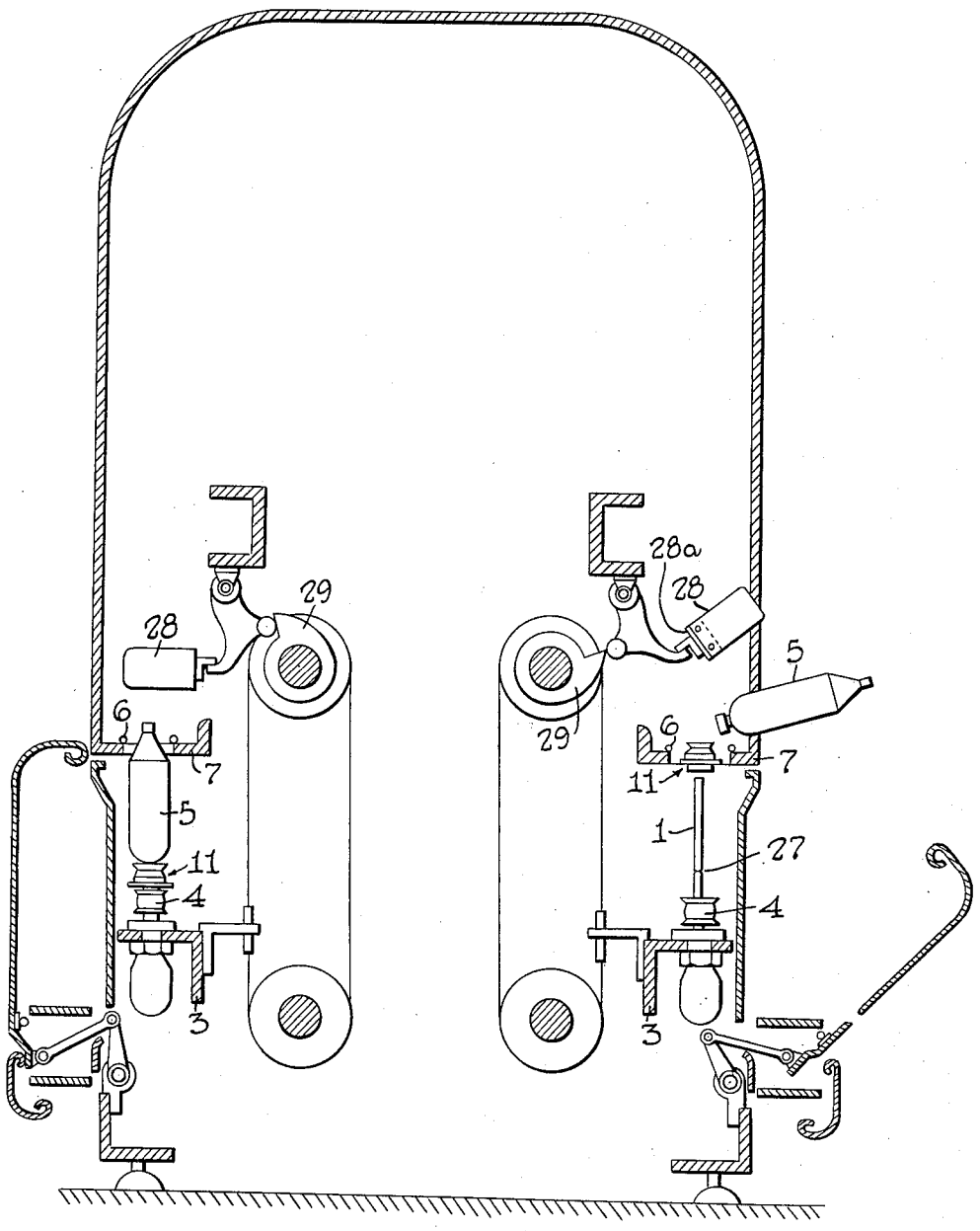


Fig. 9.

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Patented Dec. 8, 1953

2,661,589

UNITED STATES PATENT OFFICE

2,661,589

DOFFING MECHANISM FOR RING SPINNING, DOUBLING, AND TWISTING MACHINES

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Application April 24, 1951, Serial No. 222,587

Claims priority, application Great Britain April 26, 1950

5 Claims. (Cl. 57—52)

1

The invention has for its object to provide a ring spinning, doubling or twisting machine, improved means for removing or doffing the yarn packages from the spindles at the completion of the spinning operation, i. e. when the build of a full yarn package is complete, such means being applicable whether the relative reciprocatory motion between the spindles and the rings necessary for the formation of the yarn packages is effected by raising and lowering the spindle rail in relation to a stationary ring rail, or by reciprocatory movement of the ring rail in relation to a stationary spindle rail, or by a combined movement of both these elements in opposite directions.

A ring spinning, doubling or twisting unit according to the invention comprises in relation to the spindle a carrier member detachably mounted thereon with capability of relative axial movement and providing a seating for the yarn package, means in or on said carrier member for catching the yarn or thread at the base of said package and for holding the same taut when the reciprocatory element of the unit has reached the doffing position, means for severing the tautened yarn or thread, and interceptor means for retaining said carrier member on the separation of the spindle and the ring such that the yarn package is supported with freedom for doffing.

A further feature of the invention resides in an arrangement whereby the operation of severing the yarn or thread takes place simultaneously with the separation of the spindle and the ring, the tautened yarn or thread being trapped and sheared between the carrier member and a cutting edge provided on the spindle blade itself.

For this purpose the carrier member may be provided with a lateral slot extending inwardly to its bore at a point which, when the carrier member is in its operative position on the spindle, registers with the cutting edge on the latter. A detent on the carrier member adjacent the yarn package seating arrests the yarn or thread when the reciprocatory element of the unit is brought to the doffing position, whereupon the yarn is drawn chordwise through said lateral slot, seized by a catch located near the same and held taut so that, on the subsequent withdrawal of the spindle from the intercepted carrier member, it is sheared by said cutting edge, leaving the yarn package free to be doffed.

The carrier member preferably provides a shrouded seating for the base of the bobbin, pirn or like tube on which the yarn package is wound

2

on the spindle, said seating being of such character that when the spindle is withdrawn from the package the latter will be predisposed to topple laterally as the lateral support hitherto afforded by the spindle is removed.

The said interceptor may take the form of a narrow plate or bar supported slidably beneath the ring rail and extending throughout the length of the machine or of a unitary section thereof, with a connection at one end to means by which the plate or bar may be reciprocated so that projecting portions thereof are engaged with or disengaged from a flange on each package carrier member. Preferably, two such plates are provided, being disposed in spaced parallel arrangement one in front of and the other behind the spindle axes, with a yoke connecting said plates at one end to the means employed for their reciprocatory movement.

The manner in which the invention may be carried into effect is hereinafter described with reference to the accompanying diagrammatic drawings which illustrate an embodiment of the invention as applied to a ring spinning machine. In said drawings Fig. 1 is a general arrangement of a spinning unit, as viewed on a section at right angles to the spindle and ring rails, the parts being shown in the spinning position; Figs. 2 and 3 are partly sectional views respectively of the package carrier (carrier member) and of that part of the spindle on which the package carrier is mounted; Fig. 4 is a section of part of the spinning unit shown in Fig. 1 immediately after the spindle rail first reaches the doffing position, and Fig. 5 is a fragmentary section on the line V—V of Fig. 4; Fig. 6 is a similar view to Fig. 4, but depicts the second stage in the doffing cycle, Fig. 7 is a section on the line VII—VII of Fig. 6; Fig. 8 is a similar view to Fig. 1, showing the third stage in the doffing cycle. (Figs. 2 to 8 are drawn on a somewhat larger scale than Fig. 1.) Fig. 9 is a section through a spinning machine, incorporating doffing mechanism as illustrated in Figs. 1 to 8, and in which the separator plates are adapted to be moved outwardly to ensure positive doffing.

The spinning unit to which the present description relates comprises the known elements of a spindle 1, rotatably mounted in a bolster 2 which is suitably fixed in the spindle rail 3, the spindle wharve being indicated at 4. During the spinning operation, the yarn package is built upon a bobbin, pirn or like tube which is placed upon the spindle, the nose of the package being arranged to project through a ring 6 carried in a

ring rail 7. The traveller is indicated at 8 and the lappet-guide at 9. Fig. 1 depicts the path of the yarn as it is drawn from the drafting apparatus (not shown) through the guide 9 and traveller 8 to the package 5. It will be understood that the invention is applicable to ring spinning machines in which the relative reciprocatory motion between the spindle and ring, necessary to perform the operation of building the yarn package, is effected either by raising and lowering the spindle rail in relation to a stationary ring rail, or by raising and lowering the ring rail in relation to a stationary spindle rail, or by combined movements of both spindle rail and ring rail; it is however assumed for the purposes of the present description that the spindle rail is the reciprocating element and that the ring rail is stationary.

Detachably mounted on the blade of the spindle 1, so that it rests upon the shoulder 10 above the upper flange of the wharve 4 thereof, is a member 11 (herein referred to as the "package carrier member") which has an axially bored cylindrical body in the upper part of which is a deep external V-groove 12 bordered by a flared rim 13 containing a notch 14. The lower surface of said V-groove 12 supports a catch consisting of a short flat spring 15 terminating in an upturned lip 16. At the base of the groove 12 is provided a narrow lateral slot 17 extending to the inner bore of the body.

The package carrier also provides a seating 18, shrouded by the flared rim 13, for the base of a bobbin, pirn or like tube upon which the yarn package is to be wound such that the lowermost coil of yarn in the package will occupy a position immediately above the rim 13. The package carrier 11 is made a lose fit upon the spindle blade, so as to be capable of free axial movement in relation thereto; it may be made of plastic, light metal alloy or other suitable light-weight material.

The ring rail 7 is counter-bored beneath the ring 6 to provide a recess 19 capable of accommodating the flange 20 of the package carrier 11 when the spindle is raised to the doffing position, i. e. the position of the spindle relative to the ring in which the whole of the yarn package projects upwardly through the ring.

On the underside of the ring rail 7 are slidably mounted two parallel interceptor plates 21 and 22; longitudinal slots 23 in the plates cooperate with studs 24 which depend from the rail 7 to guide the movement of the plates, the weight of the latter being supported by the heads of the studs. The two plates 21, 22 are arranged to serve a plurality of spinning units, and are adapted to be slidden endwise at the appropriate times by mechanical means linked to a yoke 25 which is attached to the ends of the plates. The arms 21, 22 are operated by the yoke in synchronism with the package-building and package-doffing mechanism. The plates 21 and 22 are fashioned with oppositely disposed inward lateral extensions 26 in respect to each spinning unit.

Each spindle is provided with a circumferential groove 27 at a point which will register with the slot 17 of the package carrier 11, and the upper edge of said groove 27 is sharpened to provide a cutter for shearing the yarn in the manner hereinafter described.

The doffing operation is performed in the following manner:

It is well known in ring spinning practice, that the yarn passing through the traveller between the drafting rollers and the spindle, causes the traveller to be revolved around the ring as the spindle rotates. The traveller rotates at a lesser speed than the spindle, thereby causing the yarn to be wrapped on the bobbin or pirn, the variation in speed of the traveller being governed by the delivery rate of the drafting rollers. Upon completion of the bobbin, the spindle rail 3 is raised to the doffing position (Fig. 4), when the yarn is caught by the notch 14 and guided into the V-groove 12 where it is drawn chordwise through the slot 17 and trapped and held taut by the lip of the spring 15.

The interceptor plates 21, 22 are then moved from the inoperative position shown in Fig. 5 to the position shown in Fig. 7, in which the lateral extensions 26 of said plates are interposed below the flange 20 of the package carrier 11. The spindle is then withdrawn and the yarn lying in the slot 17 is sheared by the descending cutting edge of the groove 27 of the spindle. The interceptor plates 21, 22 retain the package carrier and the bobbin or the like resting thereon, so that as soon as the lateral support afforded by the spindle has been removed, the package may be doffed automatically.

If desired, the doffing operation may be performed by a lateral displacement effected positively by an outward sweeping movement of the seprator plates 28 convenionally provided between adjacent spinning units, as shown in Fig. 9, for which purpose adjacent pairs of said plates 28 may be joined in the rear of each spindle position by a U-shaped connection 28a which, when the plates are moved outwardly by the operation of a cam 29, as depicted at the right-hand side of Fig. 9, will push the package laterally from the package carrier, to fall in front of the machine. An arrangement wherein the casing of the machine is pivoted mechanically into a position in which it forms a hopper receiving the doffed yarn package and guiding it on to a conveyor for removal to a receptacle at the end of the machine, forms the subject of my United States patent application, Serial No. 193,825, filed November 3, 1950, now Patent No. 2,570,057.

It will be understood that the translational movements of the spindle and the yarn packages herein referred to are movements in relation to the ring rail and that the references herein contained to the package "reaching the doffing position" or the spindle being "withdrawn from the package" are intended to include the case in which the doffing position of the package is reached by a movement of the ring rail and in which the ring rail raises the package from the spindle.

What I claim as my invention and desire to secure by Letters Patent is:

1. A ring spinning, doubling or twisting unit, comprising relatively reciprocable ring and spindle rails, a spindle supported by the spindle rail, a package carrier member detachably mounted on the spindle with capability of relative axial movement and providing a seating for a yarn package, said carrier member including means for catching the yarn or thread at the base of the package so as to hold the same taut when the reciprocatory element of the unit has reached a doffing position in which the spindle is caused to project to the maximum extent above the ring rail, means for severing the tautened yarn or thread, and interceptor means for retaining said carrier member with the ring rail and thereby separating it from the spindle during an ensuing relative separation of the

spindle and the ring rail, such that the yarn package is supported with freedom for doffing.

2. A spinning or like unit as claimed in claim 1, wherein the severing means for shearing the trapped and tautened yarn or thread consists of a cutting edge provided on the spindle.

3. A spinning or like unit as claimed in claim 1, wherein the severing means consists of a cutting edge on the spindle and the package carrier member comprises an axially bored body provided with a lateral slot extending inwardly to the bore at a point which, when the carrier member is in its operative position on the spindle, registers with the cutting edge on the spindle, the yarn catching means being located near said slot and being adapted to seize the yarn after it has been drawn chordwise through said slot so that, on the subsequent separation of the spindle and the ring rail, the yarn is sheared by said cutting edge.

4. A spinning unit as claimed in claim 1, wherein separator plates are provided at each side of the spindle and are connected to form a U-shaped member enclosing the rear of the yarn package, and wherein means is provided for moving said plates outwardly at the appropriate time to impel the yarn package outwardly to ensure positive doffing.

5. A spinning or like unit as claimed in claim 1, wherein the severing means consists of a cutting edge on the spindle and the package carrier member comprises an axially bored body provided with a lateral slot extending inwardly to the bore at a point which, when the carrier member is in its operative position on the spindle, registers with the cutting edge on the spindle, the yarn catching means being located near said slot and being adapted to seize the yarn after it has been drawn chordwise through said slot so that, on the subsequent separation of the spindle and the ring rail, the yarn is sheared by said cutting edge, the body of the package carrier member being provided in its upper part with a deep circumferential groove at the base of which is formed said lateral slot, and having a flared rim surrounding the package seating, with a notch formed in said rim serving to catch the yarn or thread at the base of the package on arrival of the latter at the doffing position.

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No references cited.