

[54] **YARN HANDLING APPARATUS FOR TEXTILE YARN PROCESSING MACHINE**

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[51] Int. Cl. **D01h 7/08**

[58] Field of Search **57/34 TT, 54, 129-135; 242/46.21**

[56] **References Cited**

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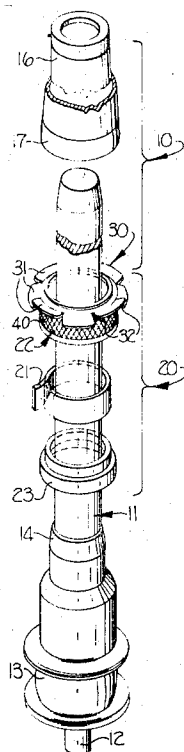
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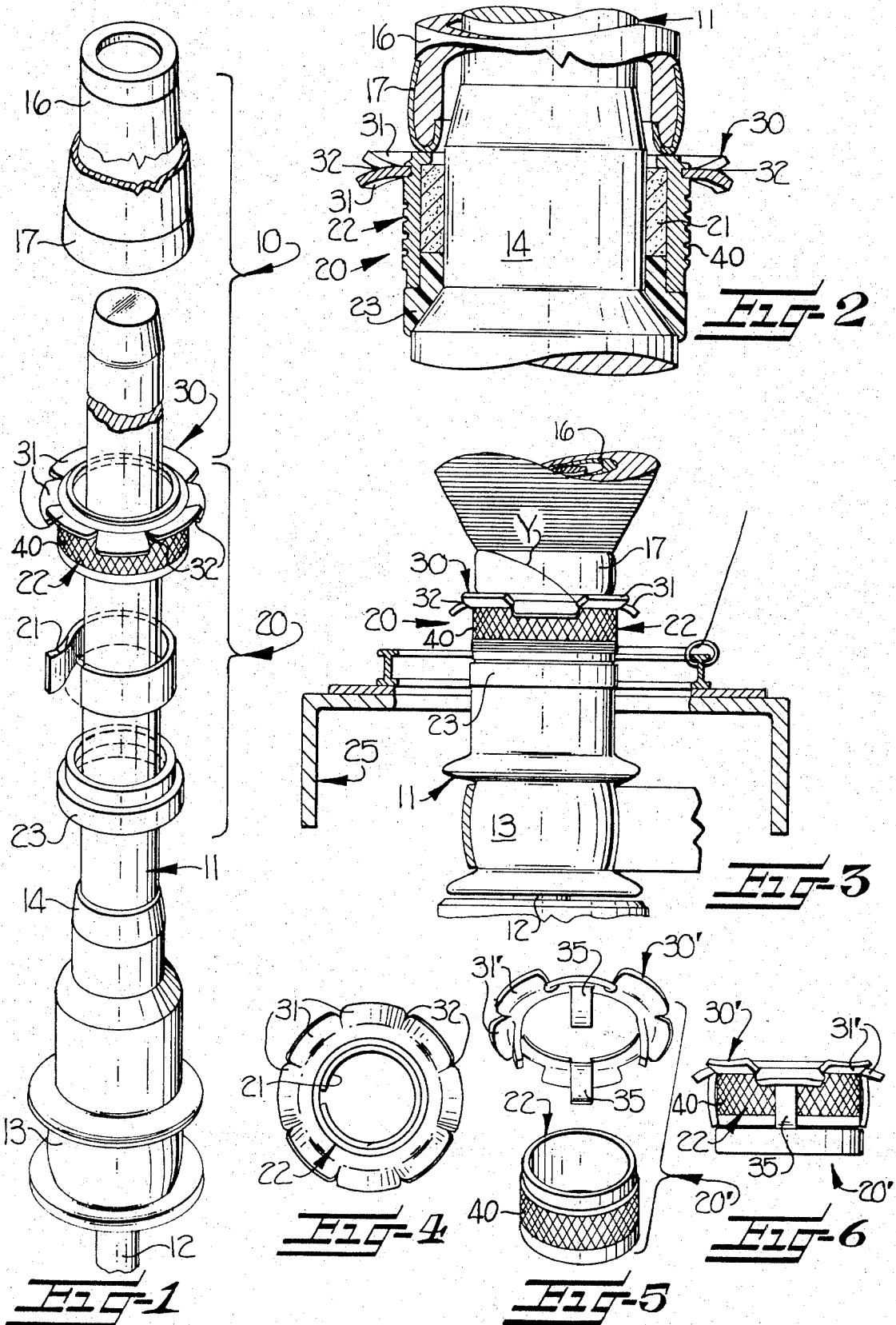
[57] **ABSTRACT**

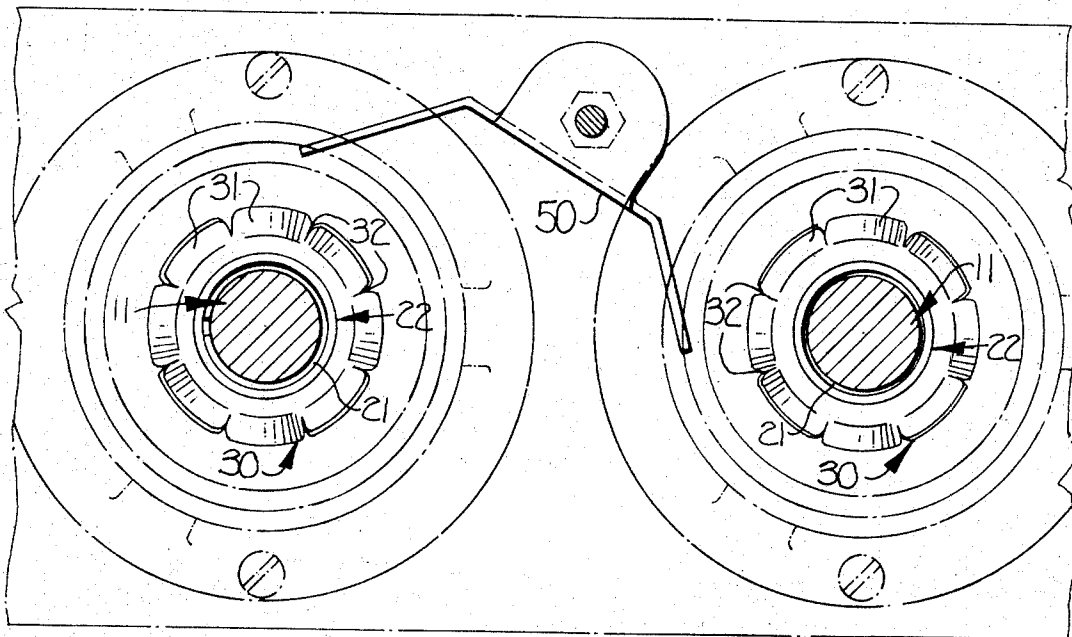
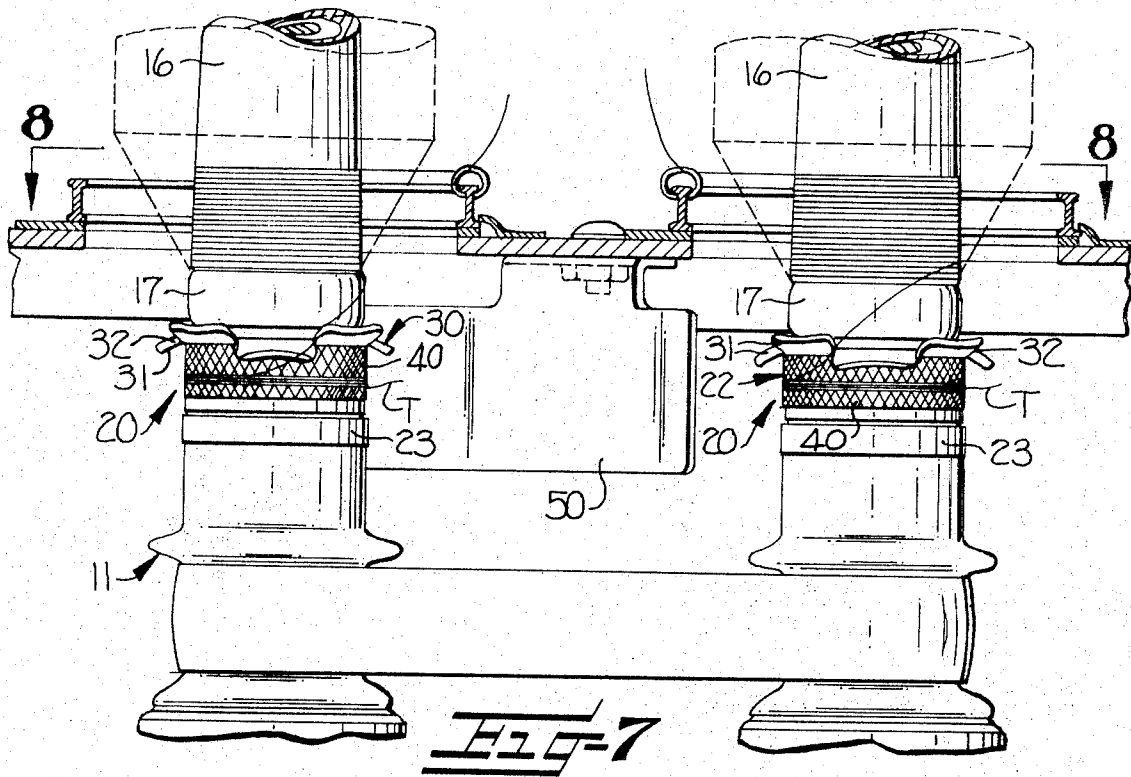
The improvements, in a yarn processing machine including elongate rotating spindles for receiving hollow yarn carrying bobbins and a magnetic seater device for magnetically seating the bobbins on the spindles in non-friction fitting association, of apparatus for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine comprising a horizontal protruding lip extending outwardly from the magnetic bobbin seater devices around the spindles and defining a plurality of separate segments slightly spaced from each other for forming generally V-shaped grooves between each of the segments. The improved apparatus may also include means for holding the last few wraps of the yarn prior to doffing of the full bobbins from the spindles and means for cutting off the loose tails of yarn extending from the bottom of the spindles as a result of bobbin doffing operations.

11 Claims, 8 Drawing Figures



2 Sheets-Sheet 1





YARN HANDLING APPARATUS FOR TEXTILE YARN PROCESSING MACHINE

This application is a continuation-in-part of prior, copending application Ser. No. 34,428, filed May 4, 1970 now abandoned.

This invention relates to improved apparatus for handling of yarn in textile yarn processing machines. More specifically, the improved apparatus includes means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine. Preferably, the apparatus also includes means for receiving and holding the last few wraps of yarn prior to doffing of full bobbins from the spindles to aid in bobbin doffing, bobbin replenishment and yarn processing start-up procedures and means for cutting off the loose tails of yarn extending from the lower ends of the spindles as a result of bobbin doffing operations.

In textile yarn processing machines, such as spinning frames, twistors and the like, recent improvements have been provided in the spindle assemblies by providing magnetic bobbin seater devices positioned around the spindles at generally the lower ends thereof for magnetically seating the bobbins on the spindles in non-friction fitting association therewith for ease in both manual and automatic doffing. These improvements are disclosed in U.S. Pat. No. 3,510,079, issued May 5, 1970 and U.S. Pat. No. 3,525,478, issued Aug. 25, 1970, both of which are assigned to the assignee of the present invention.

In the use of spindle assemblies including the magnetic seater devices in textile yarn processing machines, certain problems in yarn handling, including guiding, holding and breaking the yarn during bobbin doffing, bobbin replenishment and yarn start-up procedures, have become evident. These problems are particularly acute in textile yarn processing machines having automatic doffing equipment. In such machines without the improved apparatus of this invention, yarn is processed on the bobbins contained on the spindles until the bobbins have been filled and are ready to doff. Just prior to the doffing operation, the ring rail of the yarn processing machine is lowered to a position below the bottom of the bobbin and a few wraps of the yarn are placed on the lower end of the spindle. The ring rail is then stopped in that position and the bobbins are pulled off or doffed from the spindles, either manually or with automatic doffing equipment. This removal of the bobbins from the spindles causes the yarn to break between the full bobbin and the last few wraps of yarn around the bottom of the spindle. This breaking usually occurs at random points and where the yarn is the weakest resulting in many long yarn tails being formed when the yarn breaks at the wrong places. Empty bobbins are then placed on the spindles and the ring rail raised for again processing yarn onto the empty bobbins. Due to the long tails being formed, a lack of guiding instrumentalities, etc. many problems occur during start-up of the yarn processing operation after doffing and many ends down occur when the rails are lowered on the next doff, if these long tails are present and not removed.

Accordingly, it is an object of this invention to provide means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures in textile yarn

processing machines which include elongate spindles for receiving hollow yarn carrying bobbins over one end thereof and magnetic bobbin seater devices positioned around the spindles at generally the other end thereof for magnetically seating the bobbins on the spindles in non-friction fitting association.

It is a further object of this invention to provide means for receiving and holding the last few wraps of yarn prior to bobbin doffing of a full bobbin from the spindle to aid in bobbin doffing, bobbin replenishment and yarn processing start-up procedures.

It is still a further object of this invention to provide means for cutting off the loose tails of yarn extending from the lower ends of the spindles as a result of bobbin doffing operations.

It has been found by this invention that the above objects may be specifically and preferably accomplished by providing means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine. The means comprises generally horizontally extending protruding lip means extending outwardly from the magnetic bobbin seater around the spindle and defining a plurality of separate segments slightly spaced from each other, preferably alternately extending upwardly and downwardly at a slight angle to horizontal, for forming generally V-shaped grooves between each of the segments for receiving and guiding the yarn being processed on the bobbin during the last few wraps thereof prior to bobbin doffing for holding the yarn to effect breaking of the yarn during bobbin doffing and for receiving and guiding the yarn during yarn processing start-up.

Additionally, the above objects are preferably and specifically accomplished by providing a roughened surface on at least a portion of the outside of the magnetic seater device for receiving and holding the last few wraps of yarn prior to doffing of full bobbins from the spindles. Additionally, the above objects may be preferably and specifically accomplished by providing a cutting blade mounted on the bottom of the ring rail mechanism of the yarn processing machine for traveling therewith and which depends downwardly therefrom and extends towards the spindles for cutting off the loose tails of yarn extending from the spindles as a result of the doffing operation.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective, exploded view of a spindle and bobbin assembly utilizing some of the improved apparatus of this invention;

FIG. 2 is a partial, enlarged, elevational view of a portion of the spindle and bobbin assembly of FIG. 1 with portions thereof shown in sections;

FIG. 3 is a partial, elevational view of a bobbin and spindle assembly including a ring rail mechanism shown in section utilizing some of the improved apparatus of this invention and showing the mechanisms in position for applying the last few wraps of yarn around the lower end of the spindle prior to bobbin doffing;

FIG. 4 is a top plan view of the magnetic bobbin seater utilizing some of the improvements of this invention thereon illustrated in FIGS. 1-3;

FIG. 5 is an exploded perspective view of a magnetic bobbin seater having an alternate form of apparatus constituting one of the improvements of this invention;

FIG. 6 is an elevational view of the apparatus of FIG. 5 assembled together;

FIG. 7 is a partial, elevational view of two bobbin and spindle assemblies including the ring rail mechanism and illustrating the improved apparatus of this invention, with the apparatus in position for start-up of the yarn processing operation; and

FIG. 8 is a sectional view taken substantially along the line 8—8 of FIG. 7 with some parts shown in phantom lines.

Referring now to the drawings in detail, there is illustrated, particularly in FIGS. 1-3, a spindle and bobbin assembly 10 constructed in accordance with this invention. This assembly 10 includes a driven rotating spindle 11 having the usual blade portion 12, whorl 13 and partially tapered generally conical metallic body portion 14. A hollow yarn carrying bobbin 16 is positioned over the upper end of the spindle 11 for receiving yarn during a yarn processing operation, such as spinning or twisting. Bobbin 16 conventionally includes a metallic ferrule 17 at the lower end thereof.

The spindle and bobbin assembly 10 further includes a magnetic bobbin seater device 20 frictionally positioned around the lower end of the spindle 11 and base portion 14, in the manner illustrated in FIG. 2, for rotation therewith. The magnetic bobbin seater device 20 magnetically receives and seats the bobbin 16 in non-friction fitting association with the spindle 11, as may be seen in FIG. 2, for ease in manual and automatic doffing inasmuch as an even pressure or force is required for removing the bobbin 16 from the spindle 11. As set forth above, this magnetic seater device is specifically disclosed in the two aforementioned U.S. Pat. Nos. 3,510,079 and 3,525,478, assigned to the assignee of this invention, and reference to these patents may be had for a full disclosure of the bobbin seater device 20.

Briefly, this bobbin seater device 20 includes a magnetized member 21 which is formed into annulus or band around the spindle 11 and is magnetized in such a manner as to provide one magnetic pole at its inner surface and the opposite magnetic pole at its outer surface. The magnetic seater device 20 further includes a metallic magnetic flux conducting member 22 surrounding and encapsulating the magnetized member 21, as shown in FIG. 2, and which forms a magnetic flux conducting pole piece. The magnetic seater device 20 may further include and may be supported on a collar or base 23 of non-metallic and non-magnetic conducting material, such as synthetic resinous compositions.

As discussed in detail in the aforementioned patents, the magnetic seater device forms generally a magnetic circuit which passes partly through the magnetized member 21, the adjacent portion of the metallic spindle 11, the metallic ferrule 17 of the bobbin 16, and the metallic pole piece 22. This magnetic circuit allows the bobbin 16 to be magnetically seated on the spindle 11 and the dimensions of the magnetic seater device 20 are such that the bobbin 16 will be spaced upwardly from its conventional friction fitting position on the spindle 11 so as to be in non-friction fitting association therewith, as shown in FIG. 2.

It is to be understood that in a yarn processing machine, such as a spinning frame, twister, etc., a plurality of the above-described spindle and bobbin assemblies 10 are conventionally positioned in side-by-side relation and rotated by a common drive for receiving yarn on the bobbins 16. To aid in the yarn processing operation, there is utilized a ring rail mechanism 25 which carries yarn Y and traverses up and down the rotating bobbins 16 on the spindles 11 to apply yarn thereto. These ring rail mechanisms 25 are conventional in textile yarn processing machines and further description thereof is not deemed necessary herein.

The apparatus for improved handling of the textile yarn in yarn processing machines, as described above, includes means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine. Specifically, this means comprises a protruding lip 30 extending outwardly from the metallic member 22 of the magnetic bobbin seater device 20 and extending around the spindle 11, as shown in FIGS. 2 and 3. This protruding lip 30 defines a plurality of separate segments 31 spaced slightly from each other and alternately extending upwardly and downwardly at a slight angle to the horizontal for forming generally V-shaped grooves 32 between each of the segments 31, as shown in FIGS. 1-3, for purposes to be described hereinafter.

The improved yarn handling apparatus also preferably includes means for receiving and holding the last few wraps of yarn prior to doffing of a full bobbin 16 from a spindle 11. This means comprises a roughened surface 40 on the lower end of metallic member 22 below the protruding lip 30. The roughened surface may be formed as a knurled, scored, etc., surface.

During normal operation of a conventional spinning frame, twister, etc., after the bobbin 16 has been filled with yarn y, the ring rail mechanism 25 is designed to drop to a lower position than previously utilized in placing the yarn Y on the bobbin 16. This results in the last few wraps of yarn being applied to the lower end of the spindle. The ring rail mechanism 25 is then stopped in that position and the bobbins 16 are pulled off or doffed from the spindles 11, either manually or with automatic doffing equipment. This removal of the bobbins from the spindles causes the yarn to break between the full bobbin and the last few wraps of yarn around the bottom of the spindle.

With the yarn handling apparatus of the present invention, the ring rail mechanism 25 may be adjusted to drop to a slightly lower than normal position for applying the last few wraps of yarn Y around the roughened surface 40, as shown in FIG. 3, for retaining those last few wraps of yarn thereon and preventing them from slipping off which would prevent good yarn processing start-up procedures. As the last few wraps of yarn are applied to the roughened surface 40, as shown in FIG. 3, the yarn Y extending from the full bobbin 16 passes over the surface of one of the downwardly extending segments 31 of the protruding lip 30 and into one of the generally V-shaped grooves 32, as shown in FIG. 3. The particular V-shaped groove which will receive the yarn Y depends upon whether the yarn is being spun or twisted with an S-twist or a Z-twist (as is well understood by those of ordinary skill in the art).

After the last few wraps of yarn are applied to the roughened surface 40, the full bobbin 16 may be doffed, either manually or automatically, from the spindle 11. As these full bobbins are pulled from the spindles 11, the yarn Y will tighten into the bottom of the V-shaped groove 32 and the yarn will be broken at that point when sufficient tension is applied thereto by the doffing of the bobbins. This results in an even break of the yarn each time a bobbin is doffed.

After fresh bobbins 16 have been placed on the spindles 11, the ring rail mechanism 25 is raised several inches and then brought down to the position shown in FIG. 7, which results in a length of yarn passing up from the last few wraps around the roughened surface 40 to the new bobbin. This length of yarn passes over one of the upwardly extending segments 31 of the protruding lip 30 and into one of the V-shaped grooves 32 to be guided and held thereby. This section of yarn will also be broken when the bobbin is subsequently doffed.

Thus, full bobbin doffing and yarn processing start-up procedures can be accomplished easily and quickly and the yarn will be guided and held when desired during these procedures.

As a result of the above bobbin doffing and yarn processing start-up procedures, a loose yarn tail T which was previously held until broken by one of the V-shaped slots 32, extends outwardly from the roughened surface 40 at the lower end of the spindle 11, as may be seen in FIG. 7. This loose yarn tail T sometimes causes tangling and malfunctioning of the yarn processing machine resulting in ends down.

According to this invention, the yarn handling apparatus also preferably includes means for automatically cutting off the loose yarn tails T from the lower ends of the spindles during yarn processing operation. This means comprises a cutting blade 50 mounted on and secured to the bottom of the ring rail mechanism 25, as shown in FIGS. 7 and 8, for travel with the ring rail mechanism 25. The cutting blade 50 depends downwardly from the bottom of the ring rail mechanism 25 and extends toward a spindle 11 such that, as the ring rail mechanism is traversed to a lower position thereof, as shown in FIG. 7, the blade 50 will engage the loose yarn tail T and cut the same off to a desirable length. It should be noted that the blade 50 cannot extend any closer to the spindle 11 than the width of the ultimate bobbin yarn package or it would interfere with the yarn on the bobbin as the ring rail traverses to a higher position.

Also, preferably, the blade 50 is mounted generally between two adjacent spindles, as shown in FIGS. 7 and 8, and extends toward each of the two adjacent spindles for cutting off the loose yarn tails T from the two adjacent spindles. Accordingly, only one cutting blade 50 need be used for every two adjacent spindles 11 in the yarn processing apparatus.

Referring now to FIGS. 5 and 6, there is shown therein an alternate form of apparatus in accordance with this invention. In this embodiment, the protruding lip 30' is constructed as a separate piece adapted for sliding over and resting on a shoulder on the top of the metallic member 22 of the magnetic bobbin seater device 20. The protruding lip 30' includes depending legs 35 which are adapted to be positioned along the outside surface of the metallic member 22. These depending legs 35 provide a surface against which the last

few wraps of yarn left on the lower portion of the metallic member 22 and which also surrounds the legs 35, may be manually cut for removal therefrom. Also, the depending legs 35 provide a roughened uneven surface on the lower portion of the metallic member 22 which may eliminate the necessity for knurling or otherwise roughening the surface. This alternate construction of a protruding lip member 30' provides the desirable advantage of allowing removability thereof in the case of damage without also having to remove and replace the entire magnetic bobbin seater device 20.

Thus, it may be seen that this invention has provided improved yarn handling apparatus for spindle and bobbin assemblies used in textile yarn processing machines. This yarn handling apparatus provides means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures and provides means for receiving and holding the last few wraps of yarn prior to doffing of a full bobbin from a spindle to aid in the bobbin doffing, bobbin replenishment and yarn processing start-up procedures. Additionally, the apparatus provides means for cutting off the loose yarn tails from the lower ends of the spindles during yarn processing operations.

In the drawings and specification, there has been set forth a preferred embodiment of this invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed is:

1. In a spindle assembly, for use in a textile yarn processing machine, including an elongate spindle for receiving a hollow yarn carrying bobbin over one end thereof and a magnetic bobbin seater device positioned around said spindle at generally the other end thereof for magnetically seating the bobbin on said spindle in non-friction fitting association; the improvement therewith of

means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine, said means comprising generally horizontally extending protruding lip means extending outwardly from said magnetic bobbin seater device around said spindle and defining a plurality of separate segments slightly spaced from each other and alternately extending upwardly and downwardly at a slight angle to the horizontal for forming generally V-shaped grooves between each of said segments for receiving and guiding the yarn being processed on the bobbin during the last few wraps thereof prior to bobbin doffing, for holding the yarn to effect breaking of the yarn during bobbin doffing and for receiving and guiding the yarn during yarn processing start-up.

2. In a spindle assembly, as set forth in claim 1, in which said magnetic bobbin seater device comprises a magnetized member disposed generally around the other end of said spindle and a metallic magnetic flux conducting member surrounding said magnetized member and cooperating therewith to magnetically seat the bobbin on said spindle, in which said protruding lip means extends outwardly from generally the

upper end of said metallic member, and in which said spindle assembly further includes means for receiving and holding the last few wraps of yarn prior to doffing of a full bobbin from said spindle to aid in bobbin doffing, bobbin replenishment and yarn processing start-up procedures, said means comprising a roughened surface on at least a lower portion of the outside of said metallic member below said protruding lip means.

3. In a spindle assembly, as set forth in claim 2, in which said protruding lip means comprises a generally circular member for fitting around the upper portion of said metallic member of said magnetic seating device and including depending leg portions disposed along the outside surface of said metallic member for providing surfaces against which the last few wraps of yarn left on the lower portion of said metallic member may be manually cut for removal therefrom.

4. In a spindle assembly, for use in a textile yarn processing machine, including an elongate spindle for receiving a hollow yarn carrying bobbin over one end thereof and a magnetic bobbin seater device positioned around said spindle at generally the other end thereof for magnetically seating the bobbin on said spindle in non-friction fitting association, and magnetic bobbin seater device comprising a magnetized member disposed generally around the other end of said spindle and a metallic magnetic flux conducting member surrounding said magnetized member and cooperating therewith to magnetically seat the bobbin on the spindle; the improvement therewith of

means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine, said means comprising generally horizontally extending protruding lip means extending outwardly from said metallic member around said spindle and defining a plurality of separate segments slightly spaced from each other and alternately extending upwardly and downwardly at a slight angle to horizontal for forming generally V-shaped grooves between each of said segments for receiving and guiding the yarn being processed on the bobbin during the last few wraps thereof prior to bobbin doffing, for holding the yarn to effect breaking of the yarn during bobbin doffing and for receiving and guiding the yarn during yarn processing start-up, and

means for receiving and holding the last few wraps of yarn prior to doffing of a full bobbin from said spindle for aiding in bobbin doffing, bobbin replenishment and yarn processing start-up procedures and cooperating with said means for receiving, guiding and holding the yarn, said means for receiving and holding the last few wraps of yarn comprises a roughened surface on a lower portion of the outside of said metallic member below said protruding lip means.

5. In a spindle assembly, as set forth in claim 4, in which said protruding lip means comprises a generally circular member for fitting around the upper portion of said metallic member of said magnetic seating device and including depending leg portions disposed along the outside surface of said metallic member for providing surfaces against which the last few wraps of yarn

left on the lower portion of said metallic member may be manually cut for removal therefrom.

6. In a yarn processing machine including elongate rotating spindles for receiving hollow yarn carrying bobbins over one end thereof and a yarn carrying ring rail mechanism for traversing movement up and down the bobbins on said spindles to aid in the yarn processing operation and for aiding in applying the last few wraps of yarn around the lower ends of said spindles prior to bobbin doffing which results in loose tails of yarn extending from the lower ends of said spindles after bobbin doffing; the improvement therewith of

means for automatically cutting off the loose tails of yarn from the lower ends of said spindles during the yarn processing operation, said means comprising a cutting blade means mounted on the bottom of said ring rail mechanism for traveling therewith and depending downwardly therefrom and extending toward said spindles for cutting off the loose tails of yarn from said spindles when said ring rail mechanism traverses to a lower position thereof.

7. In a yarn processing machine, as set forth in claim 6, in which said cutting blade means comprises a cutting blade mounted generally between two adjacent spindles and extending toward each of said two adjacent spindles for cutting off the loose tails of yarn from said two adjacent spindles.

8. In a yarn processing machine including elongate rotating spindles for receiving hollow yarn carrying bobbins over one end thereof, magnetic bobbin seater devices positioned around said spindles at generally the other ends thereof for magnetically seating the bobbins on said spindles in non-friction fitting association and a yarn carrying ring rail mechanism for traversing movement up and down the bobbins on said spindles to aid in the yarn processing operation and for aiding in applying the last few wraps of yarn around the lower ends of said spindles prior to bobbin doffing which results in loose tails of the yarn extending from said spindles after bobbin doffing; the improvement therewith of

means for receiving, guiding and holding yarn during bobbin doffing, bobbin replenishment and yarn processing start-up procedures of the yarn processing machine, said means comprising generally horizontally extending protruding lip means extending outwardly from said magnetic bobbin seater devices around said spindle and defining a plurality of separate segments slightly spaced from each other for forming generally V-shaped grooves between each of said segments for receiving and guiding the yarn being processed on the bobbin during the last few wraps thereof prior to bobbin doffing, for holding the yarn to effect breaking of the yarn during bobbin doffing and for receiving and guiding the yarn during yarn processing start-up, and

means for automatically cutting off the loose tails of yarn from the lower ends of said spindles during the yarn processing operation comprising cutting blade means mounted on the bottom of said ring rail mechanism for travel therewith and depending downwardly therefrom and extending toward said spindles for cutting off the loose tails of yarn from said spindles when said ring rail mechanism traverses to a lower position thereof.

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9. In a yarn processing machine, as set forth in claim 8, in which each of said magnetic bobbin seater devices comprises a magnetized member disposed generally around the other end of said spindle and a metallic magnetic flux conducting member surrounding said magnetized member and cooperating therewith to magnetically seat the bobbin on said spindle, and in which said separate segments of said protruding lip means alternately extend upwardly and downwardly at a slight angle to horizontal for more easily guiding the yarn into said V-shaped grooves.

10. In a yarn processing machine, as set forth in claim 9, further including means for receiving and holding the last few wraps of yarn prior to doffing of the full bobbins from said spindles to aid in bobbin doffing,

bobbin replenishment and yarn start-up procedures, each of said means comprising a roughened surface on a lower portion of the outside of said metallic members below said protruding lip means.

11. In a yarn processing machine, as set forth in claim 10, in which said protruding lip means comprises a generally circular member for fitting around the upper portion of said metallic member of said magnetic seating device and including depending leg portions disposed along the outside surface of said metallic member for providing surfaces against which the last few wraps of yarn left on the lower portion of said metallic member may be manually cut for removal therefrom.

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