ABSTRACT

A device for creating an intense vortex air flow sufficient to strip a strand from a bobbin, untwist the strand, shred the strand into staple fiber and transport the staple fiber to a receptacle.

4 Claims, 7 Drawing Figures
STRAND STRIPPER AND RECLAIMER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a device for stripping strands of fibers from a bobbin and reclaiming the fibers to respin into strands.

2. Description of the Prior Art

In the production and use of yarn in manufacturing processes, fibers are transferred onto (and from) bobbins, reels and/or spools at various stages. If a machine should malfunction or if the fiber should break in such a way as to cause the machine to malfunction, the fibers may be improperly wound onto a storage device and thus create an unusable supply of fibers. Similarly, if a wound supply of fibers is being fed into another machine for processing and the machine malfunctions so as to destroy or damage the wound supply in any way, it would also create a wound supply of fibers that is unusable. Previously these fibers had to be removed from the bobbin by hand and separately processed or reclaimed.

Thus, there exists a need in the industry for a device which is simple, efficient and inexpensive for the stripping and reclaiming strands of fibers from a wound supply and transforming these strands into staple fibers suitable for reprocessing.

SUMMARY OF THE INVENTION

The present invention is a device for stripping a strand from a bobbin, unwinding the strand, shredding the strand into staple fiber and transporting the staple to a receptacle. The device includes a strand inlet and outlet chamber having coincident longitudinal axis and a housing therearound so as to create an intense vortex air flow in the outlet chamber so as to draw the strand into said chamber and untwist and shred to staple fibers which are transported to a receptacle.

OBJECTS OF THE INVENTION

An object of the present invention is to provide a single, simple device which will strip strands of fibers from a bobbin and create staple fiber for reclaiming.

Another object of the invention is to provide an inexpensive device with a minimum number of parts to untwist and shred strands of fibers into staple.

A further object of the invention is to provide a device for creating an intense vortex air flow using a minimum number of parts.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of the preferred embodiment of the subject invention;

FIGS. 2-5 are cross-sectional areas of the vortex tube showing communicating ports;

FIG. 6 is a front view of the present invention's preferred embodiment shown in use; and

FIG. 7 is a side view of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1, which illustrates a preferred embodiment of the strand stripper and reclaimer, shows a strand inlet chamber 12, a vortex tube or strand outlet chamber 14, a sleeve or pneumatic housing 16 and a lock nut 18.

The inlet chamber 12 has an internal bore 20 having its inlet end tapered at 22 and its outlet end tapered at 24. The external diameters of the inlet chamber 12 is larger at 26 and smaller at 28, with a shoulder 30 created therebetween. The vortex tube 14 has four internal sections 32, 34, 36 and 38 creating shoulders 40 and 42. Shoulder 42 is shaped so as to have a chamfer and section 38 is inclined so as to create a flaring effect. The vortex tube 14 has two outside diameters 44 and 46 with a shoulder 48 therebetween.

Sleeve 16 is threaded at 50 and has an aperture 52 to receive a fitting from the air supply. Sleeve 16 also has a bore 54 to receive the external wall 46 of outlet chamber 14. Lock nut 18 has internal diameters or walls 56 and 58 with a shoulder 60 therebetween. Lock nut 18 is threaded at 62 externally and has an external diameter 64 with a shoulder 66 between external surfaces 62 and 64.

The strand stripper and reclaimer is assembled as shown in FIG. 1. The output chamber 14 is held firm against sleeve 16 by the pressure of nut 18's shoulder 66 on the end thereof, which forces shoulder 48 of tube 14 into the internal face of the end of sleeve 16. Inlet tube 12 is press fitted into nut 18 such that external shoulder 30 of inlet chamber 12 rests securely against internal shoulder 60 of nut 18. The assembled strand stripper and reclaimer has internal air chambers 68 and 70. Mating surfaces 50 and 62, 32 and 64, and 46 and 54 are sufficient to create air tight seals. Air chamber 68 communicates with an air supply through aperture 52 and communicates with air chamber 70 through four input ports 72, 74, 76 and 78.

As can be seen in FIGS. 2-5, the inlet ports 72, 74, 76 and 78 are located 90° of rotation around the internal diameter 34. The inlet ports are formed so as to be tangential to the inner wall 34 of the vortex tube 14. This allows the air which is forced from chamber 68 into 70 and into the circular air flow in chamber 70. The air chamber 70 diminishes to a very narrow chamber 80, which is formed between surface 78 of the inlet tube 12 and surface 36 of outlet tube 14. This narrow chamber 80 causes the circular motion of the air created in chamber 70 to be intensified and to move from left to right in FIG. 1. This will create a vortex air flow in section 38 of outlet tube 14. This vortex will be of approximately circular diameter, creating a spiral flow from left to right. The flow will create a negative pressure at 24 of inlet tube 12 so as to create a sucking force from left to right as shown in FIG. 1. The vortex air flow in section 38 is sufficient to strip or draw a strand from a bobbin through end 22 of inlet chamber 12 into section 38 of outlet chamber 14 wherein it is untwisted to an extent so that the fiber becomes weak and shreds and to propel the shredded fibers or staples with sufficient force to carry them to a receptacle. The whole process is completed using a single source of compressed air which may in the range of 70± 10 lbs. per square inch.

The preferred embodiment of the stripper and reclaimer as shown in FIG. 1 has only four major parts, with two internal air chambers for creating an intense spiral flow. The communication of the two air chambers and the intersection of the inlet and outlet chamber creates the intense vortex air flow. The longitudinal
axis of the four parts are parallel and coincidental so as to provide a simple and efficient aerodynamic device. The number of parts to the present device is reduced by using the overlapping of the inlet chamber 12 and the outlet chamber 14 to form the walls of air chamber 68 and air chamber 70. The air passage 72 between chamber 70 and the chamber section 38 of outlet pipe 14 is sufficiently long so as to create a laminar vortex air flow.

The strand stripper and reclaimer as illustrated in FIG. 1 (generally referred to as 10) is shown in use in FIGS. 6 and 7. A frame or support device 100 has uprights 102, 104, 106 and 108 joined by cross-members 110, 112, 114, 116, 118 and 119 and rest on legs 120, 122, 124, 126 and 128. Eight of the strand stripper and reclaimer 10 are shown connected to the frame and having their sleeves 16 connected to a source of compressed air (not shown) through pipes 130 and there outlet chambers 14 communicating with exit tubes 132. The output of exit tubes 132 carry the shredded staple to a gathering chamber or may be connected directly to the device which will condition and reprocess these staple fibers. For example, exit tubes 132 may be connected directly to the input of a carding machine or a picker.

As seen in FIG. 6, a bobbin 134 having strands of fibers 136 wound thereon rests upon a spindle 138. The yarn 136 is shown leading into and being sucked through one of the downward facing devices 10. Connected at the top and extending from upright cross member 119 is a rod 140 upon which is mounted a bobbin 144 having strands or fibers 144 wound thereon. A nut or other retaining device 146 is shown to prevent the bobbin 142 from spinning off the end of rod 140. The yarn 144 is shown being fed into one of the four upward facing devices 10. As can be seen, the frame 100 provides the utilization of the strand stripper and reclaimer 10 to unwind strands from rotating bobbins or devices such as 142 and also strip strands of fibers over end for a stationary device or bobbin such as 134. A foot actuated device 148 is shown in FIG. 7 to help remove the stationary bobbins 134 from the spindles 138.

As can be seen from the application of the strand stripper and reclaimer 10 in FIGS. 6 and 7, the vortex air flow created in chambers 68, 70 and 80 is sufficient to strip a strand from a bobbin, untwist the strand, shred the strand into staple fiber and transport the staple to a receptacle. Although the invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the appended claims.

What is claimed is:

1. A device for reclaiming staple fibers from a spun yarn or spun roving comprising:
   an outlet chamber having at least first and second connected concentric internal passages having a common longitudinal axis and an outlet exiting from the second chamber;
   an inlet chamber having an inlet connected to a passage extending through the inlet chamber and having the same longitudinal axis as the outlet chamber, a first portion of the inlet chamber mounted within the outlet chamber in a space relationship defining a large cavity adjacent the first passage, and a second portion of the inlet in a spaced relationship defining a small cavity adjacent the second passage;
   a housing at least partially surrounding each chamber, and securing them together;
   means associated with the first passage for providing a vortex of air to occur in the first cavity, progressing to the second cavity and exiting through the outlet;
   means for sucking yarn or roving into the inlet chamber; and
   means within the passages for untwisting the yarn or roving to cause the staple fibers to separate from the yarn or roving and individually exit the outlet.

2. The device of claim 1 wherein the means for providing a vortex includes four inlet ports connecting the exterior of the outlet chamber to the first passage.

3. The device of claim 2 wherein the ports are tangential to the walls of the passage.

4. The device of claim 1 wherein the outlet passage is tapered outwardly.

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