May 13, 1952 R. RAGAN 2,596,172

SPINNING, TWISTING, AND LIKE APPARATUS

Filed April 26, 1950

2 SHEETS—SHEET 1

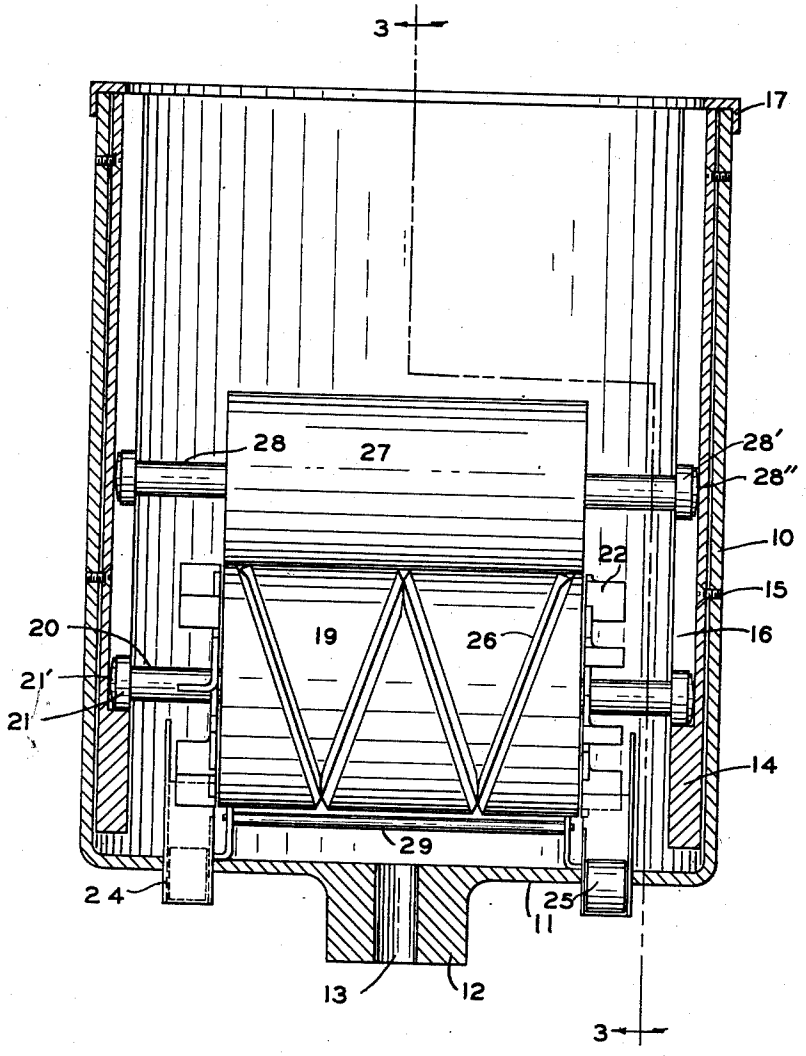


FIG 1

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2 SHEETS—SHEET 2

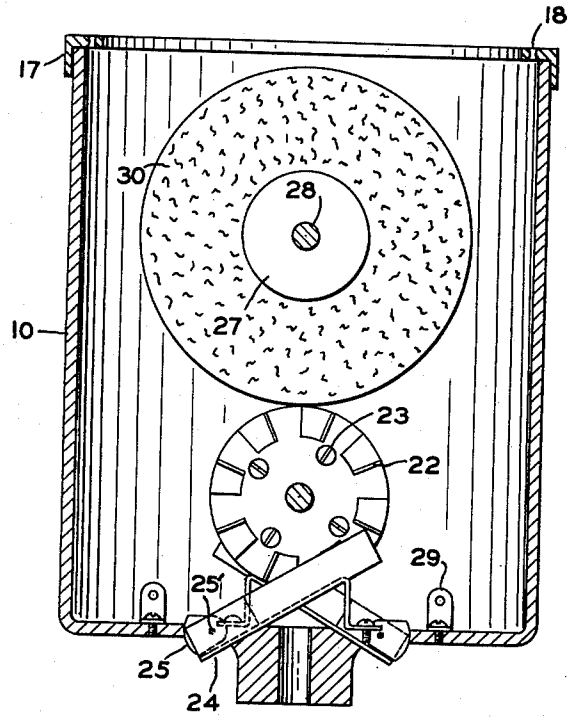


FIG 3

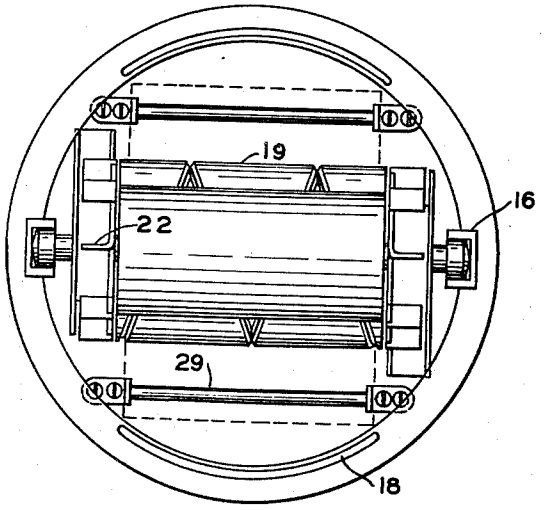


FIG 2

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Patented May 13, 1952

2,596,172

UNITED STATES PATENT OFFICE

2,596,172

SPINNING, TWISTING, AND LIKE APPARATUS

Ralph Ragan, Atlanta, Ga.

Application April 26, 1950, Serial No. 158,179

11 Claims. (Cl. 57—69)

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The present invention relates to spinning, twisting and like apparatus, and more in particular to improved mechanism to replace the spinning rings, travelers, flyers, throwers and the like on present forms of spinning and twisting machines.

The chief objective of prior art machines as well as that of the present invention is to wind roving or fiber upon a spindle while simultaneously applying a twist to the fiber to make it stronger and keeping the same under tension during the winding period. Since modern production methods demand high rotative spindle speeds, it is readily apparent that such a device must be well constructed and balanced to withstand the high rotative speeds, yet delicate enough to handle light fibers in giving the necessary twist and applying the proper tension during the winding period.

Another object of the invention is to provide mechanism which makes it possible to run spinning and twisting frames at rotative speeds higher than permissable with those machines of the prior art.

Another object of the invention is to provide apparatus of the character described which provides uniform twisting of the fiber while applying constant tension to the same as it is being wound upon the cylinder.

A further object of the invention is to provide apparatus which eliminates all of the prior art reciprocating traveling mechanism formerly used, and provides an air driven, rotating traveler drum, which is spun in both a vertical and a horizontal plane to impart twisting and winding to the fiber into a package.

Another object of the invention is to provide apparatus which eliminates the ring travelers of the prior art devices.

Another object of the invention is to provide spinning apparatus which maintains uniform tension from an empty package to a full one.

Still another object of the invention is to provide apparatus permitting the winding of a larger package of the fiber than hertofore accomplished.

Further objects and advantages will become apparent in the course of the following detailed description of the invention when viewed together with the accompanying drawing in which:

Fig. 1 is a vertical cross section of an embodiment of my invention in spinning, twisting and like apparatus.

Fig. 2 is a top view thereof.

Fig. 3 is a vertical sectional view taken along lines 3—3 of Fig. 1.

In the drawing, numeral 10 designates a cylindrical pot the bottom 11 of which is provided with an upset boss 12 having an axial bore 13 by which the same may be mounted on any vertically disposed rotatable spindle.

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On the inner wall surface of the pot 10 I have provided two diametrically opposed guide bars 14, disposed vertically along the pot walls and held in position by means of screws 15. Each guide bar 14 is provided with a slot 16 on its inner face extending from the top end to a point near the bottom thereof.

Fitted over the top of the pot 10 I have provided a flanged rim 17 having diametrically opposed, elongated slots 18 formed on the top face thereof.

The guide or driving drum 19 is mounted on a shaft 20 having sealed anti-friction bearings 21 on each end thereof and adapted to ride in the slots 16 of the guide bars 14, and provided with convex caps 21' to prevent wedging in the slots. Mounted on each end of the driving drum 19 are air vanes 22 held to the drum proper by means of screws 23 or the like. In cooperation with these vanes 22 I have provided troughs 24, the bottoms of which are extended through the bottom of the pot 10. At the lower ends of these troughs 24 I have provided gate valves 25 which are pivoted at 25' and which control the quantity of air passing up through the troughs 24 to the vanes as the pot is being rotated by the spindle.

It will be noted that upon the periphery of the traveler drum 19 I have formed a groove 26 constituting oppositely inclined spirals which operate to reverse the traverse of the strand whereby the fiber is moved backward and forward during its winding period.

Above the traveler drum and resting on the same is the cylinder 27 also mounted on a shaft 28 whose outer ends are mounted in anti-friction bearings 28' to ride in the slot 16 of the guide bars 14. Convex bearing caps 28'' are provided to prevent wedging in the slots.

In the inside bottom of the pot 10 I have provided opposed cross bars 29 positioned in the manner shown in Figs. 2 and 3. In operating the device, the thread or yarns are brought through a thread guide (not shown) preferably located over the central vertical axis of the pot, in accordance with standard practice, and then extended through one of the slots 18 of the upper flanged rim 17, and brought down under the corresponding lower cross bar 29 and positioned in the spiral groove 26 cut in the face of the traveler drum 19, and finally wound around in a cross spiral on the cylinder 27.

With a fixed spindle speed and a given area of

opening of the gate valves 25 for the admission of air, there is provided a constant speed of rotation for the driving drum 19 and consequently a constant, uniform tension on the fibers. The cylinder 27 onto which the fibers are wound is rotated with a constantly changing speed as the yarn builds up on it, and this change in speed or difference between the speed of the driving drum and the speed of the cylinder causes the yarn to be wound so that succeeding turns are spaced out across the cylinder to fill all the space uniformly rather than to have each successive layer directly on top of the preceding, as would be the case if the speed of the cylinder were constant.

Since the cylinder 27 rests upon the driving drum 19, it will be driven by the driving drum and will rotate in the opposite direction thereto, winding the threads or yarns in a criss-cross spiral. Very, very light tensions are necessary in spinning, and the size of applicant's driving drum and winding cylinder are such that the finest threads will overcome the friction in the anti-friction bearings in which these rotating parts are mounted; and the fact that constant, uniform tension is maintained all the way from an empty package to a full package permits extremely high spindle speed to be employed.

The size of the package produced on my apparatus will be five times as large as that produced by a 2'' spinning ring operating on the present spinning frames. This means a continuous thread without knots with a sufficient yardage to make a full beam to be put on as warp on the looms, and the doffing period is five times as long as with the present day 2'' spinning ring. My package can be taken directly from the spinning frame and placed on a high speed beamer, thus eliminating a very expensive machine and an expensive operation in rewinding and knotting such as is now practiced.

My device is versatile and will handle all types of natural and synthetic fibers in either slack or hard twist. It can be installed on present spinning frames with only a slight change in the geared end of the frame. No ring travelers are used, so that the cost of travelers is eliminated as well as the cost of installing and changing them; and the use of my device further removes the need on present spinning frames of all the ring rails, lifting rods, counterweights, gearing and builder cams and cam followers.

It will be obvious that my invention provides needed apparatus of great convenience and usefulness, and that while I have illustrated and described my invention in a very practical embodiment thereof without attempting to illustrate or describe other embodiments thereof which I contemplate, various modifications and changes may be made without departing from the scope of my invention as defined in the appended claims.

I claim:

1. In apparatus of the class described, a hollow pot to be mounted for rotation upon a vertically disposed rotatable spindle, a driving drum horizontally positioned and mounted for rotation in said pot, air vanes secured to said drum, means arranged to direct air from outside said pot onto said air vanes to rotate said drum, means on said drum for receiving and guiding fibers, and a vertically moveable winding cylinder mounted for rotation in said pot, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibres from said drum can be wound upon said cylinder.

2. In apparatus of the class described, a hollow pot to be mounted for rotation upon a vertically disposed rotatable spindle, a horizontal driving drum mounted for rotation in said pot, air vanes on said drum, means arranged to direct air from outside said pot onto said air vanes to rotate said drum, a groove on said drum for receiving and guiding fibers, a horizontal shaft mounted for vertical movement in said pot, and a winding cylinder mounted for rotation upon said shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove on said drum can be wound upon said cylinder.

3. In apparatus of the class described, a hollow pot to be mounted for rotation upon a vertically disposed rotatable spindle, a horizontal driving drum mounted for rotation in said pot, air vanes on said drum, means arranged to direct air from outside said pot onto said air vanes to rotate said drum, a groove on said drum constituting oppositely inclined spirals for receiving and guiding fibers, a horizontal shaft mounted for vertical movement in said pot, and a winding cylinder mounted for rotation upon said shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove on said drum can be wound upon said cylinder.

4. In apparatus of the class described, a hollow pot to be mounted for rotation upon a vertically disposed rotatable spindle, a horizontal shaft mounted in said pot, a driving drum mounted for rotation upon said shaft, air vanes secured to said drum, means arranged to direct air from outside said pot onto said air vanes to rotate said drum, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, a second horizontal shaft mounted for vertical movement in said pot, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

5. In apparatus of the class described, a hollow pot to be mounted for rotation upon a vertically disposed rotatable spindle, a horizontal shaft mounted in said pot, a driving drum mounted for rotation upon said shaft, air vanes secured to said drum, means arranged to direct air from outside said pot onto said air vanes to rotate said drum, valve means arranged to control the flow of air onto said vanes, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, a second horizontal shaft mounted for vertical movement in said pot, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

6. In apparatus of the class described, a cylindrical pot provided with a bottom by which the pot may be mounted for rotation upon a vertically disposed rotatable spindle, a horizontal shaft mounted in said pot, a driving drum mounted for rotation upon said shaft, air vanes

secured to said drum, means extending through the bottom of said pot and arranged to direct air from outside said pot onto said air vanes to rotate said drum, a valve means arranged to control the flow of air onto said vanes, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, a second horizontal shaft mounted for vertical movement in said pot, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

7. In apparatus of the class described, a cylindrical pot provided with a bottom having a bore by which the pot may be mounted for rotation upon a vertically disposed rotatable spindle, diametrically opposed guide bars within said pot disposed vertically along the pot walls and secured thereto, each of said guide bars being provided with a slot on its inner face, anti-friction bearings positioned respectively to ride in each said slot, a shaft journaled for rotation in said bearings, a driving drum mounted for rotation upon said shaft, air vanes secured to said drum, means extending through the bottom of said pot and arranged to direct air from outside pot onto said air vanes to rotate said drum, valve means arranged to control the flow of air onto said air vanes, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, other anti-friction bearings positioned respectively to ride in each said slot in said guide bars, a second shaft journaled for rotation in said other bearings, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

8. In apparatus of the class described, a cylindrical pot provided with a bottom having a bore by which the pot may be mounted for rotation upon a vertically disposed rotatable spindle, diametrically opposed guide bars within said pot disposed vertically along the pot walls and secured thereto, each of said guide bars being provided with a slot on its inner face, anti-friction bearings positioned respectively to ride in each said slot, a shaft journaled for rotation in said bearings, a driving drum mounted for rotation upon said shaft, air vanes secured to said drum, diametrically opposed troughs extending through the bottom of said pot and arranged to direct air from outside said pot onto said air vanes to rotate said drum, valve means arranged to control the flow of air through said troughs, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, other anti-friction bearings positioned respectively to ride in each said slot in said guide bars, a second shaft journaled for rotation in said other bearings, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

9. In apparatus of the class described, a cylindrical pot provided with a bottom having a bore by which the pot may be mounted for rotation

upon a vertically disposed rotatable spindle, diametrically opposed guide bars within said pot disposed vertically along the pot walls and secured thereto, each of said guide bars being provided with a slot on its inner face, anti-friction bearings positioned respectively to ride in each said slot, a shaft journaled for rotation in said bearings, a driving drum mounted for rotation upon said shaft, said drum having ends spaced from the side walls of said pot, air vanes secured to the ends of said drum, diametrically opposed troughs extending through the bottom of said pot and arranged to direct air from outside said pot onto said air vanes to rotate said drum, valve means arranged to control the flow of air through said troughs, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, other anti-friction bearings positioned respectively to ride in each said slot in said guide bars, a second shaft journaled for rotation in said other bearings, and a winding cylinder mounted for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

10. In apparatus of the class described, a cylindrical pot provided with a bottom having a bore by which the pot may be mounted for rotation upon a vertically disposed rotatable spindle, diametrically opposed guide bars within said pot disposed vertically along the pot walls and secured thereto, each of said guide bars being provided with a slot in its inner face, anti-friction bearings positioned respectively to ride in each said slot, a shaft journaled for rotation in said bearings, a driving drum mounted for rotation upon said shaft, said drum having ends spaced from the side walls of said pot, air vanes secured to the ends of said drum, diametrically opposed troughs extending through the bottom of said pot and arranged to direct air from outside said pot onto said air vanes to rotate said drum, gate valves arranged to control the flow of air through said troughs, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, other anti-friction bearings positioned respectively to ride in each said slot in said guide bars, a second shaft journaled for rotation in said other bearings, and a winding cylinder mounted for rotation upon said second shaft, and cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

11. In apparatus of the class described, a cylindrical pot provided with a bottom having a bore by which the pot may be mounted for rotation upon a vertically disposed rotatable spindle, diametrically opposed guide bars within said pot disposed vertically along the pot walls and secured thereto, each of said guide bars being provided with a slot on its inner face, a flanged rim fitted over the top of the pot and having diametrically opposed slots formed therethrough, anti-friction bearings positioned respectively to ride in each said slot, a shaft journaled for rotation in said bearings, a driving drum mounted for rotation upon said shaft, said drum having ends spaced from the side walls of said pot, air vanes secured to the ends of said drum, diametrically opposed troughs extending through the bottom of said pot and arranged to direct air

from outside said pot onto said air vanes to rotate said drum, gate valves arranged to control the flow of air through said troughs, a groove in the face of said drum constituting oppositely inclined spirals for receiving and guiding fibers, other anti-friction bearings positioned respectively to ride in each said slot in said guide bars, and a second shaft journaled for rotation in said other bearings, and a winding cylinder mounted

for rotation upon said second shaft, said cylinder being positioned above said driving drum and in peripheral contact therewith to be driven thereby, whereby fibers from the groove in the face of said drum can be wound upon said cylinder.

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No references cited.