Nov. 12, 1963 G. J. KYAME ET AL 3,110,150

YARN SPINNING MACHINE

Filed May 1, 1962 4 Sheets-Sheet 1

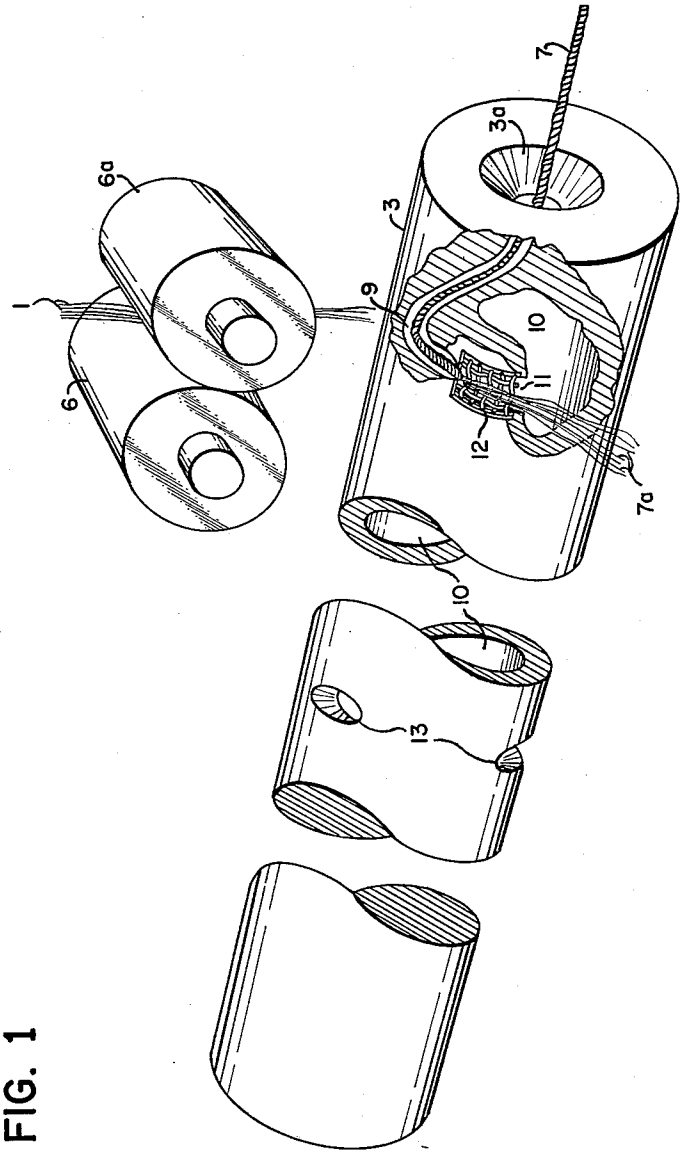

FIG. 1

INVENTOR
GEORGE J. KYAME
HERBERT R. COPELAND

BY R. Hoffman
ATTORNEY

Nov. 12, 1963 G. J. KYAME ET AL 3,110,150

YARN SPINNING MACHINE

Filed May 1, 1962 4 Sheets-Sheet 2

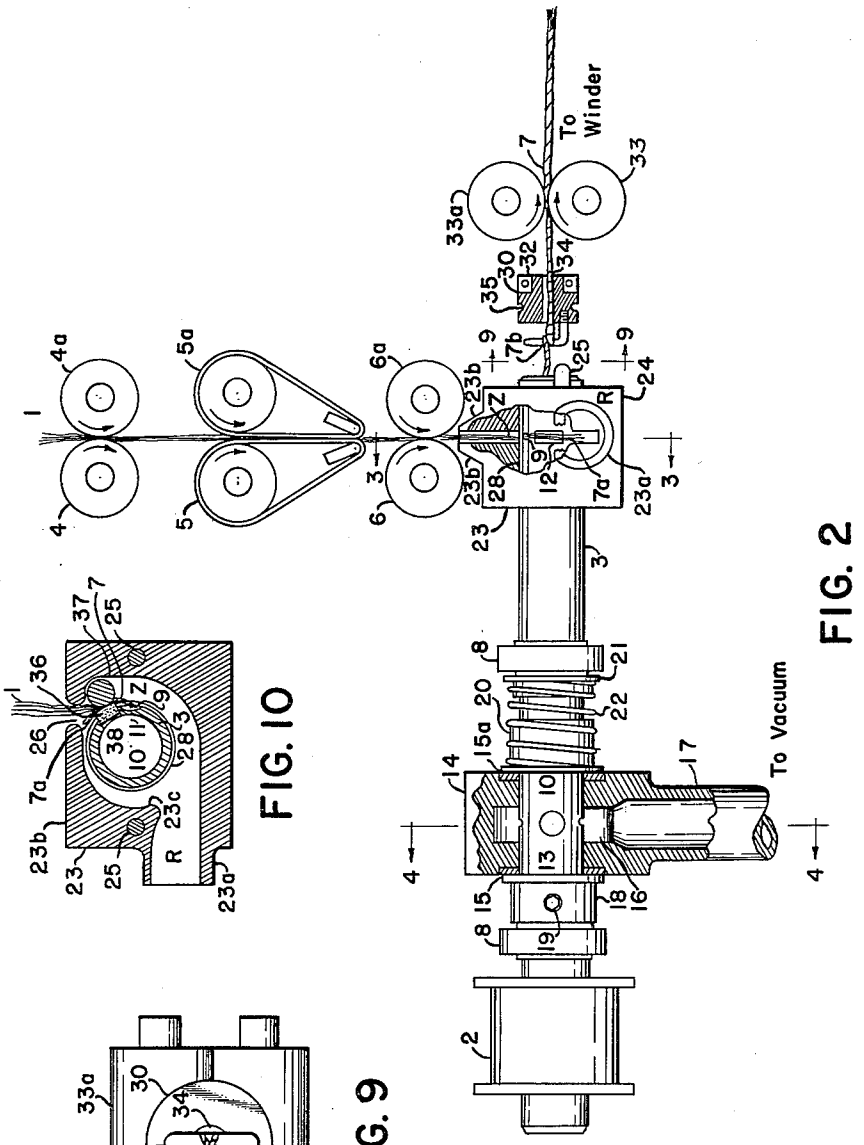

FIG. 2

FIG. 10

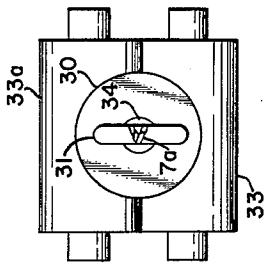

FIG. 9

INVENTORS
GEORGE J. KYAME
HERBERT R. COPELAND

BY R. Hoffman
ATTORNEY

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YARN SPINNING MACHINE

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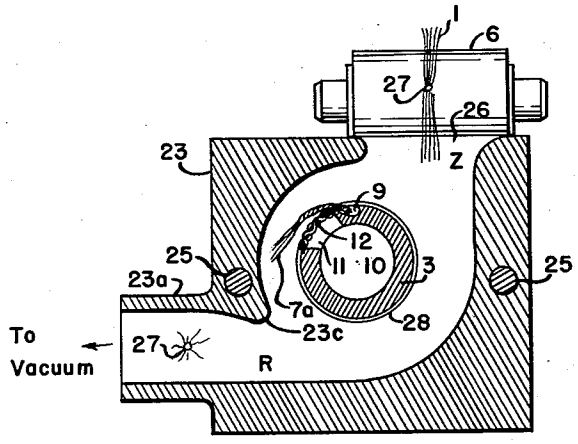

FIG. 3

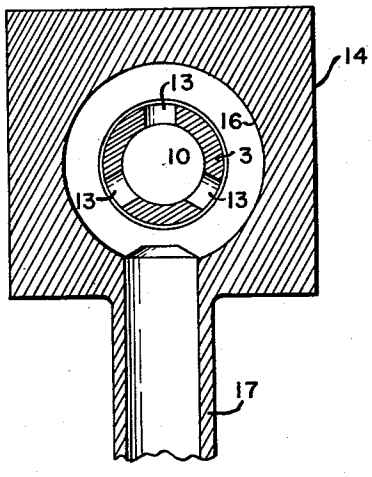

FIG. 4

INVENTORS
GEORGE J. KYAME
HERBERT R. COPELAND

BY R. Hoffman
ATTORNEY

Nov. 12, 1963 G. J. KYAME ET AL 3,110,150

YARN SPINNING MACHINE

Filed May 1, 1962 4 Sheets-Sheet 4

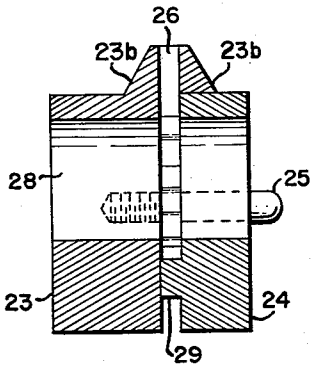

FIG. 6

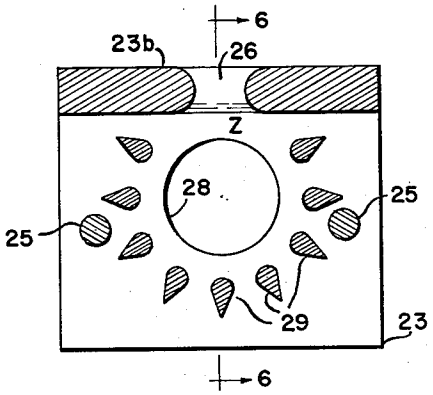

FIG. 5

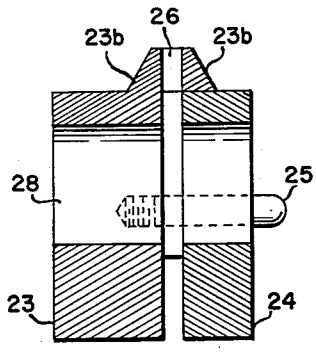

FIG. 8

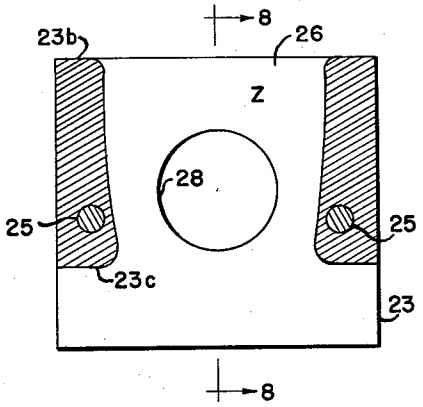

FIG. 7

INVENTORS
GEORGE J. KYAME
HERBERT R. COPELAND

BY R. Hoffman
ATTORNEY

United States Patent Office 3,110,150 Patented Nov. 12, 1963

3,110,150
YARN SPINNING MACHINE

George J. Kyame and Herbert R. Copeland, New Orleans, La., assignors to the United States of America as represented by the Secretary of Agriculture

Filed May 1, 1962, Ser. No. 191,652
10 Claims. (Cl. 57—58.89)
(Granted under Title 35, U.S. Code (1952), sec. 266)

This invention relates to the producton of yarns from staple fibers having spinning properties similar to cotton fibers.

In an earlier patent by one of us, U.S. Patent No. 2,732,682, it is suggested that the invention may be practiced "by using a machine utilizing suction to draw fibers from the roving or sliver into a confined space in which they lie in substantially parallel lines and are mingled with fibers rotating about an axis substantially parallel to said lines." Keeler et al., U.S. Patent No. 2,926,483, provides means whereby fibers are drawn off by suction from an untwisted strand and are delivered pneumatically into a spinning zone wherein they are presented to a spinning element rotating at a very high speed so as to provide free spinning ends which are caused to revolve by the spinning element and become twisted to form a spun yarn.

While it is true that yarns can be spun by such means, particularly when using long staple synthetic fibers, we have found that with relatively shorter cotton fibers, spinning continuity is most difficult to maintain. Cotton yarns can be spun without interruption only in short lengths, and the yarns produced are characterized by extreme fluctuations in cross-sectional area.

We have found that an important requirement for maintaining the continuity of the spinning operation is that the free end of the yarn being spun must be held in intimate contact with the untwisted fibers drawn from the supply strand. We have found also, that to make an even yarn, i.e., one of unvarying cross-section, it is essential that the fibers be fed to the rotating yarn free end preferably singly and at a uniform rate.

The principal object of this invention is to provide means for bringing and holding together untwisted fibers and the free end of a rapidly rotating forming yarn strand, thereby to sustain the uninterrupted formation of yarn whether the fibers be long, such as synthetic staple fibers, or relatively short such as cotton fibers. A further object is to provide means whereby the untwisted fibers drawn from a source of supply, such as a roving or sliver, are fed at a uniform rate to a twist-inserting element for concatenation to form a yarn strand of uniform-cross-section. Still another object is to provide means for removing unwanted short fibers and non-fibrous foreign matter usually present in the untwisted fiber supply strand. These and other objects and advantages will appear in the following detailed description when taken in conjunction with the drawings which show, by way of example, a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a three-dimensional view of the spinning spindle used to twist the fibers fed to it into yarn. The spindle is broken away in part to show internal details;

FIGURE 2 is a schematic assembly of the preferred embodiment of the invention;

FIGURE 3 is a section along line 3—3 of FIGURE 2 showing details of the housing for the zones of spinning activity and of foreign matter removal and disposal;

FIGURE 4 is a section along line 4—4 of FIGURE 2 showing details of the suction box used to evacuate the hollow, spinning spindle of FIGURE 1;

FIGURE 5 is a section similar to FIGURE 3 showing a variant of the spinning zone. This variant has no provision for short fiber and foreign matter removal;

FIGURE 6 is a section along line 6—6 of FIGURE 5 with front cover plate added;

FIGURE 7 is another variant of spinning zone which provides means for foreign matter removal without disposal facilities;

FIGURE 8 is a section along line 8—8 of FIGURE 7 with cover plate added;

FIGURE 9 is a section along line 9—9 of FIGURE 2 showing the false-twist device; and

FIGURE 10 is a section view similar to FIGURE 3 showing an alternative arrangement for bringing yarn end fibers and roving fibers together for spinning into yarn.

In the machine to be described, fibers, preferably in the form of drafted roving, are brought into intimate contact with the free end fibers of a yarn strand which is being turned about its longitudinal axis while its other end is held fixed against rotation. Twist resulting from said rotation of the free yarn end, causes the roving fibers to intermingle with the free end fibers and become a newly formed increment of yarn. While the new yarn increment is being formed, the yarn strand is drawn linearly away from the zone of fiber intermingling at the same time that additional roving fibers are introduced into said zone in quantity sufficient to maintain an equilibrium between incoming roving fibers and outgoing yarn. Thus a continuous strand of yarn of any desired length can be made so long as the above-mentioned equilibrium conditions are maintained.

Referring to the drawings in greater detail, the invention is shown applied to spinning cotton roving or sliver 1, utilizing a conventional power supply to turn the tape driven whorl 2 attached to spinning spindle 3. Roving or sliver from conventional sources of supply is guided by the usual guide trumpet, not shown, into the nip of input feed roll pair 4, 4*a*, of a conventional drafting system comprised of said input roll pair, apron pair, 5, 5*a*, and roving delivery roll pair 6, 6*a*.

The drafting system attenuates fiber supply strand 1 drawing the fibers therein in substantially parallel alignment with the longitudinal axis of the strand. This facilitates removal of the fibers from the attenuated strand as it is delivered into the spinning zone designated by the letter Z in the drawings.

Spinning spindle 3 is one apparatus suitable for bringing together into intimate contact the fibers drawn from attenuated supply strand 1, and the yarn free end fibers 7*a*, while said spindle is rotating during the insertion of twist into yarn strand 7.

Spindle 3 is a capped, partly hollow cylindrical member rotatably supported by bearings 8, which, along with all other component elements of the invention, are assembled in a suitable supporting framework by means well-known to those skilled in the art. The capped end of spindle 3 is provided with a smooth-walled, curling yarn passageway 9 which enters the cylindrical spindle surface tangentially and substantially at right angles to the spindle axis, spirals steeply, and within a quarter turn or less emerges along the spindle axis at the apex of conical depression 3*a* in the center of said end cap. Yarn passageway 9 is completely independent of, and in no way joins, hollow spindle interior 10. Adjacent said yarn passageway on the surface of spindle 3, a circumferential slit-like opening 11 connects with spindle hollow 10. Opening 11 is covered with a fine-mesh wire screen 12, preferably of the order of 100–150 mesh although it need not be so

limited. Spindle 3 is preferably 5/8" in diameter, and screened opening 11 is 1/8" wide axially by 3/8" long circumferentially. These dimensions are given by way of illustration only and may be varied over wide ranges without departing from the spirit of the invention.

At a suitable point remote from screened opening 11, spindle 3 is pierced circumferentially by several, equally-spaced holes 13 which connect with hollow interior 10 providing, in conjunction with suction box 14, means for creating suction at the surface of screen 12 while the spinning spindle is rotating.

Suction box 14, fitting loosely around spindle 3 is equipped with anti-friction air seals 15 and 15*a*. An annular hollow 16, coaxial with spindle 3, connects with tubular coupling 17 which protrudes from one of the sides of the box. Said suction box is floatingly mounted by conventional means in axial alignment with spindle 3. A close-fitting, smooth-flanged set collar 18 is rigidly held to spindle 3 by set screw 19 at a position to maintain alignment between annular hollow 16 and spindle evacuation holes 13 when air seal 15 bears against the smooth flange of collar 18. On the opposite end of suction box 14 a second, close-fitting, smooth-flanged collar 20 slides freely on spindle 3 with its flanged face bearing against air seal 15*a*. A second flanged collar 21 slides freely on spindle 3 with its flanged face bearing against the inner race of bearing 8 as shown. A light, compression spring 22 supported by said sliding collars squeezes together collar 20, suction box 14 and collar 18 in airtight conjunction without interfering with the free rotation of spindle 3.

The suction box arrangement just described is but one of many means well-known to the art for evacuating the spindle hollow 10. For example, spindle 3 could be a capped, tubular member with a suction box or airtight, rotatable vacuum coupling attached to its driven uncapped end.

Drafted roving fed to spinning spindle 3 is kept under control at all times by the novel housing assembly of the preferred embodiment pictured in FIGURE 2 and FIGURE 3. Housing 23 is a block-like structure bored transversely for a clearance fit on spindle 3. Its front face is recessed to a depth equal to the axial width of screened opening 11 in spindle 3. The shape of said recess is substantially circular with its center displaced bias-wise relative to the center of spindle clearance bore 28. Two tangential channels of the same depth as the circular recess extend into said recess at two adjacent sides of the housing. One of these channels serves as the fiber entry port 26 and is no wider than the length of roving delivery roll pair 6, 6*a* with which it is aligned. The second channel, designated by the letter R in the drawing, serves as a discharge outlet for short fibers and foreign matter 27 separated from the roving fibers during the spinning operation. Upper front edge 23*b* of said housing extends upward and outward in substantially trapezoid-shaped cross-section, to bring fiber entry port 26 as close to the nip of roving delivery roll pair 6, 6*a* as is possible without blocking the free flow of air past the lower surfaces of said roll pair into port 26. Cover plate 24, also bored transversely for clearance around spindle 3, provides access to said recess in said housing for maintenance, and is supported in coaxial alignment with spindle 3 by guide pins 25 which are rigidly held in housing 23. Tubular projection 23*a* is an integral part of housing 23 and overlaps discharge outlet R and cover plate 24. Projection 23*a* provides means for coupling discharge outlet R with a vacuum source for removing unwanted short fibers and foreign matter 27. Cover plate 24 abuts the overlapping portions of projections 23*a* and 23*b* in substantially airtight conjunction. Channel R widens vertically from the point of intersection with the aforementioned circular recess to its junction with tubular projection 23*a*, thus forming projection 23*c* within said recess.

Novel housing assembly 23, 24 may take many forms. Two variants which have proven satisfactory are those shown in FIGURES 5, 6, 7, and 8. That shown in FIGURES 5 and 6 utilizes a series of grid bars 29 to keep the roving fibers sufficiently close to spinning spindle 3 that the suction at screened opening 11 will draw them into contact with the trailing yarn end 7*a* on screen 12. Grid bars 29 are preferably made an integral part of cover plate 24 to provide freer access to spindle 3 when the cover is removed. Said bars may be made in a wide variety of cross-section shapes without departing from the spirit of the invention. Thus their section may be circular, triangular, square, airfoil, etc. They may also be oriented about the spindle radially as shown, or they may be tilted to provide either positive or negative raking of trailing yarn end 7*a* as it whips by. This variant provides no means for short fiber or foreign matter removal. On the other hand, the variant shown in FIGURES 7 and 8 does provide facilities for short fiber and foreign matter removal, but none for disposal. The removed matter is merely thrown out at the bottom of housing 23 to scatter over the spinning frame.

False-twist device 30, rotatably mounted in bearing 32 in coaxial alignment with spindle 3, provides means for temporarily adding excess twist to yarn strand 7 to facilitate fiber pickup on screen 12. Said false-twist device is a cylindrical member turned down at one end for mounting in bearing 32, and bored axially to provide yarn passageway 34, both ends of which are flared to present a smooth edge to yarn 7 passing therethrough. Rigidly attached to the front face of device 30 between bore 34 and its periphery is a smooth, L-shaped round rod 31, oriented so that the free arm of the L bisects yarn passageway 34. V-groove 35 in the periphery of cylindrical member 30 provides means for driving said false-twist device. The false-twist device just described is but one of many which can be used in this novel invention. Thus, the free arm of rod 31 may instead be the support shaft for an idling roller which would minimize frictional effects on the yarn looped around it. Other false-twist devices are well-known to the art.

Yarn delivery roll pair 33, 33*a* provides means for withdrawing yarn 7 from spindle 3 as fast as it is made. Finished yarn coming from delivery roll pair 33, 33*a* is delivered to conventional winding equipment, not shown. The winding units are preferably integral parts of the spinning frame, but they may be entirely independent units.

In operation, roving strand 1 drawn from conventional bobbins is fed to input roll pair 4, 4*a* of a conventional drafting system comprised as shown of roll pairs 4, 4*a* and 6, 6*a* and apron pair 5, 5*a*. Passage of the roving strand 1 through the drafting unit attenuates the strand reducing it to a thin ribbon of substantially parallel fibers which are drawn by suction into entry port 26 of housing 23. Suction at port 26 results from the combined evacuation of spinning spindle hollow 10 and spinning zone Z which creates a pressure-differential across port 26. Air rushing between the lower surfaces of rolls 6 and 6*a* and the upper edges of projection 23*b* of housing 23 to correct the unbalanced conditions existing at port 26, sweeps the attenuated roving strand clear of said rolls and into said port. Suction at screen 12 draws said strand onto said screen into intimate contact with the end fibers 7*a* of yarn 7 already held to the screen by said suction. Suction at screen 12 is created through the medium of evacuating chamber 16 of suction box 14 via vacuum source applied to coupling 17. Subatmospheric conditions created in chamber 16 draw air out of spindle hollow 10 through portholes 13. Air from zone Z enters screen 12 to correct the unbalanced state of affairs thereby forcing the drawn roving fibers into intimate contact with yarn end fibers 7*a* as mentioned earlier. Twist imparted to yarn 7 by rotation of spindle 3 about its axis runs back along the yarn through passageway 9 forcing end fibers

7a to rotate about the yarn axis. This action increases the intermingling between the yarn end fibers 7a and the drawn roving fibers making said roving fibers a new increment of yarn replacing the original end fibers 7a with which they intermingled to become new yarn end fibers 7a.

As spindle 3 rotates and drafted roving fibers are fed to it the yarn formed by the actions just described is being withdrawn from the end of spindle 3 by yarn delivery roll pair 33, 33a for delivery to a conventional winding mechanism not shown. By maintaining an equilibrium between roving fiber input and yarn withdrawal, a single, unbroken strand of yarn of any desired length can be made and packaged in any shape or form desired.

The uniformity of yarn made with this invention is a direct function of the uniformity of the roving fiber feed to spinning spindle 3. Constant speed of roving delivery roll pair 6, 6a is not of itself sufficient for maintaining uniform roving delivery under conventional drafting conditions. Because interfiber friction exists within the attenuated roving strand, individual fibers are not drawn to spindle 3 as soon as they are free of the grip of roll-pair 6, 6a. Instead, it is normal for these fibers to cling to fibers still held by said roll pair until the constant flailing by yarn end 7a dislodges them as a bundle which is then picked up by screen 12 to be made into an increment of yarn. There follows a brief interval of no fiber pickup until the next bundle is ready to be dislodged. With the yarn being withdrawn at a constant rate the yarn made is characterized by periodic variations in diameter in keeping with the intermittent delivery of roving fiber bundles. Consequently, in the interest of yarn uniformity, it is preferable that the roving fibers be fed as individual fibers at a sufficiently fast rate to maintain the desired yarn size. For example, where conventional spinning calls for a maximum draft of 40:1, it would be preferable with our invention to use a draft of about 200:1 with no change in either, yarn size or yarn production. Although roving draft is much higher the fibers are delivered at a faster rate to the spinning spindle while the yarn is withdrawn therefrom no faster than is done in conventional spinning.

Friction between yarn 7 and passageway 9 affects the free runback of twist to screen 12 to some extent interfering with the efficient intermingling between roving fibers and yarn end fibers. This friction effect may be overcome by utilizing false-twist device 30 to put sufficient additional twist in yarn 7 that the twist runback forces exceed those due to friction. In the false-twist device, yarn 7 emerging from the end of spindle 3 is first snubbed with one loop 7b around the free arm of rod 31, then threaded through passageway 34 and finally fed to the nip of yarn delivery roll pair 33, 33a for delivery to a winding mechanism, not shown. False-twist device 30 is rotated counter to the direction of rotation of spinning spindle 3 thereby adding its twist component to that of the spinning spindle. Thus, that portion of yarn between screen 12 and device 30 contains the aforementioned combined twist, while that leaving device 30 has the added twist removed. The rotational speed of false-twist device 30 may vary from a few revolutions per minute on up to the speed of spinning spindle 3, depending on the amount of yarn-to-spindle friction to be overcome.

One of the objects of this invention was to provide means for removing unwanted short fibers and foreign matter that might be present in the roving being converted to yarn. This is accomplished by taking advantage of the centrifugal action due to the high rotational speed of spinning spindle 3. As spindle 3 rotates, that portion of the free end 7a of yarn 7 not held down on screen 12 by the aforementioned suction, is thrown outward by said centrifugal action and strikes projection 23c within housing 23 once with every revolution of the spindle. Short fibers not firmly entangled with the longer fibers in the yarn strand, and such heavy particles of foreign matter 27 as might be present are dislodged from the forming yarn strand as it strikes said projection 23c. The dislodged short fibers and heavy particles are thrown into discharge outlet R for removal by the vacuum source connected to coupling projection 23a of housing 23.

Thus far, the invention has been described as one requiring the use of suction to bring about the intermingling and entangling of the roving fibers with the yarn end fibers as the yarn is being spun. Suction is not the only medium that may be so employed. For example, screen 12 on spindle 3 may be replaced with a porous medium 36 such as felt, ceramic, sintered bearing material, etc., rigidly attached to spindle 3 and projecting above the surface thereof. Said porous element comes in rolling contact at some point during its cycle of rotation—preferably at a point directly under the point of entry of the attenuated roving strand into spinning zone Z—with an idling roller 37 rotatably mounted within the aforementioned circular recess in housing 23. Idling roller 37 is made preferably of a "non-stick" type of plastic material such as those of the fluorocarbon family, e.g., that sold under the trade name of "Teflon." The vacuum system described earlier for creating suction at screen 12 is now used figuratively in reverse as a liquid container and conduit means to keep porous medium 36 constantly wet with a liquid medium 38 having a great affinity for holding fibers to the surface which it wets. Such liquid media may include such materials as water with wetting agent added, starch solutions, mild adhesive solutions, oils used to lubricate fibers during processing, and many others.

In operation, yarn free end 7a and fibers drawn from the attenuated roving strand are squeezed together onto the wet surface of porous element 36 by roller 37. The wet liquid film on the surface of porous element 36 holds the fibers and yarn end in intimate contact, as did the suction previously, while spinning spindle 3 rotates to insert twist into yarn 7. All other details of the previously described spinning operation with the exception of those delineated above remain unchanged. The continuity of roving feed into spinning zone Z is maintained by the indirect action of the suction used to remove the unwanted foreign matter 27 mentioned previously. Said action creates a pressure differential across fiber entry port 26 causing air to be drawn through port 26 into zone Z carrying the attenuated roving strand with it.

In this invention, yarn production rates are governed by the same conditions prevailing in conventional spinning systems, viz., spinning spindle speed and twists per inch desired in the yarn. However, since the spinning spindle of this invention does not carry the yarn package as does the spindle of the conventional frame, and also, since no ring and traveler combination is employed, higher spindle speeds and therefore higher production rates are the rule. The count or size of the yarn produced is determined by the size of the roving used and the overall draft of said roving, i.e., the ratio of the rate of yarn withdrawal to the rate of input of roving to the drafting unit. A novel feature of this invention is its adaptability to multiple spindle construction similar to conventional ring spinning systems.

It is apparent that the above description is given by way of illustrating a preferred embodiment of the invention, and the various structures are subject to wide variations without departing from its scope. Some of these variations were pointed out as the description progressed; others will be readily conceived by those skilled in the art.

We claim:

1. A spinning machine for preparing spun yarn from staple length fiber comprising in combination, a cylindrical rotatably mounted spinning spindle having a hollow interior, means for supporting said spinning spindle and means for rotating said spinning spindle about its center axis, means for maintaining reduced air pressure within the hollow interior of said spinning spindle, means for

advancing unspun fiber and means for withdrawing spun fiber yarn from an area on the outer curved surface of said spinning spindle defined as the fiber spinning zone; said spinning spindle comprising a hollow cylindrical rotor capped at one end and having the other end open, the open end communicating with said means for maintaining reduced air pressure through an essentially air-tight seal with rotational clearance relative to the outer surface of the rotor adjacent the seal; communication between the hollow interior of the rotor operating under reduced air pressure and the fiber spinning zone of the outer rotor surface operating at normal air pressure provided by a screen-covered circumferential slit, said slit occupying an arcuate portion of at least about 45 degrees on the rotor surface within the spinning area, said rotor provided with a cylindrical yarn passageway within the capped end of the rotor, said yarn passageway originating as a substantially circular opening on the outer surface of the rotor adjacent to and on the same cylinder circumference as the screened slit but not communicating therewith, the origin of the yarn passageway being spaced from the screened slit by not more than 180° of arc measured on the rotor surface from the rotational leading edge of the screened slit, said yarn passageway extending in a smooth direct path from its origin on the rotor surface down through the capped portion of the rotor and terminating as a circular opening at the center of rotation of the capped end of the rotor.

2. The spinning machine of claim 1 in combination with a yarn false twisting device, said yarn false twisting device positioned in advance of the means for withdrawing spun fiber yarn and said yarn false twisting device operating to introduce temporary additional twist to the spun fiber yarn emerging from the yarn passageway of the rotor.

3. A spinning machine for preparing spun fiber yarn from staple length fiber comprising in combination, means defining a generally cylindrical spinning chamber provided with an unspun fiber inlet port integral with a side wall of the spinning chamber and communicating with the interior of the spinning chamber, a hollow spinning spindle rotatably mounted lengthwise inside the spinning chamber, extended portions of the spinning spindle projecting with rotational clearance from each end of the cylindrical spinning chamber, means for supporting and means for rotating the spinning spindle, means for maintaining a reduced air pressure within the interior of the spinning spindle, means for advancing unspun fiber to the inlet port of the spinning chamber and means for withdrawing spun fiber yarn from one end of the spinning spindle exterior of the spinning chamber; said spinning spindle comprising a hollow rotor capped at one end and having one end open, the open end communicating with the reduced air pressure means through an essentially air-tight seal providing rotational clearance relative to the seal and the rotor surface adjacent the seal; communication between the hollow interior of the rotor which operates at reduced air pressure and the outer surface of the said rotor within the confines of the spinning chamber which operates at normal air pressure provided by a screen-covered circumferential slit occupying an arcuate portion no more than about 45 degrees of the rotor surface; said rotor provided with a cylindrical spun yarn passageway within the capped end, the spun yarn passageway originating as a substantially circular opening on the rotor outer surface adjacent the screened slit and on the same rotor circumference as the screened slit but not communicating therewith, the space between the screened slit and the origin of the spun yarn passageway being not more than about 180° of arc measured on the rotor surface from the rotational leading edge of the screened slit; said yarn passageway extending in a smooth direct path from its origin on the rotor outer surface adjacent the screened slit down through the capped portion of the rotor and terminating as a circular opening at the center of rotation of the capped end of the rotor exterior of the spinning chamber.

4. The spinning machine of claim 3 wherein the spinning chamber is defined by a plurality of grid bars; said grid bars arranged parallel to the rotor axis and parallel to one another, spaced relative to the periphery of the rotor surface at a distance not exceeding about one-quarter inch and spaced relative one to another to allow free passage of air toward the rotor surface.

5. The spinning machine of claim 3 in combination with a yarn false twisting device, said yarn false twisting device being located between the spun yarn passageway circular opening and the means for withdrawing spun yarn, the yarn false twisting device operating to introduce temporary additional twist to the yarn being withdrawn from the spinning spindle.

6. The spinning machine of claim 3 wherein the curved interior wall of the spinning chamber is provided with at least one convex projection longitudinally disposed parallel the spinning spindle and directed outward from the wall of the spinning chamber toward the surface of the spinning spindle, said projection flanking at least the spinning area of the spindle with lateral clearance relative to the spindle outer surface within the spinning zone of not more than about one-quarter inch.

7. The spinning machine of claim 6 provided with a vacuum take-off from the spinning chamber adjacent the spinning zone of the spindle to remove trash and short fibers, the vacuum take-off operating to reduce air-pressure within the spinning chamber relative to normal atmospheric pressure but in no case operating to reduce air-pressure within the spinning chamber sufficiently to overcome air flow from the spinning chamber through the screened slit of the rotor into the interior of the spinning spindle.

8. A spinning machine for preparing spun fiber yarn from staple length fiber comprising in combination a cylindrical essentially hollow rotatably mounted spinning spindle, means for supporting and means for rotating the spinning spindle about its center axis, means for advancing unspun fiber to an area on the outer curved surface of the spinning spindle defined as the spinning zone and means for withdrawing spun fiber yarn from an end of the spinning spindle, a smooth surfaced idler roll rotatably mounted and supported in free rolling contact with the spinning zone of the spinning spindle, liquid container and conduit means to supply the interior of the spinning spindle with a liquid; said spinning spindle comprising a hollow cylindrical rotor capped at one end and having the other end open, the open end communicating with said liquid container and conduit means, communication between the hollow interior of the rotor and the outer surface of the rotor within the spinning zone provided by a porous pad capable of transmitting and being wetted by the liquid inside the hollow rotor; said porous pad occupying at least 45° of arc on an outer circumference of the rotor within the spinning zone, the porous pad contacting the said idler roll once during each revolution of the rotor; said rotor provided with a cylindrical yarn passageway within the capped end of the rotor; said yarn passageway originating as a substantially circular opening on the outer surface of the rotor adjacent to and on the same cylinder circumference as the porous pad but not communicating therewith, the origin of the yarn passageway being spaced from the porous pad by not more than 180° of arc measured on the rotor surface from the rotational leading edge of the porous pad and said yarn passageway extending in a smooth direct path from its origin on the rotor surface down through the capped portion of the rotor and terminating as a circular opening at the center of rotation of the capped end of the rotor.

9. The spinning machine of claim 8 wherein the smooth surfaced idler roll is covered with a non-wettable and a fiber non-adherent material.

10. The spinning machine of claim 8 in combination with a yarn false twisting device, said yarn false twisting device being located between the spun yarn passageway outlet and the means for withdrawing spun yarn, the yarn false twisting device operating to introduce temporary additional twist to the yarn being withdrawn from the spinning machine.

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