Aug. 7, 1951 C. PENNATI 2,563,187

VARIABLE SPEED ROTATING RING FOR SPINNING MACHINES

Filed March 2, 1951 2 Sheets-Sheet 1

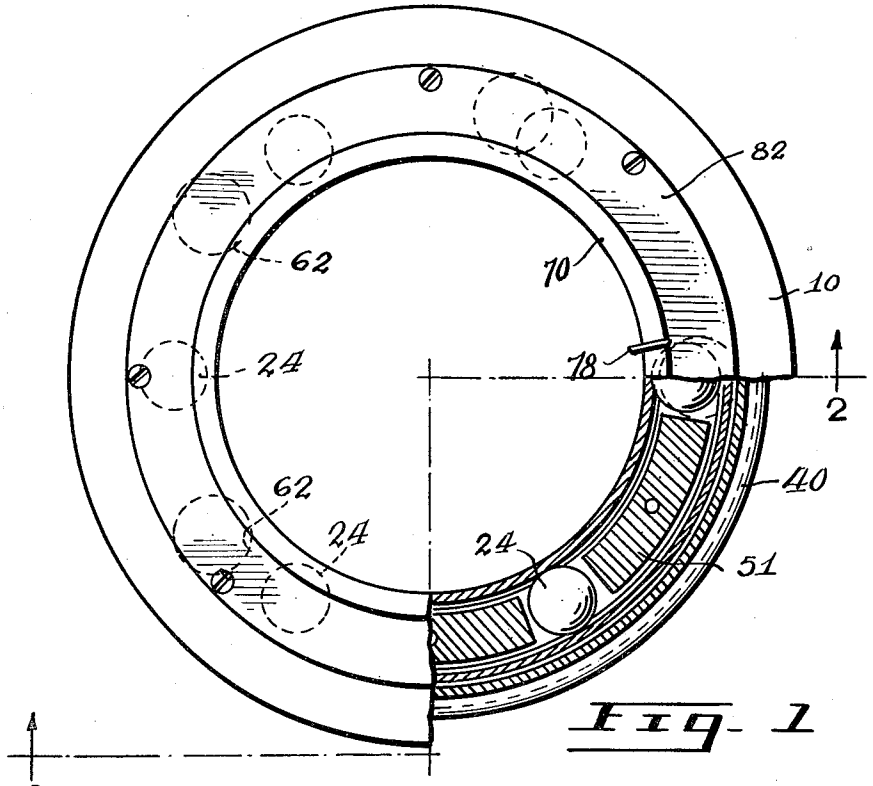


Fig. 1

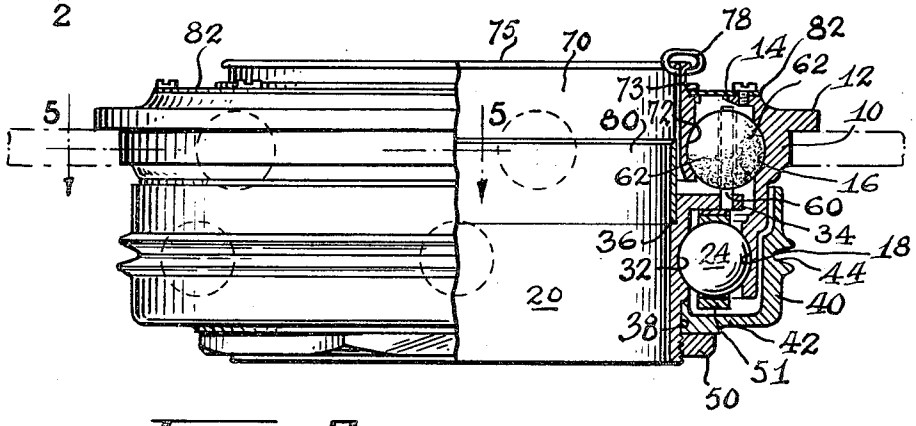


Fig. 2

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Aug. 7, 1951 C. PENNATI 2,563,187

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Filed March 2, 1951 2 Sheets-Sheet 2

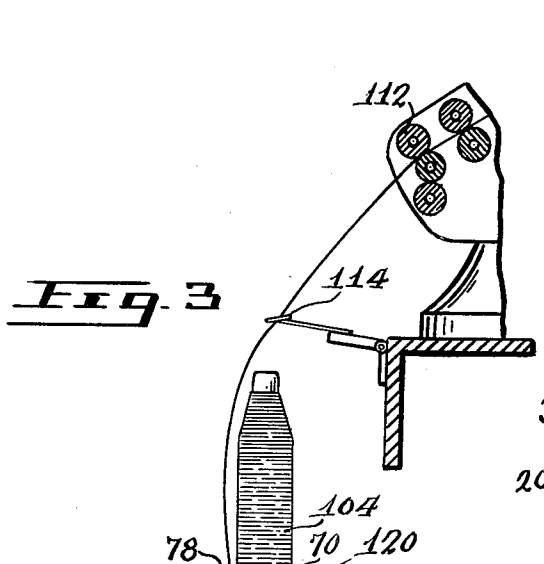


Fig. 3

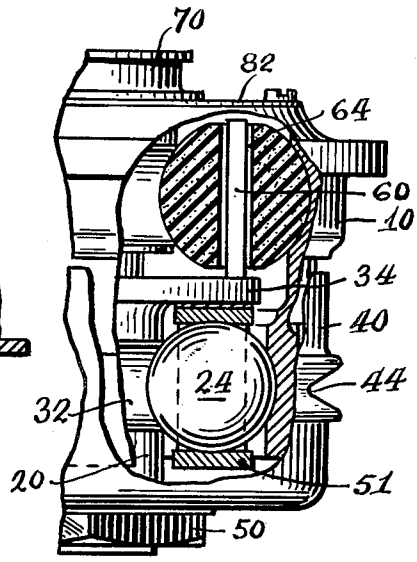


Fig. 4

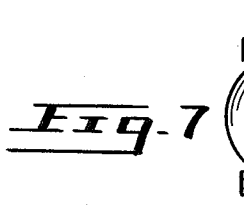


Fig. 7

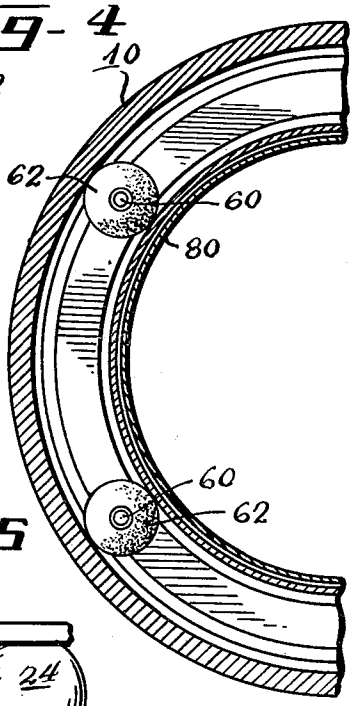


Fig. 5

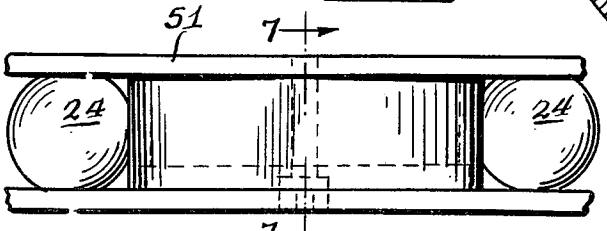


Fig. 6

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Patented Aug. 7, 1951

2,563,187

UNITED STATES PATENT OFFICE

2,563,187

VARIABLE-SPEED ROTATING RING FOR SPINNING MACHINES

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Application March 2, 1951, Serial No. 213,502

9 Claims. (Cl. 57—124)

1

The present invention relates to improvements in textile ring spinning frames.

In operation of converting roving into yarn in the textile industry, the spinning machine stretches out or thins the roving to a predetermined size, adds the necessary twist to give it the required strength and also winds the finished yarn on suitable spools or bobbins.

In ring spinning, the twist is applied to the yarn by the combined action of the spindle on which the bobbin is supported, the traveller, and the ring. The spindle, and consequently the bobbin is rotated at high speed. The traveller fits loosely over the upper flange of the ring so that it can travel about the circumferences of the ring under the pull of the yarn with the flange and the ring serving as a guiding track. In the usual set up, the yarn is threaded from the drafting rollers through a thread guide and through the traveller and wound on to the bobbin.

This action is well known in the art, and it is also well known that the weight of the traveller must be according to the strength of the yarn wound on if undue strain or excessive breakage is to be avoided. If the wrong weight or type of traveller is employed, the efficiency of the spinning equipment is considerably depreciated.

The production obtained from spinning equipment necessarily depends a great deal on the speed at which the spindles are rotated which in turn is determined to a great extent by the twist desired in the yarn, because the twist of the yarn determines the ratio between the front drafting roll speed and the spindle speed. For example, if the yarn is to be spun with a low twist the speed of the spindle must be such that the speed of the front draft roll is not too high for good spinning. However, if the twist desired is high enough to allow the front roll to be driven in high speed, the diameter of the ring is the determining factor. This is due to the fact that there are definite limits to the speed at which the traveller can travel about the ring without causing excessive heat by friction.

At the present time, while the spindles of modern spinning equipment are capable of speeds up to about 10,000 R. P. M., and the drafting rollers of proportionate speeds, the maximum speed at which the travellers can effectively maintain about the rings without burning by friction is about 4,500 feet per minute, which requires a spindle speed of about 7,640 R. P. M. or considerably less than the maximum capacity of the equipment. These figures are based on the use of a ring of 2¼ inches in diameter. Attempts

2

have been previously made to overcome these disadvantages by providing various modified types of travellers and rings but to date, none of these have proved entirely practical.

The present invention recognizes these problems and aims to provide a means whereby friction between traveller and ring is completely eliminated. In accordance with the invention, different weights of travellers for different yarns are no longer necessary and spinning frames can be run at maximum possible speeds with a minimum of breakage.

Accordingly, the invention is a ring assembly that is adapted to be mounted on any standard ring rail with little or no modification to existing equipment, and embodies means whereby the traveller supporting ring may be rotated relative to the spindle instead of allowing the traveller to slide about the ring. The ring assembly consists essentially of an outer annular member or casing adapted for connection to a standard ring rail, upper and lower inner annular members that are adapted to rotate within the outer annular member and driving means between the upper and lower inner annular members whereby rotation of the lower annular member through a drive connection from the regular spinning frame power source is adapted to rotate the upper inner annular member about the spindle at a proportionately increased speed relative to the speed of primary drive applied.

More specifically, a preferred construction of a ring assembly constructed in accordance with the present invention consists of a main outer annular member having an outer diameter substantially equal to that of a standard ring so that it will fit snugly in the usual ring rail opening. This main outer member includes an outstanding flange about the upper periphery which bears against the upper surface of the ring rail and also provides a means for fastening the ring assembly to the ring rail in the usual manner, generally by screws or spring clips.

The main outer member is of sufficient depth to extend below a standard ring rail when the assembly is mounted for operation and the lower inner annular member is mounted for rotation within this lower portion by means of a ball bearing race with the bearings engaged in grooves provided in the outer surface of the inner body and corresponding grooves provided in the inner surface of the outer body. The lower inner annular member also includes an outstanding annular flange about its upper periphery and a plurality of spherical members are mounted in

spaced apart relationship for rotation on this flange and to serve as the drive members in an epicyclic train.

The second upper annular member is mounted for rotation within the main outer member and above the lower inner annular member by engagement with the spherical friction drive members.

An annular dust cover is adapted to fit over the lower portion of the lower inner annular member and includes an upstanding outer flange that is adapted to extend outside of the lower portion of the main annular outer member. This annular cover member is retained in position and secured to the lower inner annular member by means of a threaded retaining ring. The upstanding outer flange of the annular cover member is provided with a V-shaped groove surrounding its outer periphery so as to provide a means of attaching a belt drive connection from the driving source of the spinning frame.

With this arrangement, rotation of the cover member consequently rotates the lower inner annular member within the fixed main outer annular member. This rotation is transmitted through the spherical friction driving members, and as these are maintained in frictional contact between the main outer member and the upper inner member, the inner member supporting the traveller is also rotated at a proportionately increase speed.

Having thus generally described the nature of the invention, particular reference will be made to the accompanying drawings showing a preferred embodiment by way of illustration, and in which:

Figure 1 is a top plan view of a rotary rings assembly constructed in accordance with the invention.

Figure 2 is a side elevation of the construction shown in Figure 1 with a portion as indicated along the line 2—2 of Figure 1 shown in section.

Figure 3 is a diagrammatic view illustrating the rotary ring assembled in accordance with the invention as it may be installed on a standard ring spinning frame.

Figure 4 is an enlarged fragmentary view partially in section to illustrate the construction and relative position of the friction drive members and bearing assembly.

Figure 5 is a sectional view in plan of a portion of the construction shown in Figure 2 along the line 5—5.

Figure 6 is an enlarged detail view in side elevation of a portion of the lower bearing assembly to illustrate the construction in more detail.

Figure 7 is a sectional view of Figure 6 along the line 7—7 illustrating the construction in more detail.

With particular reference to Figures 1, 2 and 4 of the drawings illustrating a preferred construction of a ring assembly constructed in accordance with the invention, 10 designates an outer annular member which provides the main casing of the assembly. The member 10 includes an outwardly extending peripheral flange 12, an inwardly extending peripheral flange 14 and on the inner face, spaced apart parallel grooves 16, 18. An inner annular member 20 is mounted for rotation within the lower portion of the member 10 by means of a ball race assembly. The bearings 24 of the bearing assembly are engaged in the lower groove 18 of

the body 10 and a corresponding groove 32 provided in the outer face of the inner member 20. The member 20 includes an outwardly extending peripheral flange 34 and upper 36 and lower 38 annular recesses positioned on the inner and outer faces respectively.

An annular cover member 40 having an inwardly extending flange 42 fits over the lower end of the member 20 with the inner peripheral edge of the flange 42 fitting snugly into the recess 38. The member 40 is retained in position by means of a threaded locking ring 50 engaged with the suitably threaded lower marginal edge of the member 20.

The main portion of the cover member 40 extends upwardly exteriorly of and in spaced apart relationship from the lower portion of the main outer body 10 and is provided with a V-groove channel 44 so as to provide a means for attaching a driving belt. The bearing retaining race 51 of the ball bearing assembly fits between the flange 42 of the cover member 40 and the flange 34 of the body member 20 so that the member 20 is free to rotate within the outer member 10 under the influence of a drive applied to the cover member 40.

A plurality of vertical shafts 60 are mounted in equally spaced apart relationship about the upper surface of the flange 34 of the inner member 20 and a spherical friction drive member 62 is mounted for free rotation on each of the shafts 60 by means of a central boring 64.

An upper annular member 70 constituting the traveller supporting ring is mounted for rotation within and in spaced apart relationship from the outer body 10 by the engagement of a groove 72 provided in the outer surface of the member 70 with the drive members 62. The drive members 62 fit snugly between the groove 18 on the outer body 10 and the groove 72 of the member 70 so that rotation of the body member 20 is transmitted through the drive members 62 to the upper member 70 in the manner of an epicyclic train. In order to reduce weight and friction, the drive members 62 are preferably made of a wear-resistant non-metallic material, for example, nylon.

A shielding ring or skirt 80 is fitted snugly into the recess 36 of the inner member 20 so as to prevent dust or lint from access to the driving members 62. A two-piece dust cover plate 82 is secured to the inner flange 14 of the body member 10 so as to engage with an annular slot 73 provided in the member 70 in order to also shield the driving members 62 and their running grooves. The upper annular member 70 is provided with an outstanding peripheral flange 75 on which a traveller 76 is engaged. With this arrangement the spherical drive members 62 which bear the attrition from the driving source, turn at a diminished speed, approximately 2/5 relative to the speed of the upper annular member or traveller supporting ring 70. This greatly reduces wear and friction as the member 70 receives its drive only through direct contact with the drive member 62, vibration is reduced to a minimum avoiding possible irregularity to the motion of the traveller supporting ring and consequently to the tension of yarn wound on.

With particular reference to Figure 3 and in order to more fully illustrate the operation of the present device a ring assembly constructed in accordance with the invention is shown as being mounted on the ring rail of a spinning frame. The usual structure of the spinning frame in-

cludes a ring rail 100 which is supported and reciprocated in the building motion by a plurality of pokers 102 so that the ring mounted in the rail is moved up and down relative to the bobbin 104 supported and rotated by a spindle 106. The spindle 106 is mounted in suitable bearings to the spinning frame 108 and is driven by a tape belt 110 from the usual power source. The drafting rollers 112 are mounted above the spindle and the roving is fed through a thread guide 114, through the traveller 78 and onto the bobbin.

The present ring assembly which we shall designate as 120 is inserted in the usual ring rail opening with the flange 12 of the member 10 resting on the ring rail and being secured thereto by suitable screws or spring clips. A belt drive 122, which can be either a cord or tape, is engaged with the V-belt groove 44 of the member 40 so that the ring assembly is driven from the usual spindle rotating power source. With this arrangement, as the ring rail 100 is reciprocated up and down in the usual building motion about the bobbin 104, the inner member 70 carrying the traveller 78 is rotated about the bobbin at a speed proportionate to the speed at which the bobbin is rotating. Preferably, the circumferential speed of the ring member 70 is such that the traveller will lag slightly behind the bobbin so as to obtain the desired tension.

As the diameter of the inner annular member 70 or traveller supporting ring is necessarily greater than that of the spindle supporting the bobbin, and the V-groove drive connection 44 on the cover member 40 is also of greater diameter than that of the pulley driving the spindle, the difference between the circumferential speeds of the bobbin and the ring is compensated by the epicyclic drive arrangement driven through the spherical friction driving members 62. This is accomplished by making the spheres 62 of sufficient diameter relative to the inner and outer annular members 10 and 70 so that one revolution of the lower inner member 20, through the V-belt groove in the cover member 40, will cause an increased number of revolutions of the inner member 70. On experiment, it has been found that on the standard ring frames, a preferred proportional ratio is about 2.5 to 1. It will be understood, of course, that the ratio can be adjusted to suit varying diameters of rings.

Thus it will be seen that as the traveller no longer has to move about the ring, friction is eliminated and the spinning frame can be operated to maximum possible speeds, the only limitation being the speed at which the drafting rolls can deliver the roving to the spindle. Further, as the traveller supporting ring of the present ring assembly follows the bobbin instead of being pulled by the yarn it is no longer necessary to use different weight travellers for different weight yarns. Tension on the yarn can be regulated as desired by controlling the amount of lag between traveller and yarn wound on so that even the finest yarn can be wound on with the minimum of breakage and subsequent stoppage of production.

I claim:

1. A ring assembly adapted for mounting on a spinning frame ring rail comprising, an outer annular body adapted for stationary attachment to said ring rail, upper and lower inner annular bodies mounted for rotary movement within said outer annular body, drive means between said upper and lower inner annular bodies and said outer annular body adapted to rotatably drive said upper inner annular body and a drive connection on said lower inner annular body.

2. A ring assembly as claimed in claim 1, wherein the drive means between said upper and lower inner annular bodies and said outer annular body comprises an epicyclic train.

3. A ring assembly as claimed in claim 1, wherein said upper inner annular body is supported for rotary movement within said outer annular body by engagement with said drive means.

4. A ring assembly adapted for mounting on a spinning frame ring rail, comprising, an outer annular body, a first inner annular body mounted for rotary movement within said outer body, a second inner annular body mounted for rotary movement within said outer annular body beneath said first inner annular body, bearing means between said second inner annular body and said outer annular body, a plurality of drive members mounted for rotation on said second inner annular body and between said first inner annular body and said annular outer body, and means on said second inner annular body providing a drive connection thereto.

5. A ring assembly as claimed in claim 4, wherein said first inner annular body is supported for rotation within said outer annular body by engagement with said drive members.

6. A ring assembly as claimed in claim 4, wherein said second inner annular body includes an outstanding flange about the upper peripheral edge and said drive members are mounted for rotation in equally spaced apart relationship about said flange, each of said driving members being of spherical form in cross section and being mounted for rotation on a vertical axle extending from said second inner annular body flange.

7. A ring assembly as claimed in claim 2, wherein said drive connecting means on said second inner annular body comprises an annular cover member, said cover member having an inwardly extending flange adapted to fit snugly over the lower margin of said second inner annular body, a main body of said annular cover member extending upwardly from said inner flange so as to be positioned exteriorly of the lower portion of said outer annular body, said cover member body portion having a V-shaped groove about the outer periphery to accommodate a driving belt.

8. A ring assembly adapted for mounting on a textile spinning frame ring rail, comprising, an outer annular body having spaced apart parallel annular grooves about the inner surface, upper and lower inner annular bodies mounted for rotary movement within said outer annular body, said lower inner annular body having an outstanding flange about the upper periphery and an annular groove about the outer surface beneath said outstanding flange, a ball bearing race between said outer annular body and said lower inner annular body with the bearings of said race engaged in the lower groove in said inner annular body supporting said inner body for rotation within said outer body, a plurality of axles mounted in equally spaced apart relationship about and extending vertically from the outstanding flange of said lower inner annular body and a spherical drive member mounted for rotation on each of said axles, said upper inner annular body having a groove about the outer surface with said spherical drive members engaged in the upper groove of said outer annular body and the said groove of said upper inner

annular body, and drive connecting means on said lower inner annular body, whereby, said upper inner annular body is supported for rotation within said outer annular body and rotation of said lower inner annular body transmitted through said spherical drive members is adapted to cause rotation of said upper inner annular body relative to said outer annular body in the manner of an epicyclic train.

9. A ring assembly as claimed in claim 8, wherein said drive connecting means on said second inner annular body comprises an annular cover member, said cover member having an in-

wardly extending flange adapted to fit snugly over the lower margin of said lower inner annular body, the main body of said annular cover member extending upwardly from said inner flange so as to be disposed exteriorly of the lower portion of said outer annular body, said annular cover member being provided with a V-shaped groove about the outer periphery to accommodate a driving belt.

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No references cited.