March 24, 1936. G. KUWADA 2,034,762

SPINNING RING

Filed May 15, 1935

Fig. 1.

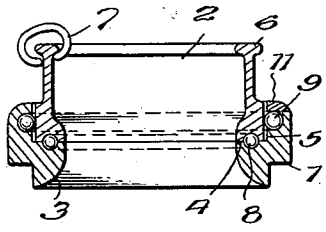


Fig. 2.

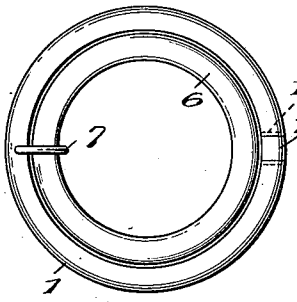


Fig. 3.

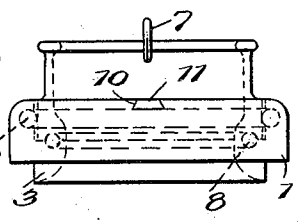


Fig. 4.

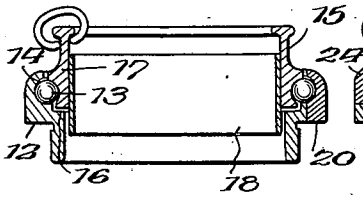


Fig. 6.

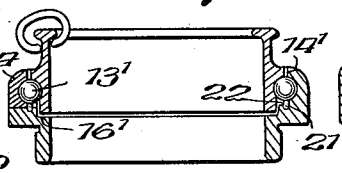


Fig. 8.

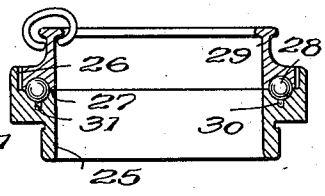


Fig. 5.

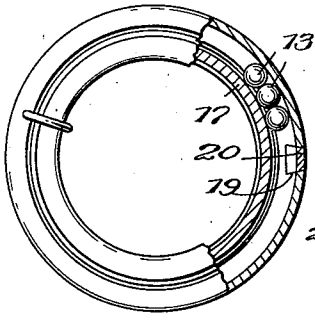


Fig. 7.

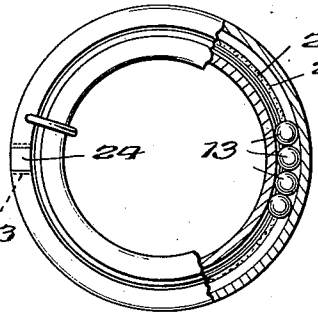
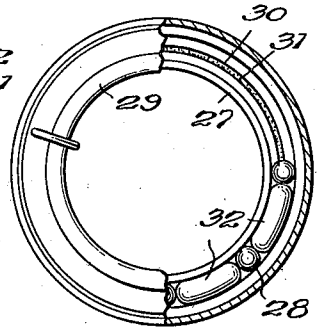


Fig. 9.



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Patented Mar. 24, 1936

2,034,762

UNITED STATES PATENT OFFICE

2,034,762

SPINNING RING

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Application May 15, 1935, Serial No. 21,647
In Japan January 5, 1934

4 Claims. (Cl. 118—59)

This invention relates to apparatus for use in the spinning of textile yarns and particularly to spinning rings which are capable of moving relative to the ring-rail or to holders in the ring-rail which receive the spinning rings.

In the spinning of textile yarns, the yarn passes from the drawing rolls through spinning rings in the ring-rail of the spinning machine and onto bobbin spindles which rotate at high speed. The spinning ring is commonly flanged and provided with a traveler which bears frictionally thereon and through which the yarn passes on its way to the bobbin spindle. The rotation of the bobbin spindle gives the desired twist to the yarn and the friction between the traveler and the spinning ring as the traveler runs around the flange thereof causes a more or less definite lag of the traveler, and consequently of the yarn, with respect to the rotation of the bobbin spindle, whereby the yarn is wound upon the spindle as well as twisted by the rotation of the spindle. If there were no friction between the traveler and the flange of the spinning ring on which it runs the traveler would keep pace with the rotation of the spindle and the yarn would be twisted but would not be wound onto the spindle.

In spinning machines as now generally used the spinning rings are rigidly secured either in the ring-rail or else in holders which in turn are rigidly secured to the ring-rail, with the result that the spinning ring never can move about its own center with the traveler. The use of such rigidly secured spinning rings is objectionable inasmuch as at times the spinning rings should be free to move around with the traveler to eliminate strain on the yarn and to reduce the friction between the flange of the spinning ring and the traveler.

Although suitable devices are usually interposed between the drawing rolls and the bobbin spindles for tensioning the yarn, the high lineal speed of the yarn and other factors incident to the high speed at which the spinning machines operate prevent the tensioning devices from maintaining the desired tension on the yarn at all times, and whenever the tension on the yarn varies the speed of the traveler about the spinning ring will vary. When the tension on the yarn is suddenly increased the traveler will be jerked forward on the spinning ring, and when the tension is decreased there will be a momentary slackening of the force which the yarn applies to the traveler and it will lag to a greater extent. In a like manner any variance of the thickness of the yarn will cause a jerking forward, or greater lagging of the traveler on the flange of the spinning ring.

Any sudden change of speed of the traveler about the flange of the spinning ring has a triple effect. Firstly, it places additional strain on the yarn and if the yarn is one which does not possess a substantial tensile strength a sudden increase of the tension thereon, with the resulting jerking forward of the traveler, may cause breakage of the yarn. Secondly, it causes excessive abrasion and wear on the surface of the spinning ring against the traveler bars; and thirdly, it causes excessive wear on the traveler. As a matter of fact, the friction caused by the continued back-and-forth movement of the traveler on the spinning ring due to variance in the tension on the yarn or to variance in the thickness of the yarn, is so great that it is the usual practice to employ travelers of very light weight, particularly when yarn of light count is being spun, although it is well recognized that the wear on light travelers is more rapid and light travelers are not as satisfactory, otherwise, as heavier travelers, at least in the spinning of certain types of yarns.

With the above and other considerations in mind the present invention contemplates a spinning ring which is so mounted that it may move relative to the ring-rail, or the holder for the spinning ring, and under certain conditions move with the traveler to smooth out the unevenness of its movement, with the result that breakage of the yarn and frictional wear on the traveler and spinning ring are reduced to a minimum. Such relative movement of the spinning ring relative to the ring-rail preferably is obtained by mounting the spinning ring on anti-friction ball bearings in a holder, which in turn is rigidly secured in suitable openings in the ring-rail.

The invention will be described further in connection with the accompanying drawing, but it is to be understood that such further description and disclosure is by way of exemplification and that the invention is not limited thereby, except as may be pointed out specifically in the appended claims.

In the drawing, Fig. 1 is a cross-sectional view of a spinning ring and its holder embodying the present invention,

Figs. 2 and 3, respectively, are plan and elevational views of the spinning ring and holder shown in Fig. 1,

Figs. 4 and 5, respectively, are a cross-sectional view and a plan view partly in section of a modified form of the invention,

Figs. 6 and 7, respectively, are a cross-sectional

view and a plan view, partly in section, of another modification, and

Figs. 8 and 9, respectively, are a cross-sectional view and a plan view, partly in section, of a still further modification.

Referring first to the embodiment of the invention shown in Figs. 1 to 3, a holder 1 for the spinning ring 2 is exteriorly shouldered at its lower edge to provide a reduced portion 3, which is adapted to be received and rigidly retained in suitable openings in the ring-rail of the spinning machine (not shown). The upper portion of the holder is interiorly shouldered to provide a receiving space defined by a horizontal face 4 and a vertical face 5 for the lower edge of the spinning ring 2. The upper edge of the spinning ring 2 has the usual flange 6 for retaining the traveler 7 during the spinning of the yarn.

The horizontal face 4 of the holder has an annular groove formed therein for anti-friction balls 8 on which the holder 2 rests. The lower face of the bottom edge of the spinning ring is also grooved so that its groove and the groove in the horizontal face 4 provide a substantially circular ball race for the balls 8. The vertical face 5 has a similar annular groove for the balls 9 against which the sides of the lower portion of the ring 2 bear. However, the outer vertical wall of the lower edge of the spinning ring 2 is not grooved to receive the balls 9 and as those balls bear against the outer vertical wall of the spinning ring the ring is free to be lifted to a slight extent wherever a sudden unevenness in the yarn causes a stress in an upward direction. Under such conditions a slight lifting of the ring relative to its holder will ease the strain on the yarn.

The anti-friction balls 8 and 9 provide a ball bearing mounting for the ring 2 which not only permits the ring to lift slightly as just described but also permits it to rotate freely about its own center and over the balls 8 which revolve and rotate in the grooves provided for them in the horizontal face 4 of the holder and in the lower face of the ring.

The balls 8 may be put into the groove before the ring 2 is inserted into the holder. The balls 9 preferably are inserted after the ring has been seated on the balls 8 by introducing them through a horizontal dovetailed slot 10 in the upper flange of the holder 1. A dovetailed cover 11 fits firmly in the dovetailed slot 10 and closes it after a suitable number of the balls 9 have been introduced.

In Figs. 4 and 5 the holder 12 has an annular groove for antifriction balls 13 formed in its vertical face 14, but no balls are inserted between the lower edge of the spinning ring 15 and the horizontal face 16 of the holder. However, the lower portion of the ring 15 has an outwardly extending flange 17 which overlies and rests on the balls 13 to provide a ball bearing mounting for the ring 15. The lower portion of the ring 15 just beneath the flange 17 is slightly grooved to cooperate with the groove in the vertical face 14 of the holder 12 to provide an annular ball race for the balls 13. The grooves in the holder 12 and the ring 15 which form the ball race preferably have a radius slightly larger than the radius of the balls to permit a small amount of play between the holder and the ring which will allow the ring to be lifted to a slight extent whenever a sudden unevenness of the yarn causes a stress in an upward direction.

As is clearly shown in Fig. 4, the vertical face 14 extends further inwardly at the bottom than at the top so that the lower edge of the groove for the balls 13 extends inwardly a distance sufficient to form a substantially horizontal bearing surface for the balls and so that the line of division between the grooves in the vertical face 14 and in the lower portion of the ring 17 is inclined to the vertical.

The lower portion of the ring 15 is spaced slightly from the vertical face 14 and the horizontal face 16 of the holder and in order that lint from the yarn may not find its way into the ball race and thereby interfere with the free movement of the balls, an annular sleeve 18 of thin metal is snugly fitted to the interior of the ring 15 and extends over the space between the lower edge of the ring and the horizontal face 16 of the holder.

The lower edge of the ring 18 is spaced slightly from the holder 12 so that there will be no friction between it and the holder as the ring rotates about its center.

In this form of the invention, the upper outer flange of the holder 12 is provided with a vertical dovetailed slot 19 through which the balls 13 may be introduced into the ball race. After a suitable number of the balls have been introduced the slot 19 is closed by a dovetailed cover 20.

The ring and holder shown in Figs. 6 and 7 is substantially the same as that shown in Figs. 4 and 5. However, the bottom of the groove formed in the vertical face 14' is provided with an annular groove 21 in which there is an oil-soaked wick 22 for supplying the necessary lubrication for the balls 13'. The provision of means for the lubrication of the balls is particularly desirable where yarns of superior tension are being spun.

The dovetailed slot 23 in this embodiment of the invention is cut horizontally above and substantially down to the horizontal face 16' and the cover 24 is fitted firmly therein.

In Figs. 8 and 9 the holder 25 has a smooth vertical face 26 and a grooved horizontal face 27 into which the balls 28 are received. The spinning ring 29 has its lower portion received within the space defined by the vertical face 26 and its lower face is grooved to cooperate with the groove in the horizontal face 27 of the holder to provide an annular ball race for the balls 28. As in Figs. 1 to 3, the ring 29 rests by gravity on the balls 28 and is free to be lifted vertically by any unevenness in the yarn.

The horizontal face 27 of the holder 25, like the corresponding face of the holder in Figs. 6 and 7, is provided with a groove 30 in which is placed an oil-soaked lubricating wick 31. In this embodiment of the invention the ball race formed between the grooves in the lower face of the ring 29 and the horizontal face 27 of the holder is not filled entirely by anti-friction balls, but more or less short sections of round wire 32, arcuate in plan are interspersed between the balls 28. The use of such short sections of wire is particularly desirable where the rings are found to rotate more rapidly than is desired, as they will retard movement of the balls, and consequently rotation of the ring 29.

The operation of the rings of the several embodiments of the invention is substantially the same, and the particular form which is most desirable will depend upon the particular conditions of spinning.

In each form of the invention the rotation of

the bobbin spindle causes the traveler to run around the flange of the spinning ring and the friction between the traveler and the ring flange causes a more or less constant lagging of the traveler which permits the yarn to be wound upon the spindle. If there is a sudden increase in the tension on the yarn, or if there is a sudden increase in the thickness of the yarn, either of which normally would cause the traveler to be jerked forward, the spinning ring, due to its ball bearing mounting will be pulled around by the traveler to a limited extent and the strain on the yarn and increased friction and wear on the outer ring and traveler will to a large extent be eliminated and a substantially uniform movement of the traveler on the ring flange will be obtained. In a like manner, the ring is free to move in the reverse direction if there is a decrease of the tension on the yarn, or if the thickness of the yarn suddenly decreases. As the friction between the traveler and the ring is reduced to a minimum it is practical to use a heavier traveler, which naturally will wear longer and permit more continuous operation of the spinning machine.

This application is filed as a continuation in part of my copending application Serial No. 740,936, filed August 22, 1934.

I claim:

1. In a spinning ring, a ring holder having interior horizontal and vertical faces each of which is formed with an annular groove therein, a ring having a portion thereof received within said holder and having an annular groove in the bottom thereof corresponding to the annular groove in the horizontal face of the ring holder, and with said latter groove forming a ball race, a series of balls in said ball race, said balls being free to revolve and circulate in said race and forming a ball bearing mounting for the ring, and a series of balls positioned in the groove in said interior vertical face of the holder and providing a ball bearing for the side of the ring holder.

2. In a spinning ring, a ring holder having an internal vertical wall having an annular groove formed therein, a ring having a portion received within said ring holder and having an annular groove on its exterior wall opposite the groove in the vertical face of the ring holder, said grooves cooperating to form a ball race, a series of balls in said ball race for forming a ball bearing mounting for the ring, whereby the ring is free to rotate about its own center, the radius of the grooves in the ring being somewhat larger than the radius of the balls, whereby said ring is capable of having a limited vertical movement.

3. In a spinning ring, a ring holder having an annular groove therein, a series of balls in said groove, a ring mounted in said ring holder and supported on said balls, said ring holder having an auxiliary groove communicating with the groove for the balls, and an oil wick positioned in said auxiliary groove.

4. In a spinning ring, a ring holder having an annular groove formed therein, a series of balls and elongated members arcuate in plan in said groove, and a ring mounted in said holder and supported on said balls and elongated members.

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