Nov. 14, 1950 F. H. STEARNS 2,530,094

DRAWING ROLL

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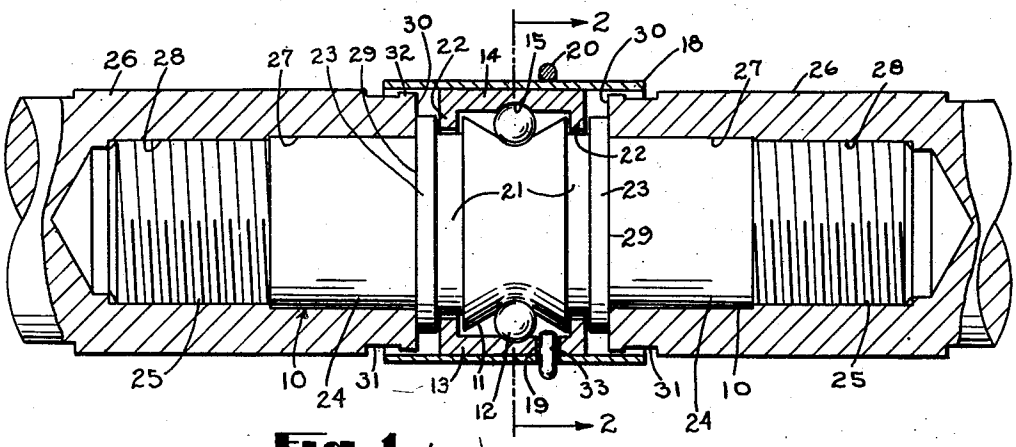


Fig. 1

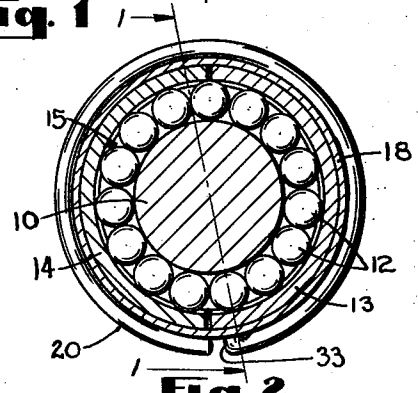


Fig. 2

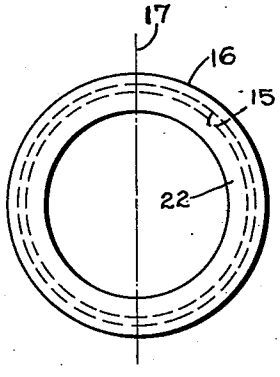


Fig. 3

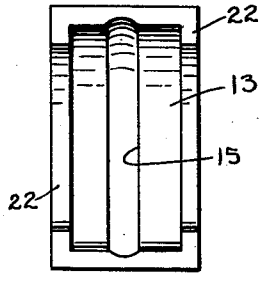


Fig. 4

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DRAWING ROLL

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8 Claims. (Cl. 19—141)

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The present invention relates to drawing rolls of the type employed in textile machinery, and more particularly to the so-called bottom roll type which cooperates with a top roll in stretching and reducing the size of yarn threads which are passed between such rolls.

As is well known to those skilled in the art, one form of bottom roll is applied to a portion of a drawframe, which provides a series of pairs of cooperating top rolls, between which top and bottom rolls lengths of fibrous material, in the form of threads or slivers, are adapted to be drawn.

These lower or bottom rolls usually are provided with fluted or corrugated cylindrical surfaces, while the upper or top rolls are provided with cylindrical surfaces covered with a non-metallic material with reduced end portions therebetween. The top rolls are normally arranged in pairs and may be maintained in position to engage the lower rolls by means of cap bars which receive the opposite end portions of each pair of top rolls. The intermediate neck portion of the top roll has a saddle member applied on the top surface of the neck for the purpose of properly loading the top roll. The fluted portions of the bottom roll are also arranged in pairs so as to be positioned directly beneath the corresponding portions of the top rolls. The bottom rolls are rotatably mounted within the drawframe, and the fibrous slivers are delivered to the oppositely disposed top and bottom rolls so as to be drawn therebetween, due to the fact that the bottom roll is positively driven.

Bottom rolls of the above noted type have usually been formed with plain bearing surfaces for journaling the roll within the drawframe. It has been found that such plain bearing surfaces are relatively short-lived, thus requiring frequent bottom roll replacements. In the past, various lubricating expedients have been employed to reduced the friction and heat set up at these bearing areas, with a view toward lessening the bearing wear. However, such lubricating expedients have not been successful, for the reason that any excess lubricant delivered to the bearing area will tend to work out to the fluted sections of the roll, thus ultimately coating the fibrous material as the same is drawn between the top and bottom rolls. Furthermore, the presence of such free lubricant upon the rolls will enhance the tendency of the rolls to collect various foreign substances thereon, such as fly, with a result that the friction will be increased

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and the efficiency of the roll correspondingly decreased.

At various times in the past, many attempts have also been made to construct bottom rolls with various types of antifriction devices, for the purpose of reducing the friction set up between the rolls and their supporting frames. However, these antifriction devices soon become clogged with fly and other foreign substances, so that the bearings used proved to be of no appreciable advantage.

It is, therefore, the primary object of the present invention to provide a bottom roll construction in which the above noted shortcomings are eliminated.

A further object of the present invention is to provide a drawing roll device with a novel antifriction bearing structure which is so sealed that foreign substances cannot gain entrance therein.

A further object of this invention is to provide a bottom roll construction with a coupling means for accurately securing pairs of roll members together and, at the same time, providing an antifriction bearing means for supporting the roll within a drawframe.

Another object of this invention is to provide such a bottom roll coupling unit with a novel antifriction bearing which may be readily lubricated, but which, at the same time, is provided with means for preventing the escape of such lubricant.

A still further object of this invention is to provide a bottom roll with an antifriction bearing which is so designed that the outside bearing diameter may be maintained at a minimum value, while, at the same time, permitting the arbor diameter of the bottom roll to be of a maximum value, to the end that the strength and ruggedness of the arbor in torsion is comparable to that of bottom rolls of the type utilizing plain bearings.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Fig. 1 represents a longitudinal sectional view of a bottom roll structure in which the present invention is incorporated, the section being along

the line 1—1 of Fig. 2, looking in the direction of the arrows.

Fig. 2 represents a vertical sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 represents an end view of a hollow cylinder which is adapted to be fractured longitudinally of itself, thereby to form two semicylindrical outer race elements which are used in conjunction with the present invention.

Fig. 4 represents a side view of one of the semicylindrical bearing races employed in the present invention.

Referring particularly to Figs. 1 and 2, the present invention comprises a steel arbor structure 10 having intermediate its end portions a hardened trough-shaped neck 11 about which a split ball-bearing structure is adapted to be provided. More specifically, this ball-bearing unit comprises a series of spherical balls 12, 12 which encircle the groove 11 in a ball-to-ball contacting relation. In order to confine these balls about the neck 11 in this relation, there are provided a pair of hardened complementary race elements 13 and 14. These races are identical in structure, and each is provided with one-half of an inner circumferential groove 15 which is particularly adapted for receiving the balls 12, 12. As may be best seen in Fig. 2, the semicylindrical race elements 13 and 14 are adapted to be assembled together in a manner such that they form a substantially hollow cylindrical bearing-confining outer race ring which cooperates with the inner neck or race 11 in maintaining the bearing balls 12, 12 in their proper positions.

Referring particularly to Figs. 3 and 4, it is to be understood that the race elements 13 and 14 are initially made as a single hollow cylindrical structure which is generally designated by the numeral 16. A second step in the forming of this composite outer bearing-retaining race is to form the groove 15 within the inner wall portion of the cylinder 16. Upon the completion of this groove 15, the cylinder 16 is then fractured lengthwise of itself along a line 17, thus forming the two semicylindrical race elements 13 and 14. Fig. 4 represents a side view of the race element 13 which is, of course, identical with the element 14.

After the race elements 13 and 14 are assembled about the bearing balls 12, 12 in a manner as indicated in Figs. 1 and 2, a cylindrical sleeve 18 is fitted snugly over the peripheries of the race elements, thereby completing the ball-bearing unit. Such a structure will permit the outside diameter of the bearing unit to be maintained at a minimum value while at the same time permitting the bearing portion of the arbor to be constructed with a relatively large diameter to the end that the arbor will possess great strength.

Still referring to Fig. 1, it is to be particularly noted that the arbor 10 is provided with a pair of longitudinally spaced annular grooves 21, 21 which are disposed adjacent the neck portion 11 for the purpose of receiving therein inwardly extending flange portions 22, 22 of the outer race elements 13 and 14. This particular construction is designed to prevent the egress of lubricant from the ball-bearing area and also to prevent any foreign matter from entering this area. However, sufficient clearance is provided between the inner peripheral portions of the flanges 22, 22 and the circumferential grooves 21, 21, in order to prevent excessive engagement between these elements. It is to be particularly understood that these flanges 22, 22 also function to stiffen their respective raceway elements which are constructed with relatively thin wall portions, so as to maintain the outer diameter of the bearing unit at a minimum figure.

At either side of the neck portion of the arbor 10, there is provided an annular flange 23 having an outer diameter which is greater than the internal diameter of the bearing race flanges 22, 22. Adjacent each of the flanges 23, 23 there is provided a cylindrical bearing surface 24, the diameter of which is accurately maintained at a predetermined figure. Extending from each of these bearing surfaces 24, 24 is a threaded end portion which is designated by the numeral 25.

As may be particularly noted in Fig. 1, the above described arbor element 10 functions as a coupling member for a pair of bottom roll elements which are generally designated by the numerals 26, 26. These roll elements may be of conventional fluted design, and each is provided at its one end portion with a bore 27, the diameter of which is maintained concentric with the roll axis. Inwardly of the bore 27, each roll element is provided with an internal threaded section 28. Thus, the present arbor or coupling member is adapted to have its opposite end portions received within the roll openings so as to connect the two bottom roll sections 26, 26 together. More specifically, each threaded end portion 25 of the arbor is adapted to be received within a respective one of the threaded bores 28, while each of the bearing surfaces 24, 24 is adapted to be snugly received within a respective one of the roll bores 27. Since each of the bores 27, 27 is maintained at an accurate predetermined figure, the coupling member, when applied to the rolls, will maintain the rolls in a proper concentric axial relationship.

In order that the present type of coupling member may be used for securing a series of roll sections together, the distance between the outer faces 29, 29 of the flanges 23, 23 and the distance between the opposite end portions of any one roll section are maintained accurately at predetermined values. Thus, whenever such a coupling member is used for connecting a pair of roll elements together, the distance between the end faces 30, 30 of the roll elements 26 will be held at a predetermined value.

Still referring to Fig. 1, it is to be noted that each of the roll elements 26, 26 is provided adjacent its end portion with a circumferential groove 31. Also, it is to be noted that each of the opposite end portions of the sleeve 18 has its free end overhanging the center portion of a respective one of the grooves 31, 31, thereby to form a roof structure over a portion of each groove. Experience has shown that such an overhanging roof structure will prevent foreign matter, in the form of fly, from working its way between the slight clearance afforded between the inner circumferential wall of the sleeve and the outer circumferential wall portion 32 of the roll element. Instead, the fly will fall within the grooves 31, 31 and thereafter be thrown from the periphery of the rolls.

It is to be noted that the present bearing structure forms a pair of substantially annular shaped chambers between each of the roll faces 30 and its associated outer race bearing flange 22. In this connection, it is to be understood that in the event that some fly material does work its way past each of the grooves 31, 31 and beneath the end portions of the sleeve 18, it will be deposited within these annular chambers. It is within the contemplation of the present invention that this

small amount of fly will, due to the rotation of the arbor 10, tend to become intermatted and thus form an annular ring of fly. The fly, by thus forming in such a ring, will not tend to work its way into the grooves 21, 21 and in fact, this fly ring will function as a secondary seal to prevent any excess lubricant which may work its way around the grooves 21, 21 from passing outwardly from between the face portions of the rolls and the surrounding sleeve member 18.

In order to lubricate the present bearing structure after it has been once assembled, there is provided a radially disposed lubricant conduit 19 which is formed directly through the sleeve 18 and one of the race elements 13 so as to communicate directly with the bearing area. A G-shaped wire 20 is adapted to encircle the sleeve 18 and the bent limb 33 of this wire will enter the conduit 19 so as to close the same. Clearly, this wire may be readily removed for the purpose of permitting lubricant to be supplied to the bearing area through the conduit 19. Furthermore, the limb 33 of the wire 30 would prevent the sleeve 18 from shifting longitudinally of the race ring should the sleeve become loose on the race ring.

From the above, it will be understood that the present fractured or sectional race assembly permits the incorporation in a given bearing space, of the maximum number of rolling elements as no cage elements are necessary for spacing the rolling elements apart. Thus, a most efficient and long-lasting bearing unit is produced. In this latter connection, it should also be appreciated that the elimination of the usual spacing cage permits the ball-receiving grooves, both in the outer race as well as in the arbor itself, to be formed with great depth thereby to make for a most rugged construction which will prevent misalignment of the bearing elements. Furthermore, since in the present construction no separate inner bearing race is required, the arbor or coupling member may be constructed with a relatively large outside diameter thereby imparting great strength to the arbor unit.

Those skilled in the art will readily appreciate that the present combination of arbor and split bearing unit will, when applied to a pair of drawing roll cylinders, make for a most efficient drawing roll structure which will require a minimum of attention when employed on a drawframe. Also, it will be clearly understood that since the bearing structure of the present drawing roll is entirely sealed, it will run free from fly and other foreign matter at all times.

I claim:

1. In a textile drawing roll having roll sections with axial openings at the opposite ends thereof, and a coupling member in the form of an arbor having longitudinally spaced end portions each of which is adapted to be seated snugly within a respective one of said roll openings; the improvement which consists in the provision of bearing means for rotatably supporting said roll, said bearing means comprising a unitary cylindrical sleeve surrounding an intermediate portion of said arbor between said end portions with the opposite end portions thereof extending over the end portions of the roll sections so as to seal off the bearing area, and rotatable bearing elements disposed between said arbor and said sleeve.

2. In a textile drawing roll having roll sections with axial openings at the opposite ends thereof, and a coupling member in the form of an arbor having longitudinally spaced end portions each of which is adapted to be seated snugly within a

respective one of said roll openings; the improvement which consists in the provision of bearing means for rotatably supporting said roll, said bearing means comprising a pair of semicircular elements disposed together so as to form an outer race ring surrounding an intermediate portion of said arbor between said end portions, rotatable bearing elements disposed between said arbor and said outer race ring, and a cylindrical sleeve surrounding said race ring with the opposite end portions thereof extending in cooperating relation with the end portions of the roll sections so as to seal off the bearing area.

3. In a textile drawing roll having roll sections with axial openings at the opposite ends thereof, and a coupling member in the form of an arbor having longitudinally spaced end portions each of which is adapted to be seated snugly within a respective one of said roll openings; the improvement which consists in the provision of bearing means for rotatably supporting said roll, said bearing means comprising a pair of semicircular elements disposed together so as to form an outer race ring surrounding an intermediate portion of said arbor between said end portions, an inwardly extending annular flange formed at each of the opposite end portions of said outer race ring and extending into an annular groove formed about said arbor, rotatable bearing elements disposed between said arbor and said outer race ring, and a cylindrical sleeve surrounding said race ring for maintaining the latter in its proper position about said arbor.

4. A textile drawing roll, comprising, roll sections with axial openings at the opposite ends thereof, an annular circumferential groove formed about each roll section adjacent its open end portion, a coupling member in the form of an arbor having longitudinally spaced end portions each of which is adapted to be seated snugly within a respective one of said roll openings, a pair of semicircular elements disposed together so as to form an outer race ring surrounding an intermediate portion of said arbor between said end portions, an inwardly extending annular flange formed at each of the opposite end portions of said outer race ring and extending into an annular groove formed about said arbor, rotatable bearing elements disposed between said arbor and said outer race ring, and a cylindrical sleeve surrounding said race ring with the opposite end portions thereof extending over the end portions of the roll sections so as to overlie said circumferential grooves thereby to seal off the bearing area.

5. In a textile drawing roll having roll sections with axial openings at the opposite ends thereof, and a coupling member in the form of an arbor having a center neck portion, an annular flange at each end of said neck portion, and a cylindrical portion at the outer side of each flange and having a diameter substantially less than that of its associated flange, each of said cylindrical portions being adapted to be snugly received within a respective one of said roll openings so that its associated annular flange engages the end portion of one of said roll sections; the improvement which consists in the provision of bearing means for rotatably supporting said roll, said bearing means comprising a pair of semicircular elements disposed together so as to form an outer race ring surrounding said arbor neck portion, an inwardly extending annular flange formed at each of the opposite end portions of said outer race ring so as to be disposed adjacent the inner face

of a respective one of said arbor flanges thereby to seal off the bearing area, rotatable bearing elements disposed between said arbor neck portion and said outer race ring, and a cylindrical sleeve surrounding said race ring for maintaining the latter in its proper position about said arbor.

6. A textile drawing roll having roll sections with axial openings at the opposite ends thereof, a coupling member in the form of an arbor having a center groove, an annular flange at each side of said groove, a cylindrical portion at the outer side of each flange and having a diameter substantially less than that of its associated flange, each of said cylindrical portions being adapted to be snugly received within a respective one of said roll openings so that its associated annular flange engages the end portion of one of said roll sections, a pair of semicircular elements disposed together so as to form an outer race ring surrounding said arbor groove, an inwardly extending annular flange formed at each of the opposite end portions of said outer race ring so as to be disposed adjacent the inner face of a respective one of said arbor flanges thereby to seal off the bearing area, rotatable bearing means disposed within said groove and between said arbor and said race ring, and a cylindrical sleeve surrounding said race ring for maintaining the latter in its proper position about said arbor.

7. A textile drawing roll having roll sections with axial openings at the opposite ends thereof, an annular circumferential groove formed about each roll section adjacent its open end portion, a coupling member in the form of an arbor having a center groove, an annular flange at each side of said groove, a cylindrical portion at the outer side of each flange and having a diameter substantially less than that of its associated flange, each of said cylindrical portions being adapted to be snugly received within a respective one of said roll openings so that its associated annular flange engages the end portion of one of said roll sections, a pair of semicircular elements disposed together so as to form an outer race ring surrounding said arbor groove, an inwardly extending annular flange formed at each of the opposite end portions of said outer race

ring so as to be disposed adjacent the inner face of a respective one of said arbor flanges, rotatable bearing balls disposed in ball-to-ball contact within said groove and between said arbor and said race ring, and a cylindrical sleeve surrounding said race ring with the opposite end portions thereof extending over the end portions of the roll sections so as to overlie said roll grooves thereby to seal off the bearing area.

8. In a textile drawing roll having roll sections with axial openings at the opposite ends thereof, and a coupling member in the form of an arbor having longitudinally spaced cylindrical portions each of which is adapted to be seated snugly within a respective one of said roll openings; the improvement which consists in the provision of bearing means for rotatably supporting said roll, said bearing means comprising a pair of semicircular elements disposed together so as to form an outer race ring surrounding an intermediate portion of said arbor between said cylindrical portions, an inwardly extending annular flange formed at each of the opposite end portions of said outer race ring and extending into an annular groove formed about said arbor, rotatable bearing elements disposed between said arbor and said outer race ring, a cylindrical sleeve surrounding said race ring for maintaining the latter in its proper position about said arbor, a lubricating conduit formed radially through said race ring and said sleeve, and means removably disposed within said conduit for preventing the egress of lubricant from the bearing area.

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