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SELF-LUBRICATING BALL BEARING FOR THE TOP ROLLS OF CARD ROOM DRAWING

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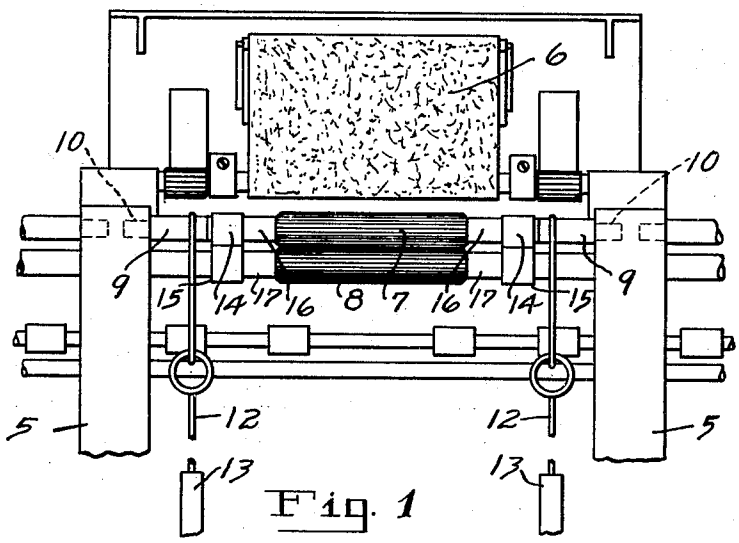


Fig. 1

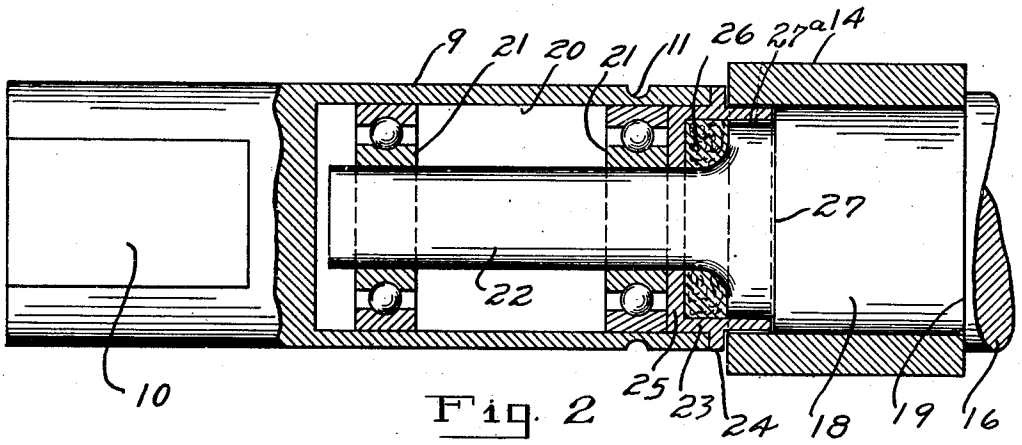


Fig. 2

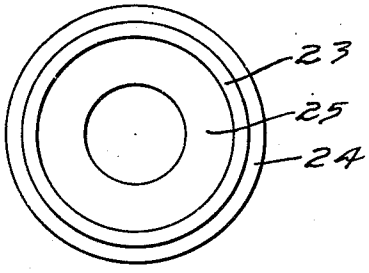


Fig. 3

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SELF-LUBRICATING BALL BEARING FOR THE TOP ROLLS OF CARD ROOM DRAWING

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8 Claims. (Cl. 19—142)

My invention is particularly concerned with the application of self lubricating ball bearings to the top rolls of card room drawing frames.

While the advantage of ball bearings, as applied to drawing rolls, is well known in the spinning art and such bearings have been devised for, and successfully used in connection with, the top rolls of spinning frames and roving frames, yet no successful method has heretofore been devised by which the benefits of the ball bearing have been applied to the top rolls of card room drawing. In card room drawing; the rolls are relatively long and heavy; there is a large volume of cotton passing between the rolls; an excessive amount of dirt and grit is still present in the cotton and this together with much lint is thrown off from the slivers under treatment; there appears to be too little space within which ball bearings can be placed; and the weight loads carried by the top rolls of these drawing frames is comparatively heavy. All these factors have all produced a problem of such a character that a commercially successful manner of applying the equally desirable ball bearings for these roll joints has not heretofore been found.

The object of my invention is to devise a compact, comparatively inexpensive ball bearing joint which can be readily incorporated in the bearings for the top rolls of card room drawing and which will not only effectually seal the ball bearing chamber against access thereinto of grit or lint, but will likewise seal into said chamber a substantial volume of lubricant, preferably in the form of light grease, which will provide a continuous lubrication for many years for the roll bearings.

A further object of my invention is to so design all parts of my improved bearings that while closely conforming to the design of existing parts I yet obtain the requisite clearance for the reception of ball bearings and storage of lubricant by substituting steel for cast iron loose bearing sleeves, whereby I can enlarge the bore therein without unduly weakening the sleeves, and by the reduction of the roll spindles to approximately half of their standard diameter, which I have found to be permissible.

A distinctive feature of my invention is the provision of a sealing cap, containing felt packing, which is pressed tightly into the inner end of the loose bearing sleeve and adapted at its inner end to provide a close running fit for the spindle and at its outer end to provide an annular projection that fits with a running joint in a packing recess formed in other roll elements, preferably between the spacer collar on the roll shaft and its mounting shoulder, so as to provide a labyrinth packing to exclude grit, dirt and lint from the felt packing of the joint.

My invention further contemplates the provision on each sealing cap of an external flange which engages the loose bearing sleeve when the cap is pressed thereinto and allows a close clearance between it and the end of the adjacent spacing collar on the roll shaft so as to form a close running joint that is left free all around so that any grit, lint or foreign matter that works into its labyrinth packing overhead can escape therefrom below before it can work its way through the labyrinth packing into the bearings.

My invention further comprises the novel details of construction and arrangements of parts which, in their preferred embodiment only, are illustrated in the accompanying drawing which forms a part of this specification, and in which:

Fig. 1 is a fragmental view of a section of a card room drawing frame, its clearer opened up and its top roll shown equipped with ball bearings in its loose end bearings.

Fig. 2 is an enlarged sectional view illustrating my improved bearings.

Fig. 3 is a detail view in end elevation for the sealing cap.

In the drawing I show a section of a card room drawing frame 5 having a movable top clearer 6 shown in raised position to expose its drawing rolls which comprise the top rolls 7 and the bottom rolls 8. Between the rolls are passed the usual number of cotton slivers, the bottom rolls being driven from the frame heads and the top rolls being driven by the meshing of their flutes with the flutes of their respective bottom rolls.

The top rolls have their shaft ends mounted in loose bearing sleeves 9 having their ends flattened at 10 so that they may have vertical play without rotation in guides, not shown, that are provided with them in the frame. In this way provision is made to allow the top rolls to have movement towards and from their coacting lower rolls, and each of their loose bearing sleeves is grooved at 11 to receive a hanger 12 for a weight 13, which weights act to hold the top rolls to their work.

To maintain the requisite clearance between the coacting rolls 7 and 8, their shafts are provided with clearance collars 14 and 15 respectively, which are pressed tightly on the shafts 16 and 17 respectively, of said rolls, and by their engagement they hold the rolls the requisite dis-

tance apart when cotton is not interposed between them. The collars 14 for the top rolls are pressed tightly on reduced seats 18 and against a shoulder 19 formed on each end of roll shaft 16.

The loose bearing sleeves, as heretofore constructed, are cylindrical iron castings flattened at one end to form the guide faces 10 and bored at the other end to accommodate the relatively large top roll spindles. Due to the presence of an excessive amount of grit and abrasive material in the cotton slivers passing between the drawing rolls, these ordinary bearings not only require frequent oilings, often every four or five hours, but they also become very quickly worn. Bearing in mind that any variation in top roll friction affects the breaking strength of the slivers being drawn by them, it follows that rapid bearing wear and even variation in the viscosity of the lubricant used for these bearings, may so vary the slivers as to produce bad drawings and adversely affect the mill product for days.

According to my present invention, I substitute for the ordinary cast iron loose bearing sleeve a steel sleeve closed at its outer end and provided at its inner end with a large bearing chamber 20 ample to receive the ball bearings 21 which have their inner race members fast on the small diameter spindle 22 formed at the ends of each roll shaft 16. This chamber 20 is of substantial capacity and is adapted to be filled with a charge of lubricant ample to lubricate the bearing for a number of years.

In order to effectively seal in the lubricant in the bearing chamber and to exclude therefrom grit, dirt and lint, I make the following provision. I provide a sealing cap preferably in the form of a brass sleeve 23 provided with an external annular shoulder 24 near its center and having a wall 25 at its inner end which is apertured to receive with a close running fit the spindle 22. The inner end of the cap is pressed tightly into the bore of the sleeve 9 until the shoulder 24 abuts the end of the sleeve. This leaves the outer end of the cap overhung from the sleeve and its shoulder 24, standing with only a close running clearance separating it from the adjacent collar 14. I provide the roll with an endwise opening annular groove or recess to receive the overhung outer end of the cap 23, and as a preferred manner of forming this groove or recess in turning down the roll, I provide a shallow shoulder 27 to define an annular spindle portion 27a which is adapted to telescope into the outer end of the cap 23 with a close running clearance. The depth of the cut for the shoulder 27 will provide between 27a and the collar 14 a clearance which will receive the overhung end of the cap with a close running joint at its inner edge and about its outer circumference. It will be obvious that other means may be provided for forming this endwise groove or recess in the roll so as to provide what I term a labyrinth packing adapted effectively to prevent access of foreign matter to the packing 26 in the cap.

The grit and foreign matter tending to work inwardly through the vertical packing joint between the shoulder 24 and the collar 14 will tend to make its escape therefrom responsive to centrifugal force and gravity at the bottom of the roll before it can work its way through this labyrinth packing, and any foreign matter that does work through the latter will be caught by the packing 26 in the cap and kept out of the lubricant filling the ball bearing chamber 20.

The ball bearings are inserted in the loose sleeve before the sealing cap 23 is pressed in place and since all of these running parts are so set up in the frame that they cannot be readily taken down, it follows that the bearing is protected from being tampered with and the felt packing 26 and the labyrinth packing will act to prevent the escape of the lubricant from the ball bearing chamber, and ingress of any foreign matter thereto throughout the long periods of use.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. A top roll for card room drawing frames, having reduced ends to form spacer collar seats and spindles, a spacer collar mounted fast on each seat, a loose bearing sleeve for each spindle, each spindle being reduced in diameter and its respective sleeve having its bore enlarged to provide between them a chamber adapted to receive ball bearings and a charge of lubricant, an annular packing groove formed between the outer end of each seat and its collar, ball bearing elements interposed between each spindle and its respective bearing sleeve, and an end sealing cap for each sleeve bearing chamber having its inner end fitted tightly into its respective sleeve and apertured for the spindle to pass therethrough with a close running fit and its outer end cylindrical and adapted to project from its sleeve so as to work with a close running fit in the adjacent annular packing groove in its respective spacer collar.

2. The combination of elements according to claim 1, in which each sealing cap has the form of a sleeve with an external intermediate collar disposed to abut the end of the bearing sleeve into which it is pressed and provide a running clearance between it and the adjacent spacer collar.

3. The combination with a top roll for a card room drawing frame, comprising a spacer collar shoulder and a spindle at each end, a spacer collar mounted on each shoulder, and a loose bearing sleeve for each of said spindles having a bore opening only through its inner end, of a sealing cap fitted loosely about a spindle and tightly into the inner open end of its sleeve, said spindles and the bores of their sleeves being designed to provide ample clearance between them to receive a substantial charge of lubricant and ball bearings, ball bearings for each spindle mounted within its respective sleeve bore, the roll elements and outer ends of the caps having coacting annular radially and axially disposed surfaces defining close running joints to form a labyrinth packing between roll elements and the outer ends of said caps, there being in each cap a packing chamber, and packing in said chambers.

4. In combination, a top roll for drawing frames having end spindles, and a bearing assembly for each spindle comprising a bearing sleeve closed at its outer end, ball bearings mounted in position between each spindle and its respective sleeve, a closure having a tight fit in the inner end of each sleeve and apertured for the passage therethrough of a roll spindle, packing to seal the joint between spindle and closure, and coacting overlapping annular end surfaces carried by the bearing sleeves and roll which are

co-axial with the roll and define a close running labyrinth packing disposed and adapted to intercept access of dirt and foreign matter to said first mentioned packing in each bearing assembly.

5. In combination, a top roll for drawing frames having end spindles and circumferential end grooves co-axial with said spindles, and a bearing assembly for each spindle comprising a sleeve defining a bearing chamber closed at its outer end, a sealing cap secured fast in the inner end of said chamber and apertured for the passage of a roll spindle therethrough, packing in said cap to seal the joint between it and its respective roll spindle and form a closure for the inner end of said bearing chamber, ball bearings mounted in position in said chamber between each spindle and its respective bearing sleeve, said chamber being of substantial capacity and filled with lubricant, and each cap having one end thereof adapted to interfit in the adjacent end groove of the roll with a close running clearance between it and the groove walls thereby to form a labyrinth packing adapted to prevent the access of dirt and foreign matter to the packing in the cap.

6. A top roll mounting for drawing frames according to claim 5, in which the packing in each cap fills the space between its apertured inner wall and the adjacent end of the roll that is telescoped into said cap.

7. A top roll for card room drawing frames, comprising roll sections having end spindles and bearings for said spindles, each bearing comprising a loose bearing sleeve, ball bearings interposed between said spindle and sleeve, a sealing cap adapted loosely to receive said spindle and form therewith a closure for the open end of the bearing space in said sleeve, packing seated in said cap, and roll elements coacting with the outer end of said cap to form an elongated close running joint leading to said packing at its inner end and at its outer end forming an open joint lying in a vertical plane and left unobstructed to provide for the ejection by both centrifugal action and gravity of foreign matter seeking ingress through said joint to the packing in said cap.

8. A top roll for card room drawing frames, comprising roll sections having end spindles and bearings for said spindles, each bearing comprising a loose bearing sleeve, ball bearings interposed between said spindle and sleeve, a sealing cap adapted loosely to receive said spindle and form therewith a closure for the open end of the bearing space in said sleeve, packing seated in said cap, and roll elements coacting with the outer end of said cap to form a labyrinth packing comprising connected axially and radially disposed close running joints, the radial joint being disposed in a plane normal to the spindle axis and left unobstructed beneath the roll to allow for the free escape of foreign matter before it enters the axially disposed joint of the packing.

JOHN L. KING.