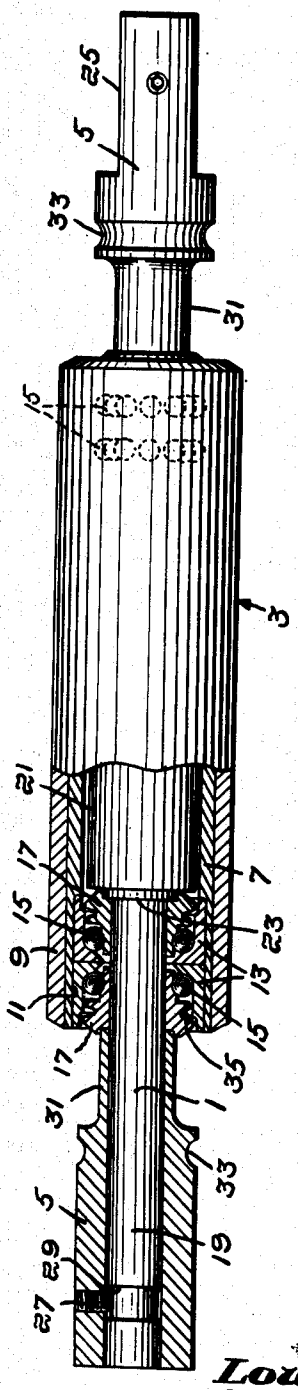
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TOP ROLL FOR DRAWING FRAMES

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TOP ROLL FOR DRAWING FRAMES

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1

This invention relates to top rolls for textile machinery, more particularly for drawing frames, sliver and ribbon lap machines, comber draw boxes and the like.

It is common practice to provide for these machines rigid one-piece top rolls having a single long boss and journals integral with the rolls, the journals being rotatably held and guided within the usual slots in the cap bars, bearing blocks, or other guides, or in plain bearing boxes received in such slots. The reduced end portions of such solid type rolls are engaged by heavily weighted saddles or hooks to urge the top rolls downwardly into rolling engagement with the bottom rolls. To overcome the objectionable friction of these rolls against their bearing blocks or cap bars and against the weighting means and the uneven rotation and ensuing bad work caused thereby, resort has been had to anti-friction bearings of both ball and roller types applied to the journals to support the saddles or hooks and thus to handle the substantial radial load imposed by the weighting means. However, these bearings usually are incapable of properly providing for the end thrust which arises because such rolls are relatively long and seldom quite parallel to the bottom rolls and at right angles to the travel of the sliver, which departure from parallel acts to impart an endwise or axial crawl to the rolls. Anti-friction bearings for such rolls, therefore, must withstand both the normal radial thrust and also this axial thrust.

There is not room available within the cap bar slots to house an angular contact or combined radial-axial bearing of a size capable of enduring the loads imposed on it by the weighting hook and at the same time maintain the roll journal of a diameter adequate to sustain this load without intolerable distortion, For full anti-friction mounting, at least two separate bearings of angular contact type must be supplied at each roll journal and spaced well apart with the weighting hook located betweeen them in order to hold the end cap or sleeve which houses the bearings in coaxial relation to the journal and prevent cramping of the bearings under the weighting load. But locating them inwardly of the cap bars shortens the working surface of the roll.

Therefore, the object of this invention is to provide a novel top roll of simple and compact construction which overcomes the above noted objectionable features and which can be substituted for prior plain bearing type rolls in existing machines without change in the cap bars or other parts.

2

Another object of the invention is to provide an improved top roll which embodies few parts and yet is so constructed that it does not rotatably engage the bearing blocks or cap bars and weighting means.

Another object of this invention is to provide an improved top roll which permits the greatest possible working surface of the roll but which has bearings so constructed as to be free of any limits on their ability to carry the load of the weighting means imposed by the size of the cap bar slot.

In an effort to overcome the drawbacks above I have resorted to the shell type or loose boss top roll construction, in which a cot-covered roll shell revolves upon an axle mounted in non-rotating relation in the cap bars of the frame. Satisfactory operation of shell type top rolls requires the use of anti-friction bearings between the shell and the axle, but here also the heavy weighting which must be applied to the ends of these single boss top rolls and the resulting flexing of the axle cramps a ball bearing, causing rapid and destructive wear thereof, by tilting the cone out of axial alignment with the ball race. The space within the roll shell available to take the ball bearing is severely limited by the outside diameter of the cot, which is dictated by the length of staple being drawn, and by the thickness of the cot wall required to give it the necessary resilience for proper drafting. Thus the ball bearing cannot be enlarged in size to increase its load-bearing capacity to compensate for the cramping to which it is subjected. Roller or needle type bearings, through offering increased load-bearing capacity without increase in outside diameter, cannot be used here because they will not withstand the end thrust arising as described, and are even more subject to cramping under flexing of the axle because of their greater axial extent.

According to the invention, I provide a single boss shell type top roll in which angular contact ball bearings capable of accepting both radial and axial loads are employed, and increase the load-bearing capacity without increase of the outside diameter of the top roll by providing two such ball bearings preferably in reversed or back-to-back relation located in a recess in each end of the metal roll shell. The non-rotating axle is preferably stiffened against flexing by increasing the diameter of the portion of its length lying between the pairs of bearings to substantially the

full extent permitted by the internal diameter of the roll shell. By locating the bearings within the roll shell, the working length of the boss is not curtailed by their presence. The major part of the flexing of the axle caused by the weighting means occurs outwardly beyond the bearings with consequent reduction in cramping and resultant injury to the bearings, whereby the useful life of the bearings and thus of the top roll is greatly extended.

To the aforesaid ends and also to improve generally upon top rolls of the character indicated, the invention further consists in the various features hereinafter described.

The improved top roll is illustrated in the accompanying drawing, the left-hand portion thereof being in section on an axial plane, and with its end cap turned 90° out of its normal working position to show the manner of securing it to the axle.

The novel top roll shown is of customary single boss type, and comprises an axle 1, a roll shell 3 rotating thereon, and end caps 5 whereby the axle 1 is mounted in non-rotating relation in the cap bars of the drawing frame or other machine in which it is employed. Roll shell 3 comprises a cylindrical metallic sleeve or body 7 on which is adhesively mounted a cot 9 of rubber, leather, synthetic, or other resilient composition, coextensive with the body 7. A recess 11 is formed in each end of the interior passage through body 7, in which recess are fitted slidably the ball races or cups 13 of a pair of angular contact or conical ball bearings provided with bearing balls 15 which are confined in the cups by cones 17. These cones 17 are fitted with a sliding fit upon the cylindrical end portions 19 of axle 1, and each of the cones of the two bearings at one end of the roll shell, together with its associated cup 13, is installed in oppositely-facing relation to its companion cone or cup, so that the two ball bearings are disposed in opposite or back-to-back relation to each other.

The portion 21 of axle 1 at mid-length thereof is of enlarged diameter, preferably being substantially as large as the interior passage of body 7 will permit, to stiffen the axle against flexing. Each extremity of the portion 21 is reduced to form a hub 23 which enters within the recessed end of the adjacent cone 17, thus forming an abutment for the latter. This portion 21 may be in the form of a thick-walled sleeve slipped or press-fitted on the axle, if preferred.

Tubular end caps 5 cover the entire portion 19 outside of the bearings at each end of axle 1. The outer half of each end cap is slabbed off as indicated at 25 to form flats fitting the slots of the cap bars (not shown) of the machine so as to be held non-rotatably therein. The axle 1 is held non-rotatably within the end caps 5 by clamping screws 27 threaded through the wall of each end cap and seating in a groove 29 in the end portion 19 of the axle, the groove being made wider than the screw to permit a small adjustment of the cap along the shaft. The inward end portion 31 of each end cap is of greatly reduced outside diameter so as to have thin walls, the inward extremity of such portion being received in the recess formed in the end of the adjacent outer cone 17. Such extremity thus forms an abutment positioning the outer cone 17 and holding it against outward digression.

Each end cap 5 is used to adjust both bearings at its respective end of roll shell 3, by shifting the end cap in or out until play in the two bearings is removed and the proper tension established, such adjustment being maintained by retightening screw 27. The arrangement of the paired bearings in reversed or back-to-back relation makes this possible. Since the inner cone 17 at each end of the roll shell abuts against the reduced end 23 of the enlarged mid-section 21 of the axle, and both cups 13 are slidable in their recess in the end of roll shell 7, axial adjustment of each end cap 5 adjusts the bearing tension of both ball bearings at one end of the roll shell simultaneously and equally. Further, this bearing tension is independent of the bearing tension established at the other end of the roll shell, which is governed by the other end cap 5. Thus with the bearing fit at each end of the roll shell being made independent of that at the other, wear or damage to the bearings at one end of the roll does not loosen or impair the proper action of the bearings at the other end thereof.

A groove 33 is formed in each end cap 5 just at the outer end of the reduced portion 31, for the reception of the weighting hooks (not shown). This reduced portion 31 is made of substantial extent and with quite thin wall thickness with the aim of localizing the bending of axle 1 between the point of loading at groove 33 and the outermost cone 17. By thus lessening the tendency of the shaft to flex within the extent of the bearings, the cramping of the bearing balls within the bearings is reduced to a degree within the capacity of the bearings to endure, since the burden of such cramping action is divided equally between the two bearings, falling upon an arc at the bottom of the ball race and cone on the outer bearing and a similar arc at the top of these parts in the inner bearing. Occasional angular shift of the end caps serves to distribute this wear.

Provision for excluding lint and fly from the ball bearings is provided by the formation of a ring or gasket composed of the intruding fibers themselves within groove 35 of each outer cone and wiping against the interior of the ball race, in the manner set forth in my Patent No. 2,644,202, dated July 7, 1952.

By the provisions of the invention the known advantages of anti-friction shell type rolls in producing better work are made available in a form having a prolonged useful life ample to make them economically practical for all-round commercial use. The top roll can be easily taken down for cleaning and repairs, and easily put together again in correct adjustment in the mills. Replacement of worn bearings by hand alone is very simple and obvious.

While I have illustrated and described a certain form in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular form shown, or to the details of construction thereof, but

What I do claim is:

1. A top roll for drawing frames having in combination a non-rotating axle, a roll shell, ball bearings in the ends of the roll shell supporting the latter rotatably upon the axle, the axle having means within the roll shell stiffening the axle against bending, and sleeves fitting the end portions of the axle and covering them from their extremities to the bearings and each sleeve having its wall thickness reduced throughout a substan-

tial part of its length at the end of the sleeve adjacent a bearing.

2. A weighted top roll for drawing frames having in combination a non-rotating axle, a roll shell, a pair of angular contact ball bearings disposed in reversed relation to each other within each end of the roll shell and supporting the latter rotatably upon the axle, the axle having abutment means within the roll shell engaging with the inner bearing of each pair, and end caps to be engaged by the weighting means and fixed on the axle, each end cap engaging the outer bearing of one pair.

3. A weighted top roll for drawing frames having in combination a non-rotating axle, a roll shell, a pair of angular contact ball bearings disposed in reversed relation to each other within each end of the roll shell and supporting the latter rotatably upon the axle, the axle having a portion of increased diameter engaging the inner bearing of each pair, and end caps to be engaged by the weighting means and fixed on the axle, each end cap engaging the outer bearing of one pair.

4. A weighted top roll for drawing frames having in combination a non-rotating axle, a roll shell, a pair of angular contact ball bearings disposed in reversed relation to each other within each end of the roll shell and supporting the latter rotatably upon the axle, the axle having a portion of increased diameter engaging the inner bearing of each pair, and end caps to be engaged by the weighting means and fixed on the axle, each end cap engaging the outer bearing of one pair, the portions of the end caps adjacent such bearings being of thin-walled construction throughout the greater part of the interval from the outer bearing to the point of engagement with the weighting means.

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