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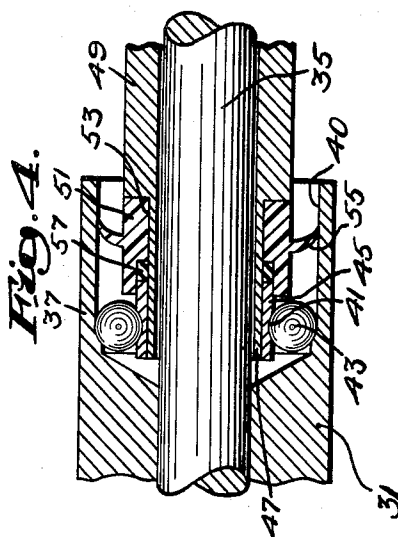
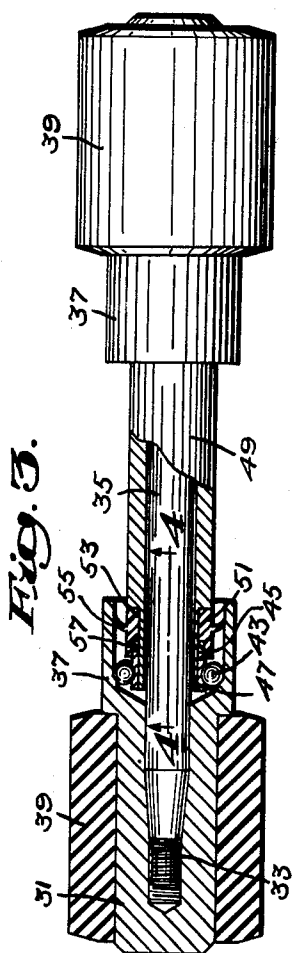
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TOP ROLLS FOR SPINNING FRAMES

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TOP ROLLS FOR SPINNING FRAMES

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The present invention is an improvement on my Patent No. 2,771,640.

This invention relates to spinning and roving frames, and particularly to the top rolls which with their co-operating bottom rolls perform the operation of drafting cotton slivers or roving to reduce their diameter and lay the fibers parallel.

These top rolls have conventionally been of solid type and supported in their working position on the bottom rolls, and guided so as to run with their axes in the same plane as the bottom rolls, by means of journals or other corresponding extensions on their ends which are held in slots in cap bars mounted on the spinning frame. However, there are a number of practical advantages to be attained through dispensing with the cap bars on the frame and the accompanying journals or extensions on the roll ends, and guiding and supporting the top rolls solely by means engaging the rolls at the necks between their bosses. An example of such center-supported top rolls and of the means which thus support and guide them is found in my Patent No. 2,865,057, granted Dec. 23, 1958. The guides which thus serve to position such top rolls must also supply the relatively heavy weighting pressure on the top rolls required to grip and draw out the fibers by the opposing top and bottom rolls. Special provision must therefore be made to let each top roll turn smoothly and steadily and with a minimum of friction with respect to the stationary guide which is applying the weighting pressure. Plain bearings or rather half-bearings engaging the rotating necks of the rolls after the manner of the familiar saddles have proved inadequate because of their need for frequent lubrication and all the trouble of oil damage to the cots and stock, lapping-up, and clogging of the bearings with lint which such lubrication entails. Consequently, resort has been had to shell type top rolls in which the roll shells rotate about a stationary axle engaged by the guiding and weighting member, with the roll shells rotating on either plain type bearings or anti-friction bearings of ball or roller type. Alternatively, it has been proposed to use loose sleeves on the necks of solid type rolls and mounted on anti-friction bearings, and adapted to be held stationary by the guiding and weighting member. Plain bearings for the roll shells and the loose sleeves involved the same problems incident to lubrication, while anti-friction bearings though highly satisfactory in cutting down friction and need for lubricating have been relatively expensive, seriously restricting their use, being occasionally employed for the heavily weighted front rolls; both types of bearings have been subject to lint fouling and resultant recurrent need for cleaning.

The leading object of the present invention thus is to provide a novel and improved top roll of center-guided type for such capbar-less spinning and roving frames which shall rotate easily and steadily, shall require no lubrication, shall be substantially immune from fouling by lint and thus require little or no cleaning of its bearings, shall be reasonable in cost, and withal shall be substantially trouble-free and long-lived and easily reconditioned following wear.

To these ends, the leading novel feature of construction of the present invention comprises a top roll having improved bearings which include lint and dust seals in the form of flanges of nylon or other resilient synthetic

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plastic material, mounted in fixed or non-rotating relation on the guiding sleeve in which rotates the axle the bosses are fixed on. These flanges are concave and located within the recessed overhanging end-portions of the bosses, and being of greater diameter than the recesses in which they fit and through their resilience and elasticity press lightly against the side walls of the recesses, concave sides facing the mouth of the recesses, to make wiping contact thereagainst all the way around the interior of the recesses. The only paths for entrance of lint and dirt to the bearing surfaces between the stationary saddle sleeve and the rotating axle are closed by these flanges, the fixing of the ends of the axle within the bosses preventing all access of lint from the outward ends of the latter.

In one preferred form of the invention, the guiding sleeve to be engaged by the guide is mounted on ball bearings within the recesses in the opposing ends of the bosses and out of contact with the axle, and the plastic flange is a part of a short sleeve fixed on the outside of the guiding sleeve axially inward of the ball bearings.

In another preferred form, the guiding sleeve has a plastic bushing in each end riding on the axle, and the flange is a part of the protruding end-portion of such bearing. In this case the bearings are formed of nylon or other synthetic plastic having a low coefficient of friction making lubrication unnecessary, and provide for easy and uniform rotation of the top rolls and supply their own lint seals.

Other objects of the invention, and the manner of their attainment, are as made plain hereinafter.

Illustrative embodiments of the invention are shown in the accompanying drawings, in which

Fig. 1 is a view in axial section of the improved top roll when made with plastic bearings.

Fig. 2 is an axial section of the same on an enlarged scale showing the parts at the inward end of the left-hand boss of Fig. 1.

Fig. 3 is a view like Fig. 1 showing the improved top roll when made with ball bearings.

Fig. 4 is an enlarged section on line 4—4 of Fig. 3.

The novel top roll of Figs. 1 and 2 comprises an axle 1 of uniform diameter except at its reduced and threaded extremities 3. On each end of this axle is fixed a boss 5 having an axial bore 7 accurately fitting axle 1, with a reduced and tapped outer end portion 9 of such bore screwed onto the end 3 of the axle to seat against a shoulder 11 on the axle. A metallic sleeve 13 surrounds the axle 1 throughout the distance between bosses and extends well into recesses 15 formed in the inward ends of the bosses as continuations or coaxial enlargements of the bores 7. This sleeve is the element which supports and guides the axle and thus the bosses in their working position on top of and parallel to the bottom roll, and is held in parallel and non-rotating relation by the guiding and weighting member 17 of the spinning frame. Shallow grooves 19 are provided equidistant from the mid-point of the sleeve, to keep the guide 17 centered over such mid-point so as to weight both bosses equally, and also to restrain the top roll from endwise digression. Cots 10 are cemented to the bosses.

Bearings 20 are provided between the axle and the sleeve to take the load of the weighting applied by the guide 17 and the reaction of the axle 1. These bearings or bushings are of sleeve type, preferably each of one piece tubular construction. They are formed of resilient and elastic material having a coefficient of friction so low as to obviate the necessity for lubrication, either in the form of applied lubricant or of a lubricating substance incorporated in or impregnated into the component material. Nylon is the preferred material for this purpose, though teflon as well as other polyamide polymers in the

class of synthetic plastic materials are suitable in certain cases. The outside diameter of the cylindrical portion of each bearing 20 exceeds the interior diameter of the sleeve 13 by .003 inch or so, so that they will fit tightly and non-rotatably in the sleeve when pressed thereinto. The interior diameter of each bushing is such as to give a smooth running fit on the axle 1. The latter is of course held out of contact with the sleeve 13 by these bushings. One end of each bushing is formed with a thickened rim 21 which engages and overlies the adjacent end of sleeve 13 and intervenes between such end and the bottom of recess 15 to prevent metal-to-metal contact here, and make an easy running engagement therewith.

A flange or skirt 23 integral with the component material of each bushing 20 is formed on the rim 21 thereof in the course of the molding of the bushing. This flange is of dished or non-radial shape in section, curving inward toward the mid-portion of the length of the bushing in umbrella or mushroom shape, so that it overhangs the end of the metallic sleeve 13. The cross-section of the flange tapers in thickness to a thin and flexible rim 25. The diameter measured across this rim exceeds the internal diameter of the recess 15 by an amount on the order of .004 inch, so that the rim is always pressed lightly against the side wall of recess all the way around the latter by reason of the inherent elasticity and resilience of the nylon or other plastic component material. The concave side faces toward the mouth of recess 15, so as to divert lint and other matter away from the line of mutual contact and toward the sleeve. This pressure of the flange against the wall of the recess in the rotating boss 5 thus constitutes a barrier sealing the bearing surfaces between the stationary bushing 20 and the rotating axle 1 against ingress of lint, fly, dirt, and other foreign matter. By reason of the inherent low coefficient of friction of the nylon, and unlike felt or leather, no significant wear of the rim of the flange occurs even after prolonged running, and thus the bearings are effectually sealed against lint so long as the bore of the bearing remains in shape for steady running of the roll.

If desired, the flange 23 can be supported midway of its outward extent by the outer rim of the end of sleeve 13, as shown, to reduce flexing and possible rupture of the root of the flange at the rim 21. Otherwise, the rim of sleeve 13 will be beveled off.

Replacement and renewal of either or both bearings 20 in the event of damage to the sleeve or its flange is easily effected by unscrewing one of the bosses 5 from axle 1, sliding off the sleeve 13, driving out the old bushings 20, and pressing new ones into place, followed by reassembling the roll by reversal of the steps indicated.

If desired, accidental unscrewing of either boss from its axle 1 is easily guarded against by the simple step of prick-punching at one or more points around the flush ends of the axle 3 as indicated at 27, to distort the mutually engaging terminal turn of the threads of the boss and axle.

The alternative form illustrated in Figs. 3 and 4 shows the invention applied to a similar center guided and weighted top roll, in which ball bearings are used to provide free rotation of the bosses relative to the guiding sleeve which holds the bosses down and in parallel relation to the opposing bottom roll.

In this form, the two bosses 31 are bored and tapered axially for a portion of their length and tapped to fit upon the threaded extremities 33 and adjacent tapered and full-diameter portions of the axle 35. The inward end portion 37 of each boss is made of materially greater diameter than the portion carrying the cot 39, and is counterbored to form a recess 40 having a ball race formed near the bottom thereof. This increased diameter makes possible the use of an oversized ball bearing of cage type, after the manner of Butler Patent No. 2,635,300.

Bearing balls 43 occupy this race and engage with a grooved path or internal raceway 41 formed for their

reception in a cone 45 slidably mounted upon the reduced cylindrical end portion 47 of guide sleeve 49 which corresponds to guide sleeve 13 of the first example.

The lint and dirt seal which according to the invention is provided to protect the ball bearings comprises in this case a short sleeve 51 of nylon or other elastic and resilient synthetic plastic material which is fitted tightly upon the inward portion 53 of the reduced end 47 of guiding sleeve 49. Preferably this portion of the surface of the reduced end 47 is knurled or fluted to insure against relative rotation of the plastic sleeve thereon.

At midlength of the plastic sleeve 51 is formed an integral flange or skirt 55 having the same mushroom shape and dimensions relative to recess 40 as the flange 23 shown in Figs. 1 and 2, and performing the same function in the recess 40 of wiping against its interior wall and barring the ingress of lint, fly, and other foreign materials into the bearings.

It will be noted that plastic sleeve 51 has its outward end counterbored to fit slidably over the inward end of cone 45 slidably mounted on the reduced end 47 of sleeve 49. In the space left between the cone 45 and the bottom of the counterbore in the plastic sleeve 51 is confined a ring 57 of resilient material such as rubber tubing or felt, which is of such axial width as to tend to thrust the cone 45 deeper into recess 40.

Thus these resilient rings 57 coact with the cones 45 and the plastic sleeves 51 in the two bosses to take up all of the slack accumulated through the tolerances allowed in the commercial manufacture of the various components of the roll, and thus automatically adjust the bearing tension correctly.

Repair, replacement, re-lubrication, and cleaning are easily effected through merely unscrewing one boss 31, as in the first species herein.

In the ball-bearing form of Figs. 3 and 4, the weighting is delivered directly to the bosses through the balls 43 by sleeve 49, and the axle 35 is not loaded by the weighting system; its function is to hold the bosses in coaxial and spaced relation. In the other form of Figs. 1 and 2, the axle is loaded by the weighting system through sleeve 13, and in turn weights the bosses.

The action of the resilient ring 57 in automatically adjusting the bearing tension in the form of Figs. 3 and 4 is of importance in saving the expense of careful adjustment in initial assembling and in overcoming errors in manufacture, and especially in keeping the mill help from reassembling the rolls in inoperative or defective relation following taking apart for cleaning.

The principle of shielding the bearing surfaces of a top roll against entry of lint and other foreign matter by an integral flange in yielding elastic wiping contact with the relatively rotating element is also contemplated for use in other situations where bushings of nylon or other low-friction resilient plastic material are used, as in the ends of each roll shell having plastic bearings turning on a stationary axle in the case of shell rolls, where the flange will extend toward and wipe against the axle.

While I have illustrated and described certain forms 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 forms shown, or to the details of construction thereof, but

What I do claim is:

1. A top roll for spinning and roving frames having in combination a rotatable boss having a recess therein, an axle rotating therewith, means coaxially disposed within the boss in non-rotating relation supporting and guiding the axle, and a sleeve fixed to such means within the boss, made of resilient synthetic plastic material and having an integral flange of mushroom shape in wiping contact with the surface of the recess and with its concave side toward the mouth of the recess.

2. A top roll for spinning and roving frames having in combination a boss, an axle therefor, stationary guiding and supporting means within the boss, a bearing within the boss mounting the boss and axle rotatably, and a flange of resilient plastic material and of mushroom shape in connection with the bearing in wiping contact with the interior of the boss and with its concave side facing away from the boss.

3. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, supporting and guiding means in which the axle rotates, and a sleeve of resilient plastic material fixed to such means within the recess and having a concave flange in wiping contact with the surface of the recess.

4. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, a metallic sleeve around the axle, ball bearings between the sleeve and the surface of the recess, and a synthetic plastic sleeve fixed on the metallic sleeve and having an integral concave flange encircling the sleeve and in wiping contact with the interior of the recess.

5. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, a sleeve around the axle, ball bearings between the sleeve and the surface of the recess, and a second sleeve of synthetic plastic material about the axle, a cone slidably mounted about the axle and engaged by the bearing balls, and resilient means confined between the cone and the plastic sleeve and adapted to take up slack in the bearings, the plastic sleeve having an integral flange encircling the axle and in wiping contact with the interior of the recess.

6. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, a sleeve around the axle, ball bearings between the sleeve and the surface of the recess, a cone slidably mounted about the axle and engaged by the bearing balls, a second sleeve of synthetic plastic material about the axle and held from movement away from the boss by the first sleeve, and resilient means confined between the cone and the plastic sleeve urging the cone into the recess, the plastic sleeve having an integral skirt encircling the axle and closing the recess.

7. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, a sleeve around the axle, ball bearings between the sleeve and the surface of the recess, a cone slidably mounted on the sleeve and engaged by the bearing balls, a second sleeve of synthetic plastic material fixed on the first sleeve, and resilient means surrounding the first sleeve and confined between the cone and the plastic sleeve urging the cone into the recess, the plastic sleeve having an integral skirt in wiping contact around the interior of the recess.

8. A top roll for spinning and roving frames having in combination a rotatable boss, stationary guiding and supporting means within the boss, and a sleeve type plastic bearing within the boss having an integral flexible extension in wiping contact with the opposing relatively moving surface throughout the entire circuit of the periphery thereof.

9. A top roll for spinning and roving frames having in combination a boss having a recess in its end, an axle on which the boss is fixed, and supporting and guiding means rotatably supporting the axle and including a nylon sleeve having a concave flange engaging the side wall of the recess in the boss.

10. A top roll for spinning and roving frames having in combination a rotatable boss, stationary guiding and supporting means within the boss, and a bearing of flexible material within the boss and fixed to the stationary means and having an integral flexible flange in wiping

engagement with the interior surface of the boss adapted to exclude lint from the bearing surfaces of the bearing.

11. A top roll for spinning and roving frames having in combination a rotatable boss, an axle on which the boss is fixed, a sleeve surrounding the axle, and a bearing between the axle and the sleeve and having an integral flexible flange in wiping contact with the boss.

12. A top roll for spinning and roving frames having in combination a rotatable boss, an axle on which the boss is fixed, a sleeve surrounding the axle, and a bearing fixed in the sleeve and surrounding the axle and having an integral flexible flange in wiping contact with the boss.

13. A top roll having in combination a pair of bosses, an axle on which both bosses are mounted for rotation, a sleeve in which the axle is adapted to rotate, and sleeve bearings fixed in the ends of the sleeve and having integral flanges in wiping contact with the bosses.

14. A top roll for spinning frames having top roll weighting means, comprising in combination an axle, bosses fixed on the axle, a sleeve loosely surrounding the axle between the bosses to receive the pressure of the weighting means, and nylon bushings engaging the axle within the bosses and rotatably supporting the axle and bosses while the sleeve stands still, each bushing having an integral concave flexible flange in wiping contact with the interior of a boss.

15. A top roll for spinning and roving frames having in combination a pair of bosses, an axle on which the bosses are fixed, a relatively rotatable sleeve on the axle between the bosses, and a nylon bushing fixed in the sleeve and constituting a bearing surface between the axle and the sleeve, such bushing having an integral flange in wiping contact with a boss.

16. The combination according to claim 9, in which the flange has a greater diameter than the recess.

17. A top roll for spinning and roving frames having in combination an axle, bosses fixed on the ends of the axle, each boss having a recess surrounding the shaft, a relatively rotatable sleeve on the axle between the bosses, and a plastic bearing fixed in each end of the sleeve and bearing against the axle and having an integral flexible flange engaging the surface of the recess in the adjacent boss throughout the circuit of such recess.

18. A top roll for spinning and roving frames having in combination a tubular member, a boss having a recess in its end, means within the tubular member and fixed to the boss mounting the boss for rotation relative to such member, and a flexible nylon flange fixed on the tubular member in wiping contact with the surface of the recess in the boss.

19. A top roll for spinning and roving frames having in combination an axle, two bosses fixed on the axle and each having a recess in its inward end, a sleeve surrounding the axle between the bosses and extending into the recesses therein, and a nylon bushing fixed in each end of the sleeve supporting the axle rotatably within the sleeve, each bushing having an integral flange resiliently pressing against the side wall of the recess in the adjacent boss and closing the space between the sleeve and the overhanging end of the boss.

20. A top roll for spinning and roving frames having in combination an axle, a pair of bosses fixed thereon, a metal sleeve, and plastic sleeves each having a portion within the metal sleeve supporting the axle rotatably and a portion of greater diameter than the metal sleeve resiliently engaging the side wall of the recess in the adjacent boss.

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