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TOP ROLL FOR SPINNING AND ROVING FRAMES

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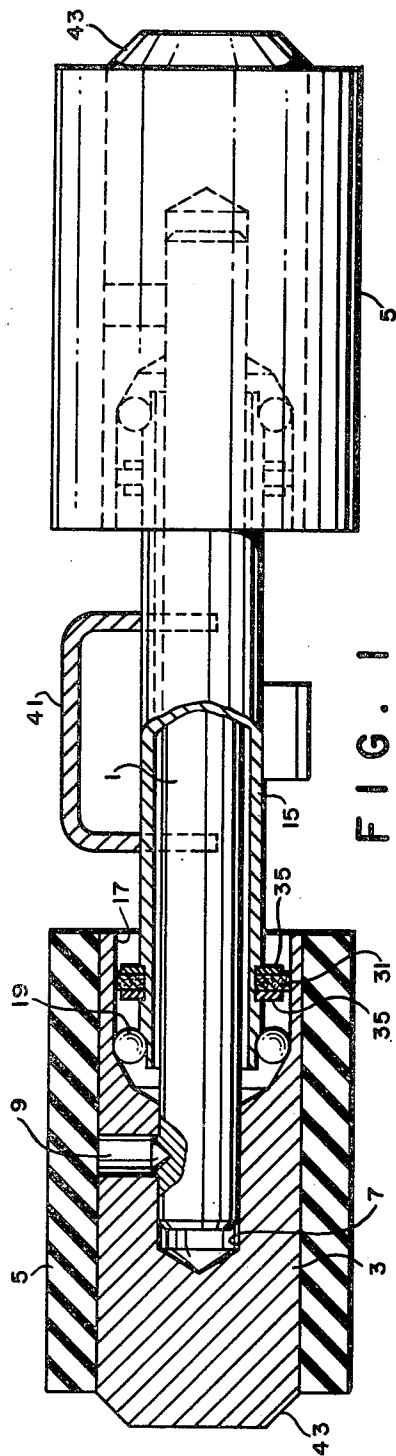


FIG. 1

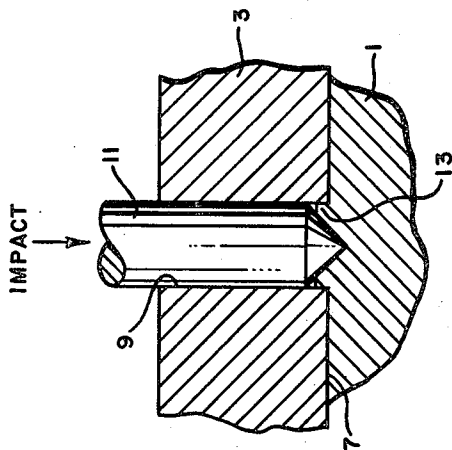


FIG. 2

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TOP ROLL FOR SPINNING AND ROVING FRAMES

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6 Claims. (Cl. 19—142)

This invention relates to top rolls for spinning and roving frames, and has as its object the provision of a novel and improved top roll especially suited for use in frames in which the top rolls are mounted without the use of cap bars, but instead are held in working relation with the bottom rolls by guides which engage solely with the necks between the bosses of the top rolls, such guides also applying the weighting force to the rolls and thus also performing the function of the saddles used heretofore. The guides are positioned through elements mounted on the usual back bars fixed in the roll stands, but are supported by the top rolls, and thus are in full floating relation with the back bars or the elements carried thereby and other fixed parts of the machine frame. The guides are connected with the back bars in exact right-angle relation to the axes of the bottom rolls, while the neck of each top roll is received either in V-shaped notches spaced far enough apart axially of such neck, or in a half-bearing of sufficient length, to hold each top roll in precise right-angle relation to the guide and thus in true parallel relation to its opposing bottom roll. Suitable weighting means are applied to the guides to cause them to function as saddles in weighting the rolls.

The outstanding advantage offered by this cap-barless-type of mounting is that it enables piecing up of the ends of yarn at front roll speeds far in excess of the practical limit attainable when the top rolls are guided in the usual manner by pintles or end caps on their ends which are held in slots in the cap bars. By entering the bobbin yarn sidewise and axially of the front rolls into the nip thereof while held taut and oblique to the roll axes so as to cross over and thus make contact with the strand already in the nip, a piecing can be made at any roll speed at which the frame can be run, which piecing is certain and strong and can be made uniform, and which requires little or no skill and training.

In this system of support of the top rolls, the usual protrusions at the ends of the top roll in the form of pintles, journals, or end caps to be held by the cap bars not only have no useful function, but moreover are in the way and offer obstruction to the spinner in piecing up by thus entering the yarns into the nips at the ends of the top roll.

Hence one object of the present invention is to provide a novel top roll for this center-support type of frame which will do away with these obstructive extensions.

The plain or solid type top roll requires lubrication of its journals at each end which bear against the cap bars, and of its neck engaged by the weighting saddle, and this lubrication causes so much expense and nuisance that resort has been had to the shell type top roll employing a stationary axle having roll shells rotatably mounted thereon usually by means of anti-friction bearings. To maintain the roll shell precisely coaxial with the axle and thus to hold them positively in exact parallel with their respective bosses upon the bottom roll, it has been thought that two sets of ball bearings must be provided in each roll shell, spaced as widely apart as

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possible. The cost of providing two such ball bearings and of fitting and adjusting them accurately has made these shell type anti-friction top rolls relatively much more expensive than the solid roll they are aimed to replace, greatly restricting their use.

Thus another object of the present invention is to provide a top roll for center-support type frames operating wholly on anti-friction type bearings, which can be simply and easily made at a substantially reduced cost, because of the reduced number of parts and increased ease of assembly and adjustment.

A further drawback in shell type anti-friction top rolls even when two sets of ball bearings are used in each shell has been the play in the bearings which allows the roll shells to wobble and thus to depart from the required precise coaxial relation with their axle and get out of the common plane of the axes of the bottom roll and such axle, resulting in the making of uneven yarn as the latter is traversed lengthwise of the bosses.

Hence an additional object of the invention is to provide a novel and improved anti-friction top roll in which the bosses are fixed on the shaft and thus cannot get out of precise coaxial relationship therewith or depart from the common plane of the two axes.

Another object of the invention is to provide a ball bearing top roll which can be buffed in exactly the same manner and with the conventional buffing machines used in the mills for refinishing their prior type solid top rolls.

Still another purpose is to provide a ball bearing top roll having better protection of its bearings from entry of lint and dust, and from free access of air to oxidize or dry out the lubricant.

Other aims of the invention, and the manner in which these and the objects recited above are attained, are set forth hereinafter.

An illustrative embodiment of the invention is shown in Fig. 1 of the accompanying drawing showing the improved top roll in side elevation, a part of the length thereof being shown in axial section. Fig. 2 shows the manner of fixing the bosses on the shaft.

The novel roll comprises a shaft 1 having a metal boss 3 fixed on each end thereof, with a cot 5 of rubber or other resilient material mounted on the cylindrical surface of each boss 3 and preferably adhesively affixed to such surface.

Each boss 3 is formed with an axial bore 7 extending for substantially $\frac{2}{3}$ or more of the distance through such boss. Shaft 1 fits without play in such boss, and is fixed therein by driving a conical ended punch or staking tool such as 11, Fig. 2, through the radial hole 9 and into shaft 1. The conical end of the punch displaces the metal of the shaft, causing such metal to flow up into the hole 9 about the conical point of the punch. The resulting radially projecting rim or hollow cylinder 13 integral with shaft 1 protrudes into the hole 9 in boss 3 with a very tight fit, since the force of the impact used to strike up the rim 13 places all abutting surfaces in the vicinity under great compressive strain. The boss 3 is thus not only keyed to shaft 1 in a manner preventing both relative axial and angular shift, but is held rigidly coaxial with the shaft.

To provide for mounting the top roll rotatably in its working position and for guiding and weighting it with a minimum of friction and need for lubrication, the top roll is provided with a sleeve 15 surrounding the entire span of shaft 1 between the two bosses 3 and extending well within each boss. The axial bore 7 in each boss is enlarged or relieved as indicated at 17 to receive one end of sleeve 15 and also to form a ball race receiving the bearing balls 19. Each end of sleeve 15 is tapered to form a cone engaged by the balls 19. The race for

balls 29 is defined by the junction of the relieved portion 17 with the taper at the inward end of such recess 17. Thus an angular-contact ball bearing is created capable of taking both radial and end thrust. Thus sleeve 15, which has a substantial clearance between its interior wall and the surface of shaft 1, is supported in precisely concentric relation to shaft 1 and in freely rotating relation therewith, but is held from all axial movement by the ball bearings in the two bosses 3.

It is to be noted that sleeve 15 which sustains the burden of the weighting load placed on the roll by the guide 41, an inverted channel member with notches in each side web hooked over the sleeve, is carried wholly by the bosses 3, which through their cots 5 are supported wholly by the bottom roll (not shown) and the yarn passing between the two rolls. The roll is easily removed from the guide for cleaning, when the guide is lifted. None of the weighting load is imposed upon shaft 1, as sleeve 15 makes no contact with such shaft. Further, the placing of the ball bearing deep within each boss 3 locates the point of transfer of the load from the sleeve to the boss and cot near the mid-length of each boss and cot, instead of to a shaft or axle at a point inwardly of the inward end of the boss, as in prior instances, thus avoiding to a large extent the bending action incident to such overhanging type of loading. Any deflection within reason imposed by heavy loading of sleeve 15 is confined to such part, and is not inflicted on shaft 1 since the latter does not contact the sleeve. Thus the bending of the neck of the top roll which occurs in both solid type and shell type prior rolls to throw the two bosses out of coaxial alignment and lessen the grip on the yarn or roving when it traverses to the outward ends of the cots, does not arise in the present construction.

It will be obvious that a single bearing located as shown in each boss is all that is needed to provide full anti-friction mounting of the roll for free rotation. This is in economical contrast with the two spaced ball bearings within each boss required in the shell roll type of anti-friction top roll. Also, having only two ball bearings, the problem of attaining and maintaining proper bearing tension and corresponding avoidance of end play is eliminated or greatly reduced.

The ball bearings, already shielded by their placement far within the axial bore of each boss 3, are further protected by a lint seal in the form of a gasket 31 of felt or other yielding material contractively surrounding the sleeve 15 and in wiping contact with the surface of the recess 17 in boss 3. This gasket or washer is received in a shallow groove in sleeve 15 and held under compression by split metal snap rings 35 which are received in the groove in the sleeve formed for the reception of these parts just outwardly of the cone. This lint seal also acts as a grease retainer for the lubricant supplied to the balls 19 in assembling, and to exclude air.

As will be obvious, the roll is assembled by first mounting and staking one boss 3 to one end of shaft 1. Then a set of balls 19 is bedded in grease or other lubricant in the bearing race of such boss, and sleeve 15 with lint seals 31 and retaining rings 35 on each end is slipped over shaft 1 till its cone at one end seats against the said bearing balls. Then the other boss is pushed onto shaft 1, with a set of ball bearings held in their race by grease, and advanced until the desired bearing tension is established. Thereupon the second boss is staked onto the shaft by the punch method described hereinbefore. Thereafter, cots 5 are slipped over the bosses 3 and adhesively secured.

To disassemble the roll as for relubrication of the bearings, if needed, after removal of the cots it is only necessary to insert a drill or counterbore into the radial hole 9 of one boss to a depth which will cut away the collar 13, thus freeing the boss to be slid off from the shaft.

To reassemble the top roll after disassembly, it is only necessary to choose another spot on the shaft which is angularly displaced from the first staking and to restake the loose boss after establishing the desired bearing tension.

The usual pintles or end caps at the ends of the roll have been eliminated, to facilitate piecing up as already indicated. But some simple provision must be made to hold and turn the top roll in order to buff or grind the cots thereon into true cylindrical and concentric shape. Such buffing is not only required in finishing the roll initially, but is absolutely essential to continued and worthwhile employment of the top roll in the mills, as a top roll of any type which cannot be easily and repeatedly buffed obviously lacks practical utility. All yarn mills possess or have access to buffing machines for the solid type top rolls having pintles extending outwardly beyond their bosses, such buffing machines having supporting and driving centers holding and rotating the pintles of the solid top rolls while being traversed axially past the buffing wheel. Accordingly, to enable the cots 5 of the novel top roll of the invention to be buffed in a standard type buffing machine, both initially and when worn through use, the solid outward ends of the bosses 3 protrude a slight distance, on the order of 1/4 inch or so, beyond the cylindrical cot-supporting surfaces, and are formed with straight tapers 43 to be received within the correspondingly internally tapered ends of female supporting and driving centers (not shown), interchangeably replacing those initially provided in the standard type buffing machine. As usual, these centers support and rotate the top roll precisely on its axis, during which the cots are buffed accurately into shape.

All metal parts of this top roll are easily and cheaply made to precision standards in automatic screw machines, except the bearing balls and the split washers, which are stock commercial articles.

The top roll as thus constructed, comprising a shaft with its two bosses firmly staked and keyed thereto, mounted and held in precise coaxial relation within a one-piece sleeve constituting a dead axle, attains greater rigidity and more complete freedom from play or wobble than the best that could be achieved hitherto in anti-friction shell type rolls employing two ball bearings within each boss. Further, there are only two possible entry points for lint or dust, or for admission of air to oxidize or dry out the lubricant, and these are both closed by the fibrous barriers constituted by the felt seals 31.

The reduction of the number of metal parts comprising the roll to only four major elements, two of which, the bosses, are duplicates of each other, and the reduction of the number of ball bearings by half, as well as the very few operations required to assemble the roll, not only cut the cost of manufacture greatly, but eliminate a significant number of points at which wear and maladjustment could arise to impair the operation of the top roll.

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 this 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 spinning frames having in combination two bosses, cots thereon, a shaft having its ends fixed within the bosses by integral portions protruding radially into the walls of the bosses, a sleeve around the shaft and extending within the bosses, and a set of ball bearings engaging each end portion of the sleeve and the interior surface of the adjacent boss, the sleeve guiding and holding the shaft and thus maintaining the roll's axis in fixed position while the roll rotates.

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2. A top roll for spinning frames having in combination a shaft, a sleeve surrounding the shaft having capacity for relative rotation and for solely guiding the top roll when in use, two bosses having pintle-less outer ends and fixed on the shaft at opposite ends of the sleeve, and cots on the bosses, the latter terminating at their outward ends in means whereby the ends of the bosses themselves may be held by driving centers positioning and rotating the top roll during buffing.

3. In combination, a top roll for spinning frames having two bosses each having a pintle-less solid outer end and a recess in its inner end, a shaft fixed and terminating in the recess of each boss intermediate the length of the latter, a tubular member around the shaft, bearing balls within each recess supporting such member from the surfaces of the recesses, and a guide on the spinning frame in the form of an inverted channel member with notches in its side webs straddling the tubular member.

4. In combination, a top roll for spinning frames comprising a shaft and two bosses fixed thereon in rigid coaxial relation, and means rotatably guiding such top roll comprising solely a sleeve surrounding the shaft, bearing balls on the sleeve within the bosses and a guide on the spinning frame in the form of an inverted channel member with notches in the side webs hooked over the sleeve.

5. In combination, a top roll for spinning frames having two bosses each having a pintle-less solid outer end and a recess including an integral ball race formed in its inner end, a shaft fixed and terminating in the recess of each boss intermediate the length of the latter, a tubular member around the shaft with its terminal portions

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forming integral cones for ball bearings, bearing balls directly engaging the ball race in each boss and the cone on the adjacent end of the tubular member, and a guide on the spinning frame in the form of an inverted channel member with notches in its side webs hooked over the sleeve.

6. In combination, a top roll for spinning frames having two bosses each having a pintle-less solid outer end and a recess including an integral ball race formed in its inner end, a shaft fixed and terminating in the recess of each boss intermediate the length of the latter, a sleeve around the shaft having its integral end-portions reduced in diameter to form cones for bearing balls, bearing balls directly engaging the cones and the integral races in the recesses, and a guide on the spinning frame in the form of an inverted channel member with notches in its side webs hooked over the sleeve.

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