Oct. 10, 1961 K. P. SWANSON 3,003,196

TOP ROLL ASSEMBLY

Filed Aug. 5, 1959 4 Sheets-Sheet 1

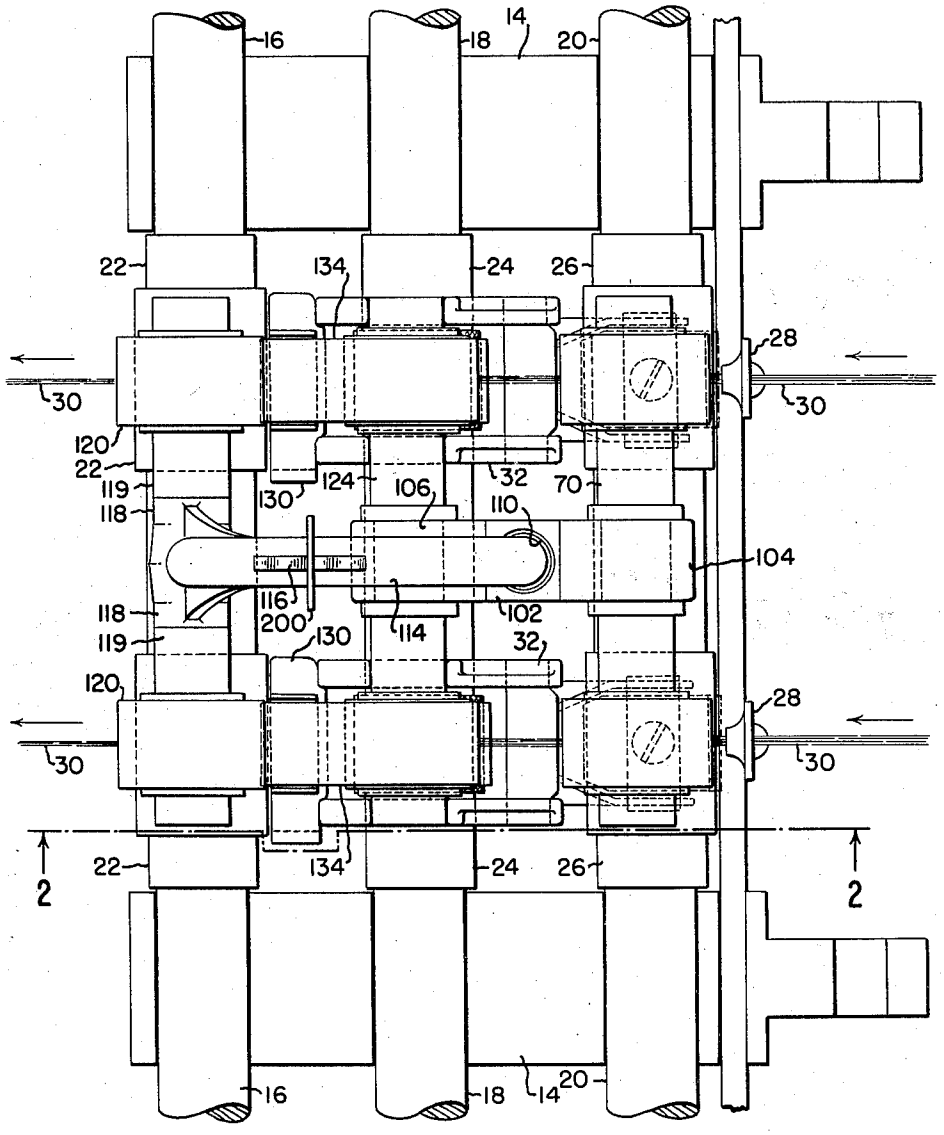


FIG. 1

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TOP ROLL ASSEMBLY

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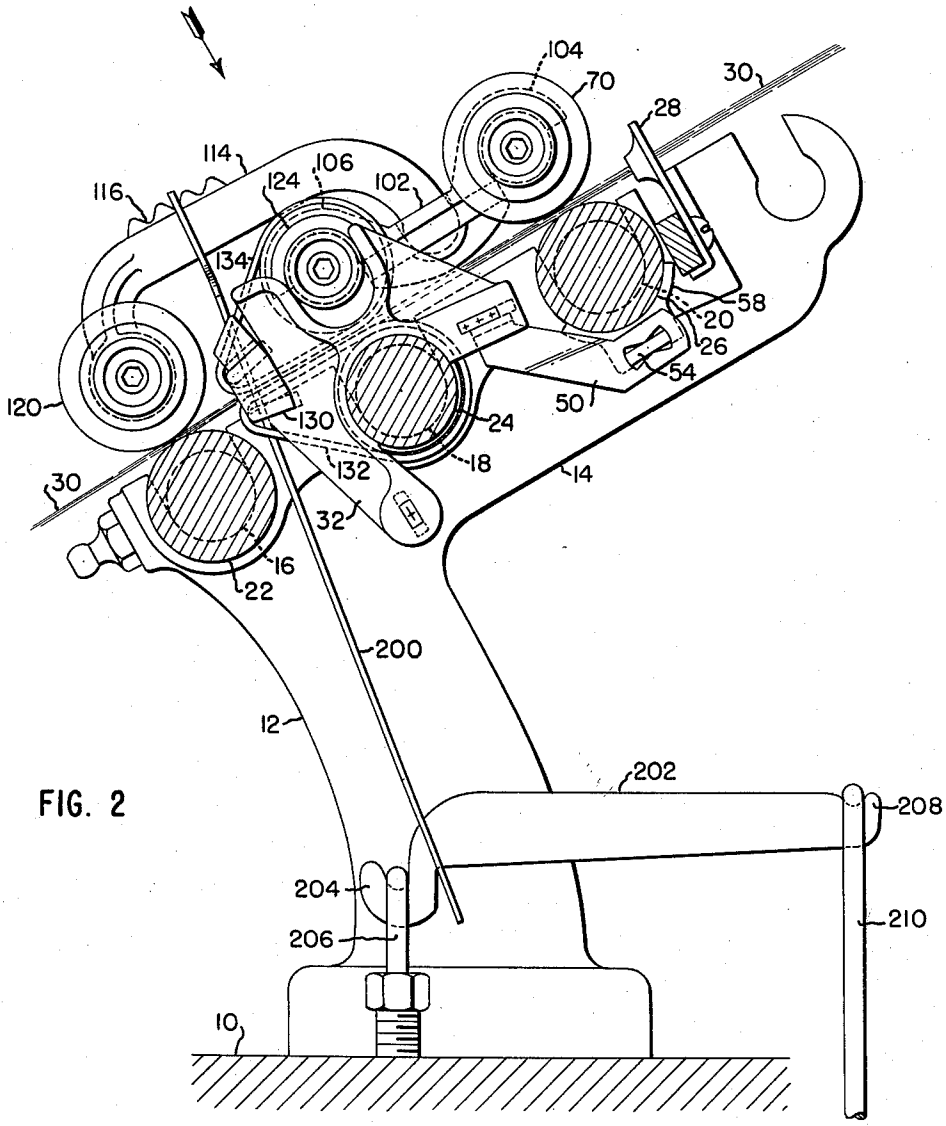


FIG. 2

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TOP ROLL ASSEMBLY

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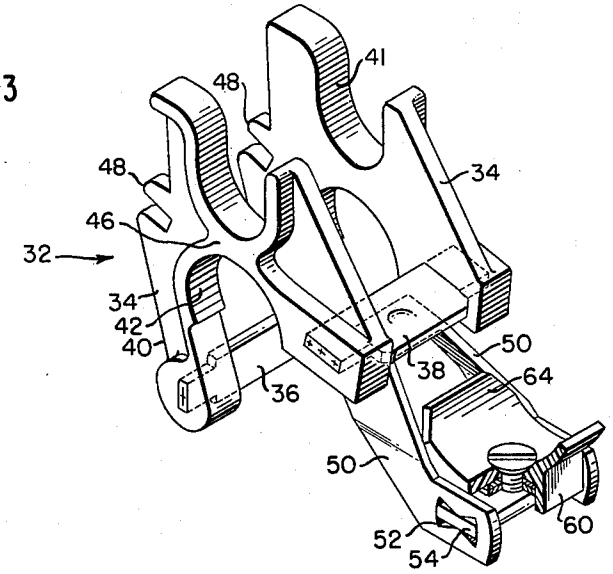
FIG. 3



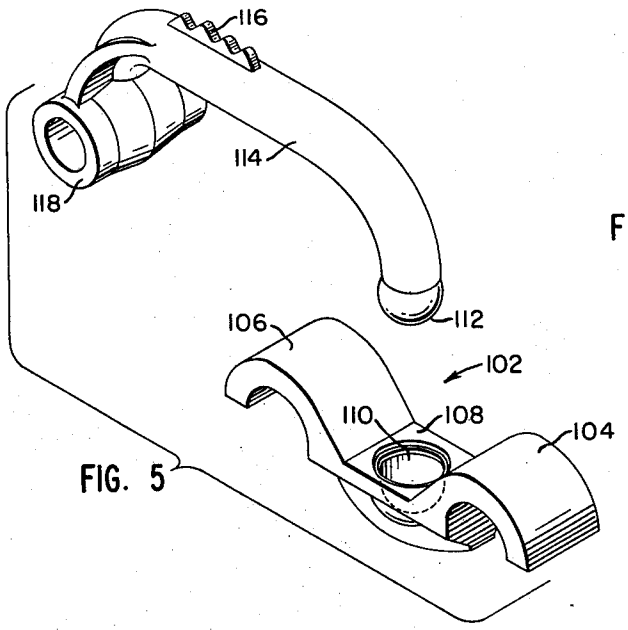
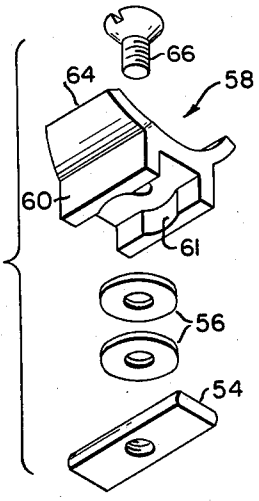




FIG. 5

FIG. 4

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TOP ROLL ASSEMBLY

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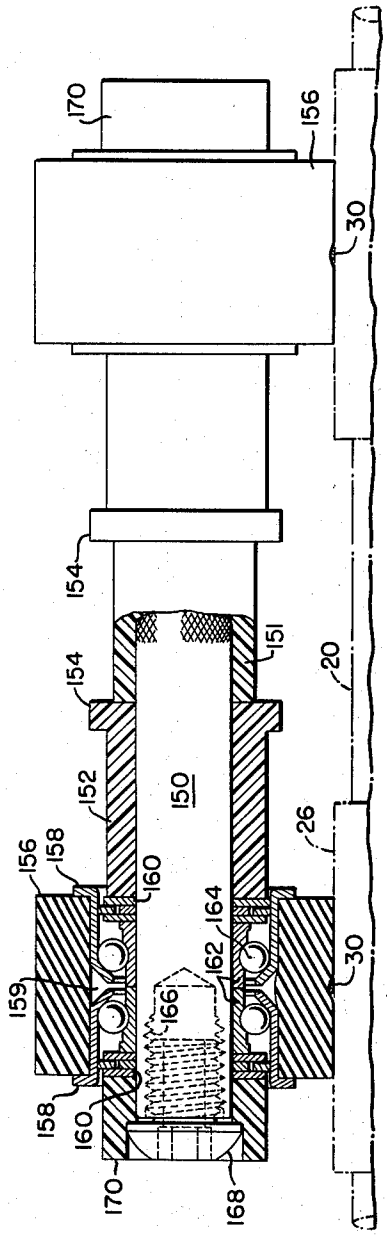


FIG. 6

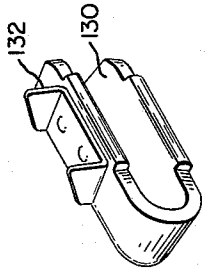


FIG. 8

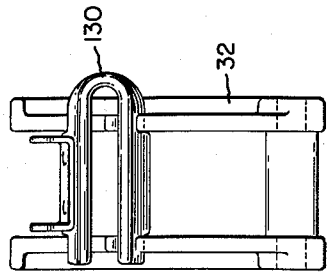


FIG. 7

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United States Patent Office 3,003,196 Patented Oct. 10, 1961



3,003,196

# TOP ROLL ASSEMBLY

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Filed Aug. 5, 1959, Ser. No. 831,840
11 Claims. (Cl. 19—131)

My invention relates to spinning and roving frames and comprises in particular an improved assembly of top rolls and supporting structure.

Currently available spinning and roving frames include a back bar which runs the length of the frame and a number of top support arms which are supported from the back bar. These top support arms are arranged to pivot about the back bar and in their operating position they are brought down over the top back, middle and front rolls to support those rolls for rotation with corresponding bottom rolls.

The top support arms and back bars constitute a rather complex structure with a considerable number of parts. In addition to their complexity, they account also for significant equipment expense. Most important, though, by their presence, they hamper the very necessary cleaning operations which are done to remove lint and fly from the frames and they themselves provide additional areas for the accumulation of lint. It is customary to provide an air blast to maintain cleanliness about the roving and spinning frames, and the back bars and top support arms of present frames prevent free circulation and efficient removal of lint by the air stream.

Other difficulties in the areas of installation, adjustment and maintenance are found in present day spinning frames and it is with the overcoming of these difficulties that the present invention is generally concerned.

The primary object of my invention is to improve the quality and efficiency of spinning and roving.

Another object of my invention is to eliminate the intricate and delicate adjustments customarily required at frequent intervals in the course of operating a spinning or roving frame.

Another object of my invention is to reduce the manufacturing, installation, and maintenance costs of top rolls and top roll mounting devices.

Still another object of my invention is to improve the strength and consistency of yarn.

An important feature of my invention resides in the combination of a cradle supporting the middle top roll and rotatably mounted on the middle bottom roll shaft, the cradle having a rearwardly extending finger engaging the bottom of the back bottom roll and including a single adjustment for varying the fixed angular position of the cradle. Although, as I have indicated above, I prefer to eliminate the back bar of frames utilizing my invention, the finger of the cradle may be designed to contact a fixed element of the frame such as the back bar where circumstances warrant this alternative. The back top roll is supported by a saddle anchored to the middle top roll, and the front top roll is mounted on an arm pivotally engaged with the saddle; consequently the adjustment of the finger simultaneously and permanently fixes the relationship of all three top rolls to the bottom rolls.

Another feature of my invention lies in locating the pivot point between the saddle and the top roll supporting arm beneath the axes of the middle and back top rolls, and so dimensioning the arm that the arc of movement of the axis of the front top roll intersects the axis of the front bottom roll. The result is that no reduction in diameter of the front top roll cots (e.g. following buffing) will alter the location of the bite of the front top and bottom rolls. Ordinarily the position of each front top roll in a spinning or roving frame must be adjusted after buffing; otherwise yarn quality suffers.



Still another noteworthy feature of my invention stems from the use of the novel cradle described above. The back bars and top support arms now almost universally provided in spinning and roving frames are supplanted by the cradle and associated elements in my invention permitting easy access to and convenient changing of the frame.

These and other objects and features of my invention, together with the incident advantages, will be more readily understood and appreciated from the following detailed description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings, in which:

FIG. 1 is a plan view of an assembly of top and bottom rolls, constructed in accordance with the invention,

FIG. 2 is a view in cross-section along the line 2—2 of FIG. 1,

FIG. 3 is a view in perspective of the cradle,

FIG. 4 is an exploded view in perspective showing the adjusting elements for the cradle finger,

FIG. 5 is an exploded view in perspective showing the saddle and cooperating front top roll arm,

FIG. 6 is a view in side elevation, partly in cross-section showing a typical top roll,

FIG. 7 is a view in front elevation of the cradle and U-pin, and

FIG. 8 is a view in perspective of the U-pin.

As best shown in FIGS. 1 and 2 the top roll assembly of my invention is applied to a conventional spinning or roving frame including the customary base 10 and upstanding frame members 12. Each of the latter has an integral inclined bracket 14 at its upper end, provided with journals supporting three bottom roll shafts: a front bottom roll shaft 16 having at spaced intervals integral enlarged roll portions 22 with knurled or fluted surfaces; a middle bottom roll shaft 18 with knurled or fluted roll portions 24; and a back bottom roll shaft 20 with knurled or fluted roll portions 26. The rolls 22, 24 and 26 are established in spaced parallel relationship and are also aligned from front to back. Each assembly includes a total of six top and bottom rolls, and there are several such assemblies per frame.

Secured to the bracket 14 behind each back bottom roll is a funnel-shaped trumpet 28 through which the silver or roving 30 is led into the bite of the rolls. Ordinarily trumpets are mounted on a traversing mechanism which oscillates horizontally at a low rate to prevent uneven wear on the surfaces of the top rolls, but in the structure of my invention I eliminate the need for traversing the strand by virtue of an improved ball bearing top roll construction shown in FIG. 6 and described in detail in my copending application Serial No. 817,513, filed June 2, 1959.

Briefly speaking, each top roll includes an arbor or shaft 150 on which is disposed a tubular central spacer 151 molded upon a knurled surface band on the shaft 150. The spacer 151 is flanked by a pair of tubular sleeves 152 each having an integral shoulder 154. At each end of the arbor 150 is a cot 156 comprising a hollow cylinder made of resilient material. Pressed into each end of each cot 156 is a cup-shaped member 158. Within each of the cups 158 is a lint sealing assembly of washers 160 and a bearing cone 162 on which a race of bearing balls 164 is mounted. The cups and cots turn freely on the balls, and the roll is completed by an end cap 170 held in place at the end of the shaft by means of a screw 168 received in an axial tapped hole 166. The roll shown in FIG. 6 happens to be the back top roll. The middle top roll differs only in employing cots of less diameter, while in the front top roll the spacer 152 is replaced by an integral arm and spacer 114, 118.

Between the cups 158 is an annular V-shaped space 159. If the strand 30 is directed upon the center of the

cot, the space 159 permits the resilient cot to flex, a result which allows operation of the frame without traverse for satisfactorily long periods of cot life.

I shall now describe the structure by means of which the three top rolls are mounted in desired relation to the bottom rolls, first pointing out that in FIG. 2 the top rolls are shown slightly separated from the bottom rolls, in the interest of clarity. In actuality the top rolls are pressed into firm engagement with the bottom rolls.

Perhaps the key element is a cradle shown generally at 32 and best illustrated in FIG. 3. The cradle is organized about a pair of flat side members 34 of identical configuration and conveniently made of molded plastic material. The side members 34 are maintained in rigid spaced parallel relation by means of a pair of flat stiff metal bars 36 and 38 the ends of which are anchored in sockets formed in the side members. Each side member includes a downwardly extending peninsular 40 shaped to form one leg of an arcuate recess 42 open at the bottom of the cradle and including an arc slightly in excess of 180°. The side members 34 are also shaped to form substantially U-shaped recesses 41 opening upwardly and separated from the recesses 42 by thin, flexible webs 46. The front edge of each member 34 is provided with an integral lug 48 providing supports for the mounting of a stiff metal U-pin 130 (cf. FIGS. 7 and 8), whose function will later be described.

Welded or otherwise secured to the lower surface of the bar 38 is a U-shaped bracket 50 having aligned recesses 52 of roughly hourglass configuration cut in the rearwardly extending bracket legs. A short flat metal bar 54 is held at each end in the recesses 52, and it is important to note that the hourglass shape of the recesses 52 permits the bar 54 to rock on a horizontal axis through a limited arc. (See FIG. 3.)

As best shown in FIG. 4, a plastic finger tip 58 has a downwardly extending channel portion 60 including a circular recess 61 accommodating a desired number of washers 56 by means of which the bar 54 may be adjustably spaced from the bottom of the inverted channel 60. The upper portion of the finger tip 58 is curved as shown at 64 to provide an arcuate seat having a radius approximately equal to that of the back bottom roll 26. A machine screw 66 passes through the bottom of the arcuate seat 64 into a hole tapped into the flat bar 54, thus holding the finger tip assembly in place on the bracket 50.

The assembly includes a pair of the cradles 32, each of which is snapped over the middle bottom roll shaft 18, the side members of each cradle embracing the middle bottom rolls 24. When the cradles are installed, they flex at the web portions 46 so that the arcuate recesses 42 are temporarily enlarged as they slip over the roll shaft 18. Because these recesses exceed 180°, it will be evident that the cradles are removably but firmly locked in place upon the middle bottom roll shaft 18. The engagement of the finger tip 58 with the back bottom roll 26 limits the rotation of the cradle 32 about the middle bottom roll shaft in the counter-clockwise direction. Since the cradles are subjected to a downward pull (as will later be explained) the finger tip 58 is forced upwardly against the back bottom roll, and the cradle is thereby fixed in a position which can be adjusted by adding or removing washers 56; the adjustment is permanent once it has been made. A middle top roll 124 is mounted on the cradles 32. The end caps 170 and spacer sleeves 152 engage the edges of the U-shaped recesses 41.

A rubber belt or apron 132 passes around the circumference of each of the pair of knurled middle bottom rolls 24 and about the lower leg of the U-pins 130 held in the cradles 32. Similar aprons 134 pass around the circumference of the middle upper top roll 124 and about the upper leg of the U-pins 130. Thus the two aprons cooperate on the strand 30 passing between them. The action of the aprons is conventional and requires no further description. However, it is important to note that the U-pin 130 is not of conventional form. It is provided with a U-shaped clip 132 on the upper surface of the upper leg, the sides of the clip serving as guides maintaining the alignment of the upper aprons 134. As has been explained, the vertical position of the discharge end of the nip of the aprons 132 and 134 is fixed by the engagement of the finger tip 58 with the bottom of the back bottom roll 26. The distance between the discharge end of the nip of the aprons and the bite of the front rolls 22 and 120 is also critical, and I provide another form of permanent adjustment to take care of it. That dimension may be determined by the breadth of the U-pin 130. If it is found that the distance is too short, for example, I may use a broader U-pin in cooperation with slightly longer aprons. Conversely, a thinner U-pin 130 and shorter aprons are employed if it is found desirable to decrease the distance.

The integral center sleeve of the middle upper top roll provides a seat for one end of a saddle member 102, best shown in FIG. 5. The saddle 102 includes a pair of arcuate fingers 104 and 106 and a depressed center portion 108 including a hemispherical recess 110. The finger 106 rests on the center of the middle upper top roll, and the finger 104 rests on the center portion of the back top roll 70.

The breadth of the fingers 104 and 106 is sufficient to span enough of the associated top rolls to ensure that the back top roll is firmly gripped and maintained in parallel relation to the middle top roll as well as to the bottom rolls. It is important to observe that the distance between the middle and back top rolls is fixed and that there is no adjustment, contrary to customary practice. Because the top roll assembly of my invention may be installed on spinning and roving frames of various models and manufacture, the required distance between the middle and back top rolls will vary. That is why it is customary to provide some means of adjusting that distance. I have found, however, that, because the distance is critical, it is preferable to use a saddle 102 properly and permanently dimensioned for the particular frame on which the assembly will be used. It is a simple matter to manufacture saddles of various lengths, and the great resulting advantage is that once a proper installation has been made, no subsequent adjustment is ever needed. Moreover the assembly can be dismounted for cleaning or repair and then reinstalled quite simply by unskilled labor.

Seated in the socket 110 is the rounded end 112 of a curved arm 114 which terminates at its forward end in a sleeve 118 which forms the center spacer sleeve of the front top roll 119 provided with the customary cots 120. The ball and socket engagement of the arm 114 and saddle 102 permits the front top roll 119 to pivot laterally, while vertical movement is restrained by a stirrup 200 as will later be described. Since the cots 120 of the front top roll 119 are rotated by their engagement with the driven front bottom rolls, the front top roll 119 is self-aligning. Consequently the front top roll is automatically maintained in proper parallel relation to the front bottom roll, and, again, no adjustment is necessary. The arm 114 may conveniently comprise a steel member having a molded plastic coating and is provided with a plurality of serrations 116 along its upper edge near the forward end. The serrations provide adjustable positioning means for a stirrup 200 which projects downwardly between the cradles 32 and between the front and middle bottom roll shafts. The upper end of the stirrup is formed with a circular recess by means of which the stirrup may be slipped over the arm 114 and moved to desired position in engagement with one of the serrations 116. The lower end of the stirrup 200 is slotted to receive a lever 202 having a hook 204 at its forward end engaging an eye-bolt 206 secured to the frame base 10. The rear end of the lever 202 has a slight hook 208 which engages a vertical rod 210 at the lower end of which is a weight (not shown).

The weight on the end of the rod **210** works through the lever **202**, the stirrup **200** and the arm **114** to apply pressure upon all three top rolls. The pressure on the front top roll is direct through the arm **114**, while the rear end of the arm **114** bears on the saddle member **102** and thereby exerts downward pressure on the middle and back top rolls. Because the stirrup **200** is disposed forwardly of the cradles **32**, there is also a force tending to rotate both cradles in counter-clockwise direction, and that force is resisted by the engagement of the finger tip **58** with the bottom of the back bottom rolls **26**. Assuming that the arm **114** and saddle **102** are properly dimensioned to begin with, it will be evident that the relationship of all three top rolls with their corresponding bottom rolls is permanently fixed by means of the engagement of the finger tip **58** with the back bottom rolls and that all those relationships are simultaneously adjusted by adding or subtracting washers **56** to adjust the height of the finger tip and the rotational position of the cradle about the middle bottom roll shaft.

Here it is important to note that the pressure distribution on the three top rolls needs to be altered in order to make the assembly operate properly on various types of yarn materials. As best shown in FIG. 2, the necessary adjustment can very simply be accomplished by slipping the upper end of the stirrup **200** into the proper serration **116**. Although three serrations are shown, any reasonable number may be utilized and each given a fixed position requiring no adjustment once set. This is in contrast to known systems wherein screw adjustments or the like are provided. Variable adjustments such as the screw are either neglected by unskilled help or require too frequent attention by skilled help. In either case the result is undesirable; poor yarn or undue expense is encountered and these difficulties are eliminated by the fixed adjustments provided by the serrations and their associated stirrup. The setting once established also promotes consistency of output because the system may be taken apart if necessary and reassembled with the identical adjustment existing before disassembly.

The relative positions of the front top and bottom rolls and their position relative to the discharge end of the bite of the aprons **132** and **134** are of critical importance in the production of quality yarns. The arm **114** pivots by reason of the engagement of its rounded end **112** in the hemispherical recess **110** of the saddle **102**. It should be noted that the pivot point is below the centers of the middle and back top rolls and that it is so located that the axis of the front top roll moves through an arc which intercepts the axis of the front bottom roll **22**. If the diameter of the cots **120** of the front top roll is reduced, as happens when the cots are buffed, the location of the bite of the front top and bottom rolls remains in precisley the same location. The relative positions of the bite of the front top and bottom rolls and the discharge end of the bite of the aprons **132** and **134** are permanently fixed after the finger tip **58** has been adjusted by means of the washers **56**. The rolls may be disassembled and re-assembled without in any way altering the critical relationships. Consequently a properly installed assembly can never get out of adjustment, and the usual requirement that exceptionally skilled workers dismount and clean top rolls is completely eliminated. The ultimate result is a striking improvement in the quality and consistency of the yarn.

Having thus disclosed by invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a roll assembly for spinning and roving frames which include a frame, three spaced parallel bottom rolls and three spaced parallel top rolls, apparatus for supporting said top rolls in juxtaposition to said bottom rolls comprising a cradle having a first surface for engaging the upper portion of the middle one of said bottom rolls, a second surface for engaging the lower portion of another of said bottom rolls, and means for adjusting the engagement of one of the surfaces with one of said bottom rolls to vary the rotational position of said cradle about the other of said bottom rolls and the position of said top rolls relative to said bottom rolls.

2. In a roll assembly for spinning and roving frames which includes a frame, spaced parallel back, middle, and front bottom rolls, and spaced parallel back, middle, and front top rolls, apparatus for supporting said top rolls in juxtaposition to corresponding ones of said bottom rolls comprising a cradle having a first surface rotatable about and engaged by the upper portion of said middle bottom roll and a second surface engaged by the lower portion of said back bottom roll, said middle top roll being mounted for rotation in said cradle, means supported from said cradle for retaining said front and back top rolls in juxtaposition with said front and back bottom rolls, and means for adjusting the distance of said second surface from the body of said cradle to rotate said cradle about said middle bottom roll and to vary the positions of all of said top rolls relative to corresponding bottom rolls.

3. Roll assembly for spinning and roving frames, comprising a frame, three spaced parallel bottom rolls mounted in said frame, a cradle engaging the upper portion of the middle bottom roll, a finger secured to said cradle and engaging the bottom of the back bottom roll, a middle top roll mounted in said cradle above the middle bottom roll, a back top roll, a saddle having fingers engaging the tops of the middle and back top rolls, a front top roll, an arm engaging the saddle between said fingers thereof, said arm also engaging said front top roll, and means for applying pressure on said arm to urge the arm, saddle and all top rolls against the bottom rolls.

4. Roll assembly for spinning and roving frames, comprising a frame, three spaced parallel bottom rolls mounted in said frame, a cradle engaging the upper portion of the middle bottom roll, a finger secured to said cradle and engaging the bottom of the back bottom roll, a middle top roll mounted in said cradle above the middle bottom roll, a back top roll, a saddle having curved fingers engaging the tops of the middle and back top rolls, an arm pivotally engaging the saddle between said fingers, a front top roll secured to said arm, and means for applying pressure on said arm to urge the arm, saddle and all top rolls against the bottom rolls.

5. Roll assembly for spinning and roving frames, comprising a frame, three spaced parallel bottom rolls mounted in said frame, a cradle engaging the upper portion of the middle bottom roll, a finger secured to said cradle and engaging the bottom of the back bottom roll, a middle top roll mounted in said cradle above the middle bottom roll, a back top roll, a saddle having fingers engaging the tops of the middle and back top rolls, an arm pivotally engaging the saddle between said fingers thereof, a front top roll secured to said arm, the axes of the front top and bottom rolls both lying on an arc having as its center the pivot point between said arm and saddle, and means for applying pressure on said arm to urge the arm, saddle and all top rolls against the bottom rolls.

6. In a drawing frame having three spaced parallel bottom rolls and three top rolls, the combination of a cradle rotatably mounted on the middle bottom roll and having an adjustable finger engaging the bottom of another bottom roll, means on the cradle for mounting the middle top roll, a saddle connected to the middle top roll and having means for holding another top roll, a third top roll supporting means pivotally connected to the saddle, and means for applying downward pressure upon said third top roll supporting means at a point between said other and middle top rolls, whereby said cradle is rotated until said finger bears against the bottom of said other bottom roll, adjustment of said finger

serving simultaneously to vary the positions of all three top rolls with respect to the bottom rolls.

7. The combination defined in claim 6 wherein said cradle is provided with means for supporting cooperating aprons disposed about the middle top and bottom rolls, and adjustment of said finger also serves to position the nip of the aprons with respect to a third bottom roll.

8. In a spinning or roving frame having front, middle and back bottom rolls and roll shafts, the combination of a cradle mounted on the middle bottom roll shaft, a finger secured to said cradle and bearing upon one of the other bottom roll shafts to limit rotation of the cradle, a middle top roll carried in said cradle, a back top roll, a saddle connected to the middle top roll for mounting the back top roll over the back bottom roll, a front top roll, means secured to said saddle for mounting said front top roll over the front bottom roll, means for weighting said means, and means for varying the length of said finger in order simultaneously to adjust the positions of all three top rolls with respect to the bottom rolls.

9. In a spinning or roving frame having front, middle and back bottom rolls and roll shafts, the combination of a cradle mounted on the middle bottom roll shaft, means fixed to said cradle to limit rotation of said cradle, a middle top roll carried in said cradle, a back top roll, a saddle connected to the middle top roll for mounting the back top roll over the back bottom roll, a front top roll, means secured to said saddle for mounting said front top roll over the front bottom roll, means for weighting said means, and means for varying the length of said means fixed to said cradle in order simultaneously to adjust the positions of all three top rolls with respect to the bottom rolls.

10. In a roll assembly for spinning and roving frames,



the combination of a frame, a plurality of spaced bottom rolls mounted in said frame, a cradle engaging the upper portion of one of said bottom rolls and the lower portion of an adjacent bottom roll, a like plurality of spaced top rolls aligned with and bearing upon said plurality of bottom rolls, one of said top rolls being mounted for rotation in said cradle, means for adjusting the position of said cradle relative to said lower portion of said adjacent bottom roll, and means supported from said one of said top rolls for retaining the remainder of said top rolls in predetermined relationship to said bottom rolls.

11. In a drawing frame having three spaced parallel bottom rolls and three top rolls, the combination of a cradle rotatably mounted on the middle bottom roll and having a finger engaging the bottom of another bottom roll, the middle top roll rotatably mounted on said cradle, a saddle engaging the tops of the middle and another top roll, an arm pivotally engaging the saddle between said middle top roll and said other top roll, said arm secured to the third top roll, and means for applying downward pressure upon said arm, whereby said cradle is rotated until said finger bears against the bottom of said other bottom roll, and said top rolls are urged into engagement with said bottom rolls.

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