RE 25520

March 24, 1959 J. R. WHITEHURST 2,878,527

MEANS FOR FEEDING SLIVERS TO COILERS

Filed Sept. 12, 1955 4 Sheets-Sheet 1

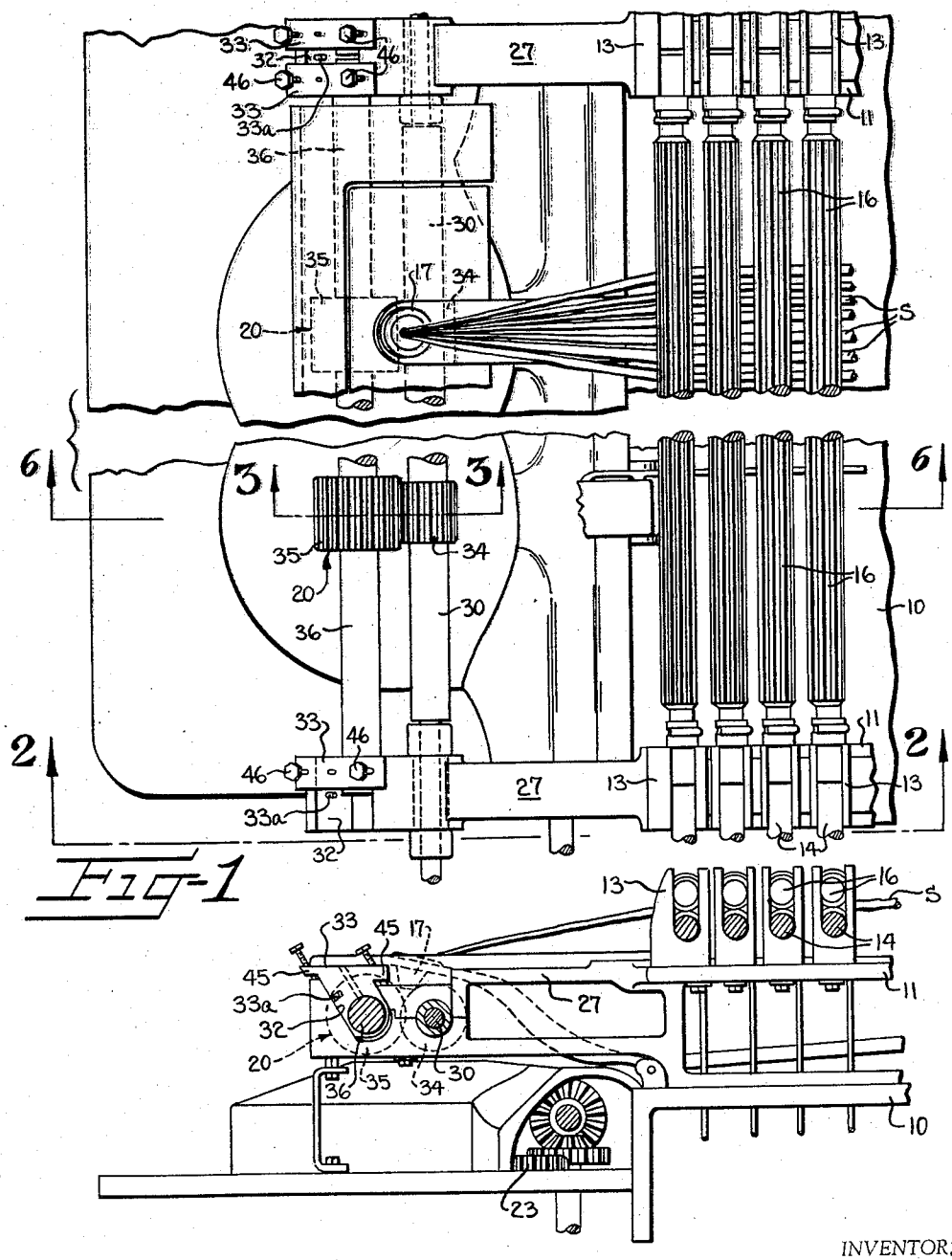


Fig-1

Fig-2

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MEANS FOR FEEDING SLIVERS TO COILERS

Filed Sept. 12, 1955 4 Sheets-Sheet 2

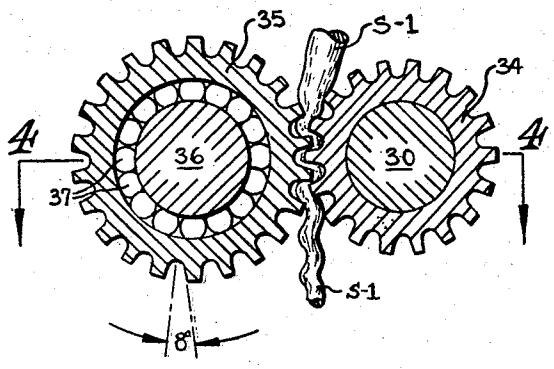


Fig-3

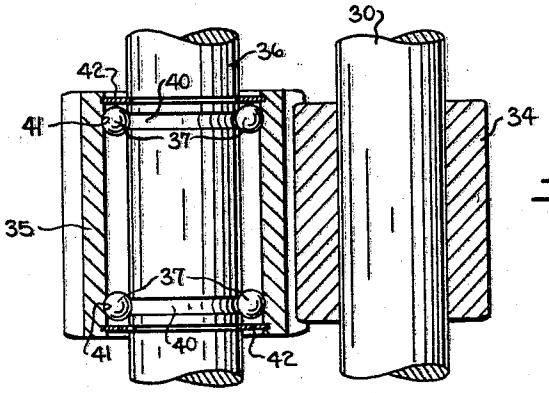


Fig-4

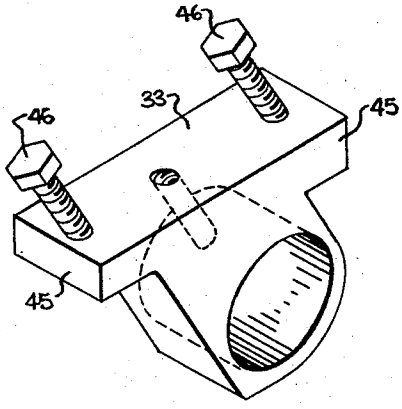


Fig-5

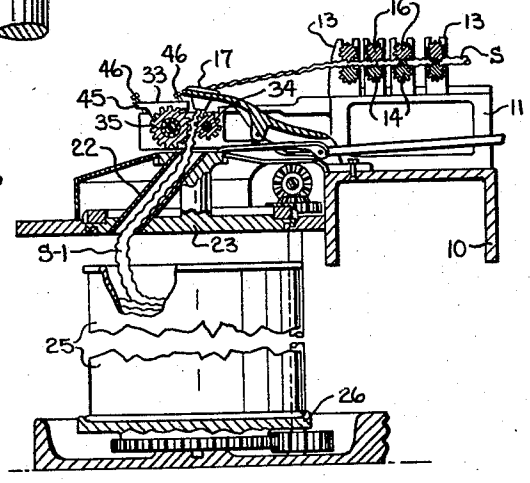


Fig-6

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MEANS FOR FEEDING SLIVERS TO COILERS

Filed Sept. 12, 1955 4 Sheets-Sheet 3

Fig-9

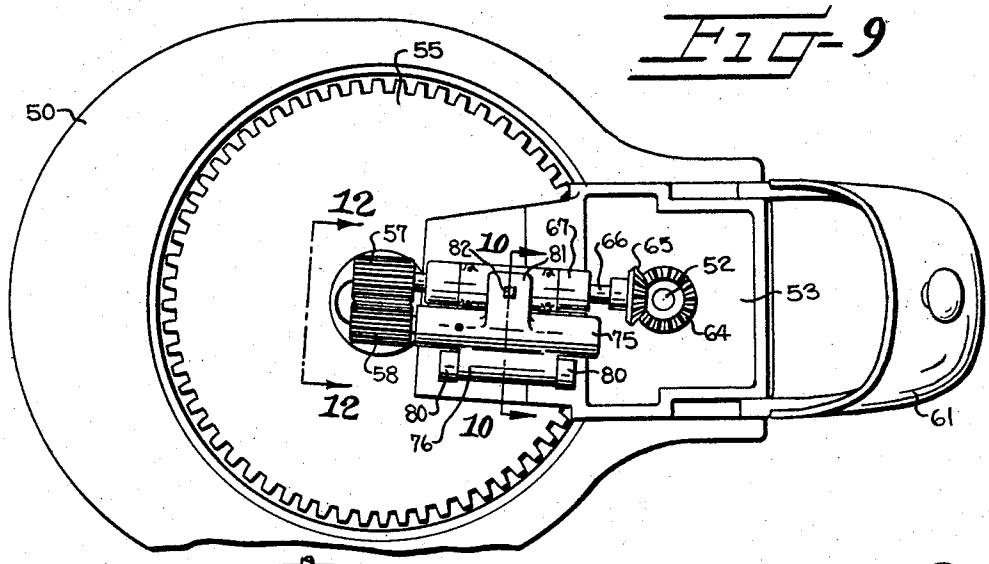


Fig-8

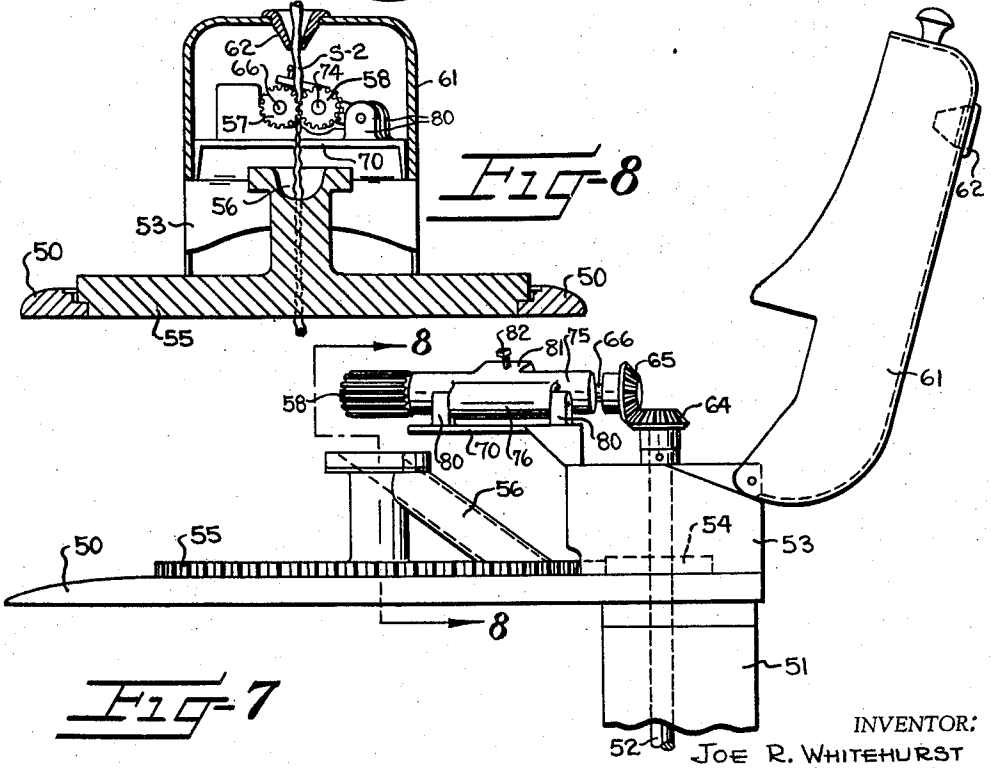


Fig-7

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March 24, 1959 J. R. WHITEHURST 2,878,527

MEANS FOR FEEDING SLIVERS TO COILERS

Filed Sept. 12, 1955 4 Sheets-Sheet 4

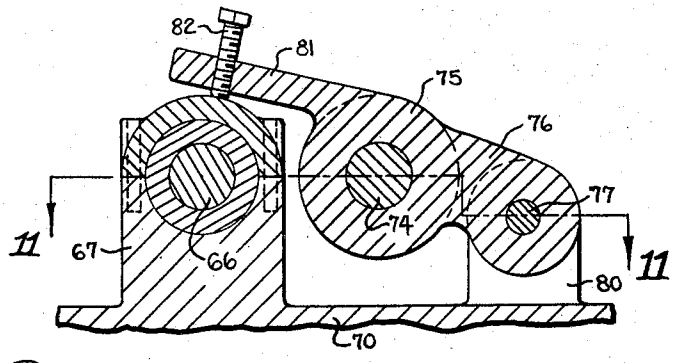


Fig-10

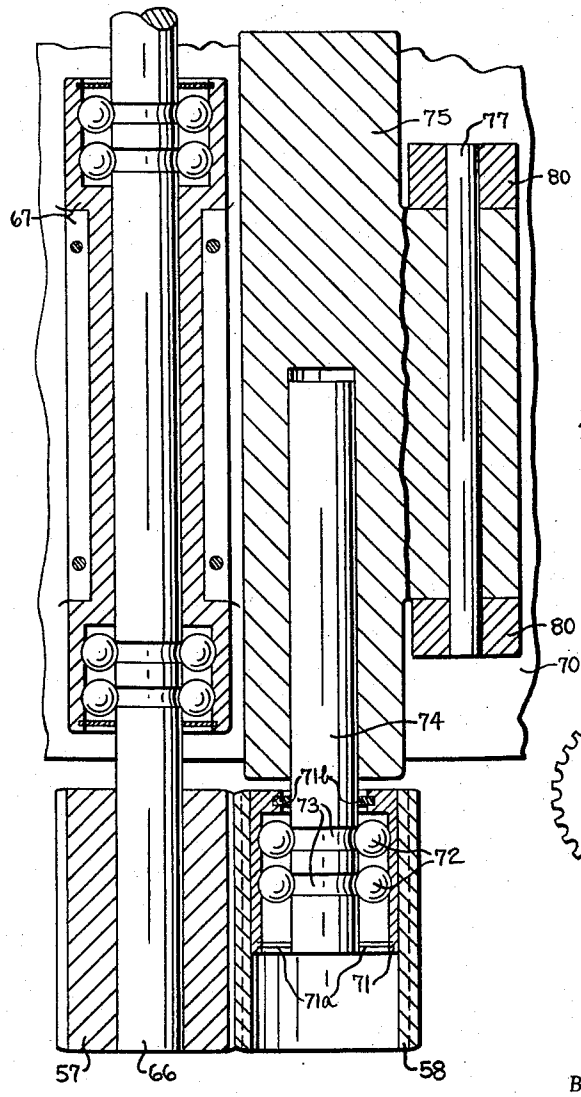
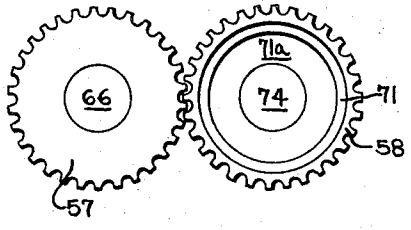


Fig-11

Fig-12



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United States Patent Office 2,878,527 Patented Mar. 24, 1959

2,878,527

MEANS FOR FEEDING SLIVERS TO COILERS

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Application September 12, 1955, Serial No. 533,735

10 Claims. (Cl. 19—159)

This invention relates to coiler mechanisms and, more especially, to improvements in calender rolls utilized for feeding strands of sliver from drawing frames, carding machines and other sliver processing machines into coiler mechanisms which coil the slivers into cans.

As is well known, coiler mechanisms include a coiler head having a driven disk or tube gear provided with an inclined tubular passageway for directing sliver from a pair of calender rolls downwardly and outwardly from the center of the disk or tube gear to be discharged from the lower end thereof in off-center relation to the axis thereof to form the sliver into coils in a can positioned beneath the disk or tube gear. Heretofore, the calender rolls have had smooth peripheral surfaces with both of the calender rolls of a pair being driven at constant speeds and at the same peripheral speeds and this would cause the calender rolls to rotate varying amounts, or slip, relative to the sliver being pulled thereby through the usual trumpet, due to the lack of sufficient traction between the calender rolls and the sliver. This, in turn, would result in uneven density and thickness of the sliver throughout its length.

In addition, the smooth peripheral surfaces on the calender rolls heretofore employed have pressed the fibers together to such an extent as to remove most or all of the crimp previously formed in the sliver during the drafting of the fibers on, for example, a drawing machine. Also, since the types of fibers in and the size of different slivers may vary, in order to provide for the proper speed of movement of the sliver at the nip of the calender rolls, it has been necessary heretofore to frequently change gears which transmit rotation from the drawing rolls to the calender rolls.

It is an object of this invention to provide an improved calender roll unit for a coiler mechanism comprising first and second fluted calender rolls in which only the first calender roll is driven and the first calender roll imparts rotation to the second calender roll by intermeshing engagement with the flutes thereof and by engagement of the rolls with the sliver therebetween, thus insuring ample traction between the sliver passing through the nip of the calender rolls so the calender rolls cannot slip relative to the sliver and also forming a crimp in the sliver as it passes through the nip of the calender rolls. The crimp formed in the sliver binds the fibers together so as to substantially increase the tensile strength of the sliver as compared to what it would be in the absence of the crimp so the sliver will not become torn apart as it is subsequently withdrawn from the coiler cans.

It is another object of this invention to provide apparatus of the character described wherein the flutes of the calender rolls are provided with a pressure angle of eight degrees in order to more effectively produce the desired crimp in the sliver, it being well known that, heretofore, the flutes of drafting rolls or the teeth of spur gears, for example, have been provided with a pressure angle of approximately fourteen and one-half degrees.

It is still another object of this invention to provide a calender roll unit for coilers wherein a first fluted calender roll is fixed on a driven shaft and a second fluted calender roll meshing therewith is rotatably mounted on a stationary shaft with means for adjusting the stationary shaft toward and away from the driven shaft to thereby adjust the speed at which sliver is drawn through the nip of the calender rolls to accommodate slivers of varying size and density. This variation in sliver speed is due to the greater surface area of the flutes of the two calender rolls which is contacted by the sliver when the calender rolls are close together as compared to such surface area when the calender rolls are spaced substantially apart.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a fragmentary top plan view of a portion of a drawing frame showing a pair of the improved calender roll units mounted thereon;

Figure 2 is an elevation, partially in section, taken substantially along line 2—2 in Figure 1 showing the relationship of the coiler mechanism to the improved calender roll unit;

Figure 3 is an enlarged fragmentary vertical sectional view taken substantially along line 3—3 in Figure 1;

Figure 4 is a fragmentary sectional plan view taken substantially along line 4—4 in Figure 3;

Figure 5 is a detail of one of the blocks for supporting the adjustable stationary shaft on which the floating or idler fluted calender roll of each pair is rotatably mounted;

Figure 6 is a somewhat schematic vertical sectional view, on a reduced scale, taken substantially along line 6—6 in Figure 1;

Figure 7 is a fragmentary elevation of the upper portion of a coiler head of the type generally used in association with carding machines showing another form of calender roll unit embodying the principles of the present invention and showing the cover or trumpet tongue for the calender roll unit in open position;

Figure 8 is a transverse vertical sectional view taken substantially along line 8—8 in Figure 7 and showing the cover for the calender roll unit in closed or lowered position;

Figure 9 is a fragmentary top plan view of the structure shown in Figure 7, also showing the cover for the calender roll unit in raised or open position;

Figure 10 is an enlarged transverse vertical sectional view taken substantially along line 10—10 in Figure 9 and showing the means for adjusting the idler fluted calender roll relative to the driven calender roll;

Figure 11 is a longitudinal sectional plan view taken substantially along line 11—11 in Figure 10;

Figure 12 is an enlarged fragmentary and somewhat schematic end view of the fluted calender rolls looking substantially along line 12—12 in Figure 9.

The invention is embodied in two forms in the drawings wherein the first form of the invention is shown in Figures 1 through 6 in association with a drawing frame and, in Figures 7 through 12 the invention is shown in association with a coiler head of the type used in association with a carding machine. The drawing frame shown in Figures 1, 2 and 6 comprises an elongated frame or beam 10 having a plurality of longitudinally spaced brackets or roll stand supports 11 fixed thereon, on each of which a plurality of conventional bearings 13 are mounted. The bearings 13 have conventional driven bottom drafting rolls 14 and top drafting rolls 16 journaled therein which exemplify one embodiment of sliver processing instrumentalities and between which strands of

textile fibers S pass as they are attenuated in the usual manner. The strands S pass forwardly from the rolls 14, 16 and are condensed through corresponding trumpets 17 each of which is associated with a corresponding one of the improved calender roll units broadly designated at 20, there being a plurality of such calender roll units 20, each of which directs the slivers condensed by the corresponding trumpet 17 into and through an inclined tube 22 carried by a disk or tube gear 23.

The disk or tube gear 23 is driven in the usual manner to deposit the sliver S–1 formed from the sliver strands S in coils in a can 25 mounted on a rotatable base 26, which base 26 is rotated by conventional means, not shown, in timed relation to the disk or tube gear 23.

The drawing frame is shown in Figures 1, 2 and 6 as being equipped with conventional calender roll stands 27 which are shown as being formed integral with the brackets or roll stand supports 11 and a driven calender roll shaft 30 is journaled in the stands 27 and is driven by conventional gearing, not shown, to rotate in proper timed relation to the drafting rolls 14, 16. Such conventional gearing includes change-gears for adjusting the speed of the calender rolls relative to the drafting rolls 14, 16. The improved calender roll units obviate the necessity of changing the gears to adjust the rate at which the sliver S–1 is fed into the coiler tube 22, as will be further described later in this context.

It will be noted in Figure 2 that the upper surface of each calender roll stand 27 is provided with a forwardly and downwardly inclined slot 32 therein for reception of improved adjustable stationary calender-roll-shaft-supporting blocks 33 which blocks 33 are parts of the present invention. The blocks 33 are restrained from endwise movement in the slots 32 by pins or screws 33*a*.

The improved calender roll units 20 each includes a pair of fluted calender rolls 34, 35, the first calender roll 34 being fixed on the driven calender roll shaft 30 and the second calender roll 35 being loosely or rotatably mounted on a shaft 36. Opposite ends of the shaft 36 are fixed in the corresponding blocks 33. It is customary to provide a separate shaft for every two idler calender rolls. Therefore two of the improved calender roll units 20 are associated with each shaft 36, but shaft 30 is common to all such units on a given drawing frame.

It will be noted in Figures 3 and 4 that the flutes on the improved calender rolls 34, 35 have pressure angles of eight degrees as compared to the usual fourteen and one-half degrees of spur gears and fluted rolls such as are normally used as drafting rolls and, in order to minimize the frictional contact between the shaft 36 and the second fluted calender roll 35, it will be observed in Figures 3 and 4 that the second calender roll 35 is tubular and is mounted on the shaft 36 by means of anti-friction bearings. In this instance, the anti-friction bearings are shown in the form of a pair of circular rows of balls 37 which fit in complementary grooves 40 and 41 formed in the proximal surfaces of the shaft 40 and the calender roll 35. It is preferable that a suitable lubricant is provided within the calender roll 35 and, therefore, suitable lubricant seals 42 may be provided on opposite ends of the tubular calender roll 35.

Since the shaft 36 is stationary and the second calender rolls 35 are loosely journaled on the shaft 36, it is apparent that the second calender rolls 35 are driven solely by the corresponding first calender rolls 34 and by the sliver passing through the nip of the calender rolls 34, 35. Accordingly, the flutes of the calender rolls 34, 35 insure that the rolls cannot slip relative to the sliver S–1 passing therebetween, thereby minimizing the variations in thickness of the sliver passing therebetween. Also, the flutes, and particularly the pressure angle of the flutes, causes the sliver S–1 to be severally crimped as it passes through the nip of the fluted calender rolls thereby compressing the fibers at closely spaced points to an extent heretofore unattainable and thus substantially increasing the tensile strength of the sliver S–1 as compared to what its strength would be if it were not crimped.

The crimping of the sliver prior to its passing through the inclined tubular passageway of the disk or tube gear 23 minimizes the stretching of the sliver as it is withdrawn from the can 25 in subsequent processes and, accordingly, minimizes variations in the diameter or size of the sliver as it is subsequently processed. Heretofore, in using conventional types of smooth-faced calender rolls, there has been recurring variations of eighteen percent in the diameter or size of the sliver throughout its length and, without crimping the sliver, as has heretofore been the case, when the sliver has subsequently been withdrawn from the can, it has stretched an average of approximately three and one-half percent and this has caused as much or more than fifty percent variation in adjacent portions of the sliver throughout its length as it was withdrawn from the can in subsequent processing operations. The improved fluted calender rolls have substantially reduced the amount of variation in size or diameter of the sliver as it is directed into the can and crimping of the sliver has maintained any variations therein substantially constant from the time they enter the can until the sliver has passed through subsequent machine processes, thus greatly improving the texture and quality of the roving and yarn subsequently made from such slivers.

Referring to Figures 1, 2 and 5, it will be observed that each of the stationary shaft-supporting blocks 33 has a pair of ears 45 thereon which overlie adjacent front and rear portions of the corresponding calender roll stand 27 and each of the ears 45 has an adjustment screw 46 threaded therethrough whose lower end bears against the upper surface of the corresponding calender roll stand 27. Thus, by adjusting the screws 46, since opposite sides of the blocks 32 engage angularly disposed surfaces of the openings 32 formed in the corresponding calender roll stands 37, it is apparent that the shaft 36 and the floating calender rolls 35 journaled thereon are adjusted toward and away from the driven shaft 30 and the driven calender rolls 34, respectively, to accommodate various kinds and/or sizes of slivers.

Since the floating calender roll 35, in each instance, is driven solely by the stock passing through the nip of the calender rolls 34, 35, this obviates the necessity of providing different sizes of gears between the main drive of the machine or the drafting rolls 14, 16 and the shaft 30, as has heretofore been required, whenever the sliver is drawn through the nip of the calender rolls at an undesirable rate of speed. The speed of the sliver S–1 is relatively high when the fluted calender rolls 34, 35 are closely intermeshed (Figure 3) as compared to its speed when the rolls 34, 35 are loosely intermeshed because, the closer the fluted calender rolls 34, 35 of a unit are to each other, the greater the surface area of the flutes engaged by the sliver. In other words, the flutes of each roll press the sliver into the grooves between the flutes of the mating roll further and more compactly as the rolls are adjusted closer together so that a greater amount of stock is drawn therebetween than is the case when they are adjusted further apart from each other.

This is one of the most important features of the present invention because it often happens that it is desirable to process different types of slivers in adjacent roll sections and calender roll units of a given drawing frame or the like. For example, one sliver may be formed solely from cotton fibers, another may be formed from a blend of cotton fibers and synthetic fibers, etc. This has not been possible heretofore due to the fact that all slivers on a given machine had to be drawn through the calender rolls at the same speed, with the result that one or more slivers would become too taut or break between the drafting zone and the calender rolls while other slivers would become unduly slackened. This condition is overcome with the improved fluted calender roll units 20 because

the displacement at the nip of mating fluted calender rolls is adjustable independently of the rolls of adjacent units. This is true even where the fluted idler calender rolls **35** of two adjacent units **20** are mounted on a same shaft, since the block **33** at either end of each shaft **36** may be adjusted toward or away from the driving shaft **30** independently of the block **33** at the other end of the corresponding shaft.

Second form of invention

Referring to Figures 7 through 12, there is shown the second form of the invention in which the improved fluted calender rolls are shown in association with a coiler head of the type used with carding machines, for example. A carding machine is another embodiment of sliver processing instrumentalities. In this instance, the coiler head comprises a platform **50** which overlies the usual can, not shown, and which is supported on a hollow pedestal or post **51**, upwardly through which a conventionally driven shaft **52** extends. The shaft **52** also extends through a gear box **53** fixed on the platform **50** and in which gear box a pinion or gear **54** is positioned and fixed on the shaft **52**. The gear **54** meshes with a conventional tube gear or disk **55** having an upwardly and inwardly extending passageway or tube **56** thereon into which a sliver S–2 is directed by a pair of fluted calender rolls which are peculiar to the present invention and are similar to the calender rolls **34, 35** in Figures 1, 2, 3, 4 and 6.

The gear box **53** has the usual cover or trumpet tongue **61** pivotally mounted thereon. The trumpet tongue **61** has a conventional trumpet **62** positioned therein for condensing the sliver as it is drawn from the carding machine, for example, and directing the same through the nip of the improved calender rolls **57, 58**. The upper end of the driven shaft **52** has a bevel gear **64** fixed thereon which meshes with a bevel gear **65** fixed on one end of a shaft **66** which is the equivalent of the driven shaft **30** in the original form of the invention. The calender roll **57** is fixed on the end of the shaft **66** remote from the gear **65** and the shaft **66** is journaled in a bearing structure **67** carried by a support or bracket **70** which is suitably secured to or formed integral with the gear box **53** and extends inwardly and terminates short of the vertical plane of the open upper end of the tube or passageway **56**.

Heretofore, it has been the usual practice to drive the second calender roll **58** by means of suitable gears fixed on the shaft **66** and on a shaft on which the second calender roll **58** was fixedly mounted. However, in this instance, the second or floating fluted calender roll **58** is in the form of a shell or tube and is pressed onto a bushing **71** which serves as the outer race of an anti-friction bearing and which has suitable grooves in the inner peripheral surface thereof in which circular rows of balls **72** are positioned, the inner surfaces of the balls **72** also being positioned in suitable grooves **73** formed in the periphery of a stationary shaft **74**. Opposite ends of bushing **71** are preferably provided with suitable lubricant seals **71***a*, **71***b*.

The stationary shaft **74** is fixed in a pivoted adjustable bracket **75** which has a relatively broad outwardly projecting portion **76** thereon which is loosely penetrated by a shaft **77**. The shaft **77** is fixed in a pair of upwardly projecting portions **80** integral with or suitably secured to the support **70**. It will be observed in Figures 9 and 10 that the bracket **75** also has an ear portion **81** projecting inwardly therefrom and overlying the bearing assembly **67** in which shaft **66** is journaled. The ear **81** has an adjustment screw or set screw **82** threaded therethrough which bears against the upper surface of the bearing assembly **67** and, by adjusting the screw **82**, since the pivot shaft **77** is disposed substantially below the level of the shaft **66**, it is apparent that the floating fluted calender roll **58** may be adjusted toward and away from the driven fluted calender roll **57**.

The flutes on the calender rolls **57, 58** are also provided with a pressure angle of eight degrees and it is therefore apparent that the calender rolls **57, 58** function in the same manner as the calender rolls **34, 35** of the first form of the invention to maintain traction between the sliver S–2 and the calender rolls as the calender rolls **57, 58** draw the sliver S–2 therebetween and feed the same into the tube **56** of the tube gear **55**. It is also apparent that the rolls **57, 58** severally crimp the sliver to maintain the substantially uniform density in the sliver as it is directed into the corresponding can and to also impart increased tensile strength to the sliver. Of course, it is apparent that the roll **58** may be adjusted toward and away from the roll **57** by means of the screw **82**, in the manner heretofore described, to accommodate slivers of varying types and/or sizes.

Here again, it is important to note that the speed of the sliver through the calender rolls is not necessarily dependent upon the speed of the shaft **52** or the machine with which the coiler mechanism may be associated. Instead, the speed of the sliver is determined, to a substantial extent, by the relative positions of the calender rolls. This is important in a carding machine, especially in view of the fact that variations in temperature and humidity, among other factors, may cause a given type of sliver to run slack, at times, and taut at other times. Such variations in sliver characteristics can be readily compensated for merely by adjusting the screw **82** in the proper direction (Figures 7, 9 and 10).

It is thus seen that I have provided improved calender roll units for directing sliver into coiler mechanisms wherein the calender rolls are fluted with the flutes being provided with eight degree pressure angles instead of the more commonly used fourteen and one-half degree pressure angles and wherein only one of the calender rolls of a pair is driven while the other of the calender rolls of said pair is a floating roll or is loosely mounted so as to be driven solely by the contact of the stock passing through the nip of the complementary fluted calender rolls and whereby the calender rolls function to insure that the sliver is uniformly passed through the nip of the calender rolls without slippage; to control the speed at which the sliver is fed to the tube gear by the calender rolls; and to cause crimping of the sliver at closely spaced intervals to thereby substantially lend to the tensile strength of the sliver as it is subsequently directed into the can so the sliver will not tear apart or become abnormally stretched during the subsequent drawing of the sliver from the cans and in subsequent sliver processing operations.

In the drawings and specification there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a machine for processing textile fibers in sliver form, said machine having processing instrumentalities and a coiler including a rotating inclined tube mounted for rotation about a vertical axis; the combination of an improved calender roll unit comprising a driven shaft, a second shaft extending parallel to the driven shaft, a first fluted calender roll fixed on the driven shaft, a second fluted calender roll loosely journaled on the second shaft and meshing with the first roll, and the nip of the fluted rolls being disposed closely above the open upper end of the inclined tube.

2. In a structure according to claim 1, means for adjusting the second shaft to vary the displacement between the mating surfaces of the first and second fluted rolls.

3. A structure according to claim 1, wherein the flutes on the fluted rolls each has a pressure angle of eight degrees.

4. In a drawing machine for processing textile fibers in sliver form, said machine having drafting rolls, a coiler including a rotating inclined tube mounted for ro-

tation about a vertical axis and a trumpet spaced above the coiler; the combination of an improved calender roll unit comprising a driven shaft, a second shaft extending parallel to the driven shaft, said shafts extending horizontally between the trumpet and the coiler, a first fluted calender roll fixed on the driven shaft, a second fluted calender roll loosely journaled on the second shaft and meshing with the first roll beneath said trumpet, and the nip of the fluted rolls being disposed closely above the open upper end of the inclined tube for drawing the sliver through the trumpet and into the tube.

5. A structure according to claim 4, wherein the flutes on the fluted rolls each has a pressure angle of eight degrees.

6. In a coiler mechanism for receiving a length of sliver from a source and having means for coiling the sliver into a can, and a rotating shaft disposed adjacent the coiling means; the combination of a first horizontal shaft journaled above the coiling means in a fixed part of said mechanism, a bracket pivoted on said fixed part for pivotal movement substantially parallel to said first shaft, gear means connecting the first shaft with the rotating shaft, a second horizontal shaft fixed to said bracket, extending substantially parallel to said first shaft and located between the pivot point of the bracket and the first shaft, a first fluted calender roll fixed on the first shaft, a second fluted calender roll journaled on the second shaft and meshing with the first roll, the nip of the rolls being positioned for feeding the sliver into the coiling means, and means to adjust the bracket about its pivot point to vary the displacement between the mating surfaces of the fluted rolls to vary the speed at which the sliver is fed into the coiling means.

7. A structure according to claim 6, wherein the flutes on the fluted rolls each has a pressure angle of eight degrees.

8. In a drawing machine for processing textile fibers in sliver form, said machine having drafting rolls, spaced drawing roll stands each provided with an inclined slot in its upper surface, a coiler including a rotating inclined tube mounted for rotation about a vertical axis and a trumpet spaced above the coiler; the combination of an improved calender roll unit comprising a driven shaft, a second shaft extending parallel to the driven shaft, said shafts extending horizontally between the trumpet and the coiler, a first fluted calender roll fixed on the driven shaft, a second fluted calender roll loosely journaled on the second shaft and meshing with the first roll beneath said trumpet, the nip of the fluted rolls being disposed closely above the open upper end of the inclined tube for drawing the sliver through the trumpet and into the tube, said driven shaft being journaled in said stands adjacent said slots, a block adjustably mounted in each slot, opposite ends of the second shaft being fixed in adjacent pairs of said blocks, ears on the upper end of each block overlying adjacent portions of the corresponding roll stands, adjustment screws threaded through said ears and engaging said portions, and said slots being inclined upwardly and away from the driven shaft whereby adjustment of the screws adjusts the displacement between the mating surfaces of the fluted rolls to vary the speed of the sliver passing therebetween.

9. In a machine for processing textile fibers in sliver form, said machine having processing instrumentalities and a coiler including a rotating inclined tube mounted for rotation about a vertical axis; the combination of an improved calender roll unit comprising a driven shaft, a first fluted calender roll fixed on the driven shaft, a second fluted calender roll supported for free rotational movement on an axis parallel to the axis of, and meshing with, the first roll, and the nip of the fluted rolls being disposed closely above the open upper end of the inclined tube.

10. In a structure according to claim 9, means to adjustably vary the displacement between the first and second calender rolls.

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