May 21, 1940. O. C. WILSON 2,201,844

SPINNING MECHANISM

Filed March 17, 1939 4 Sheets-Sheet 1

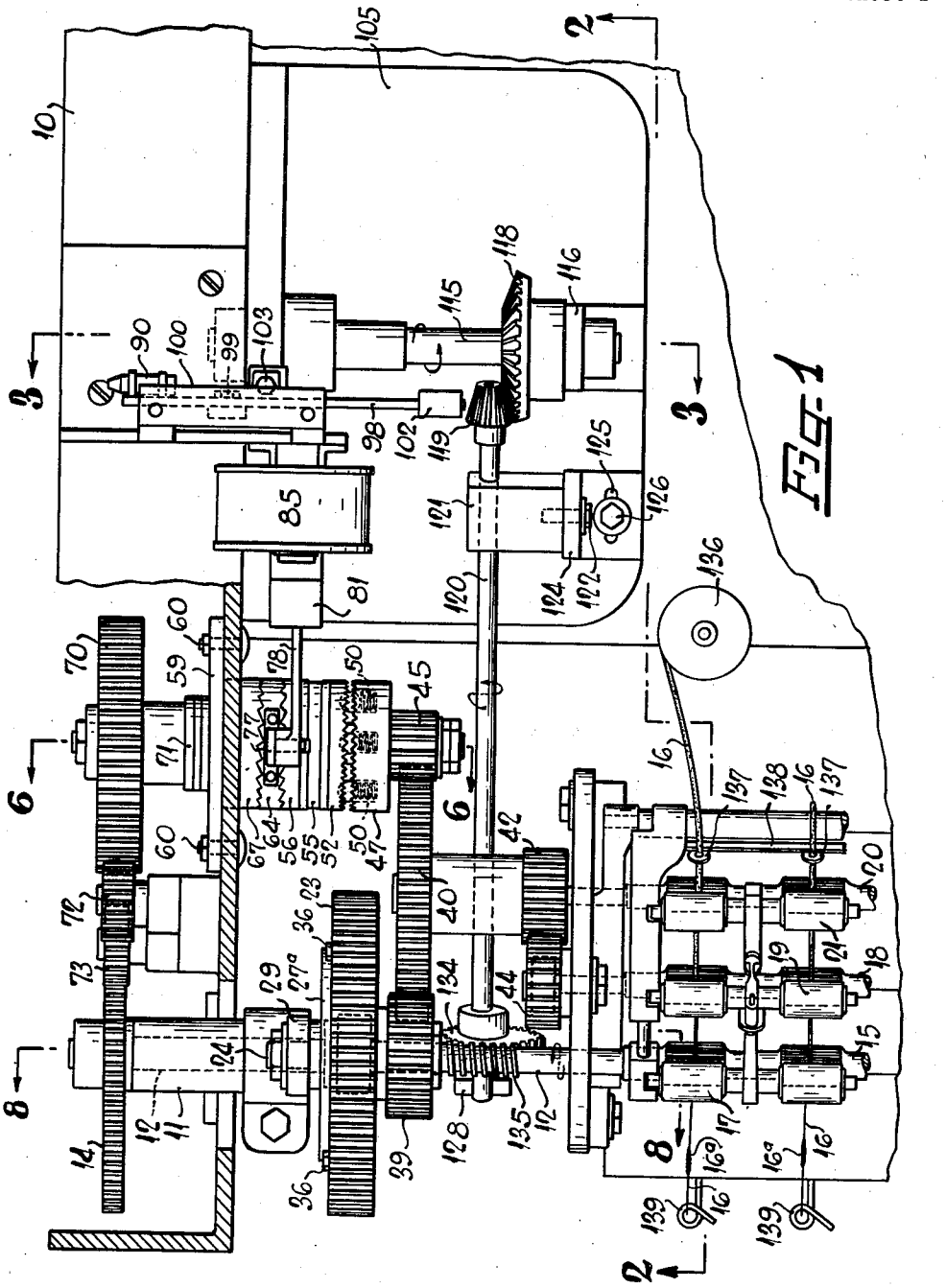

Fig-1

Inventor:
OSCAR C. WILSON

By

Attorney

May 21, 1940. O. C. WILSON 2,201,844

SPINNING MECHANISM

Filed March 17, 1939 4 Sheets-Sheet 2

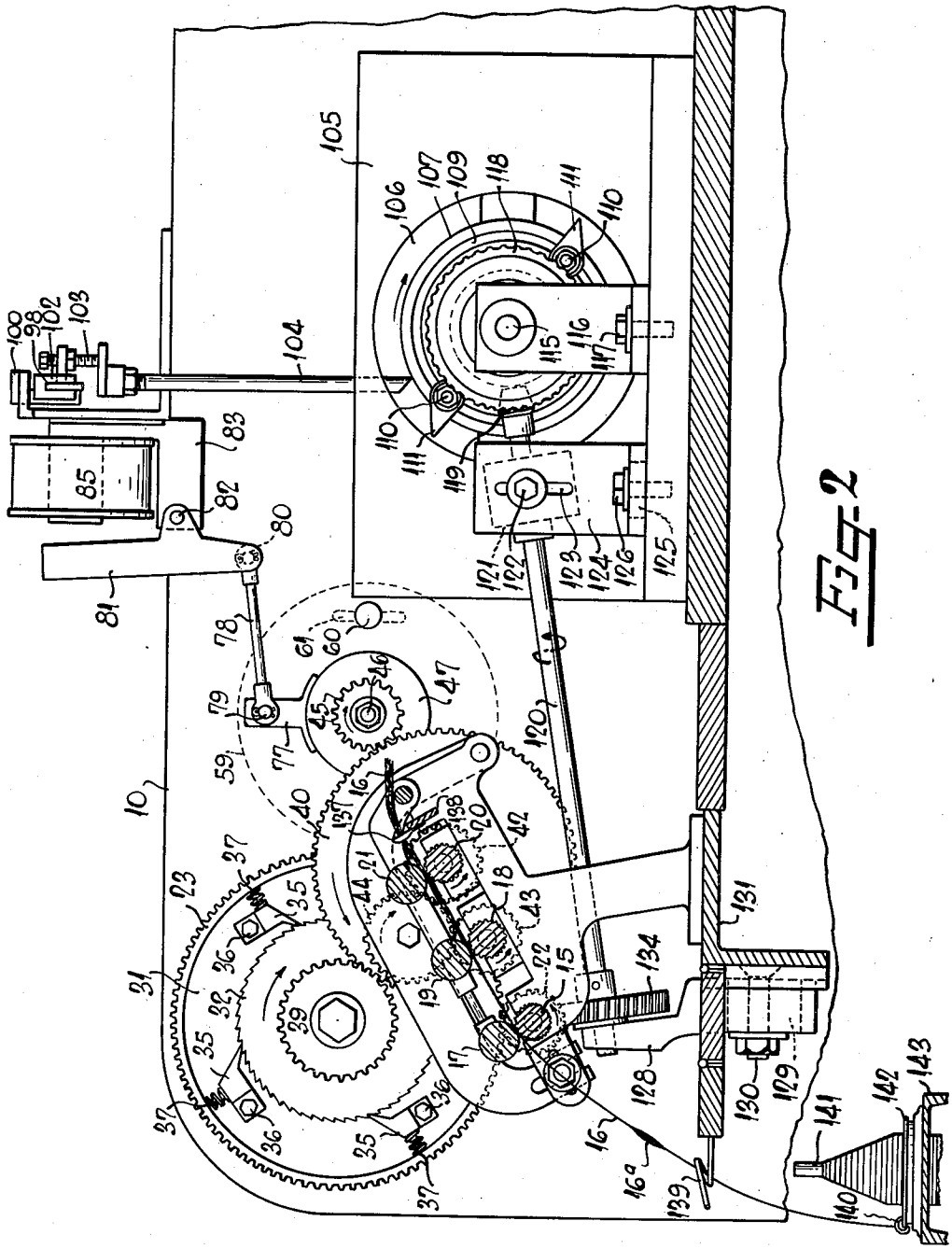

Fig-2

Inventor:
OSCAR C. WILSON
By Raney & Eaton
Attorney

May 21, 1940. O. C. WILSON 2,201,844

SPINNING MECHANISM

Filed March 17, 1939 4 Sheets-Sheet 3

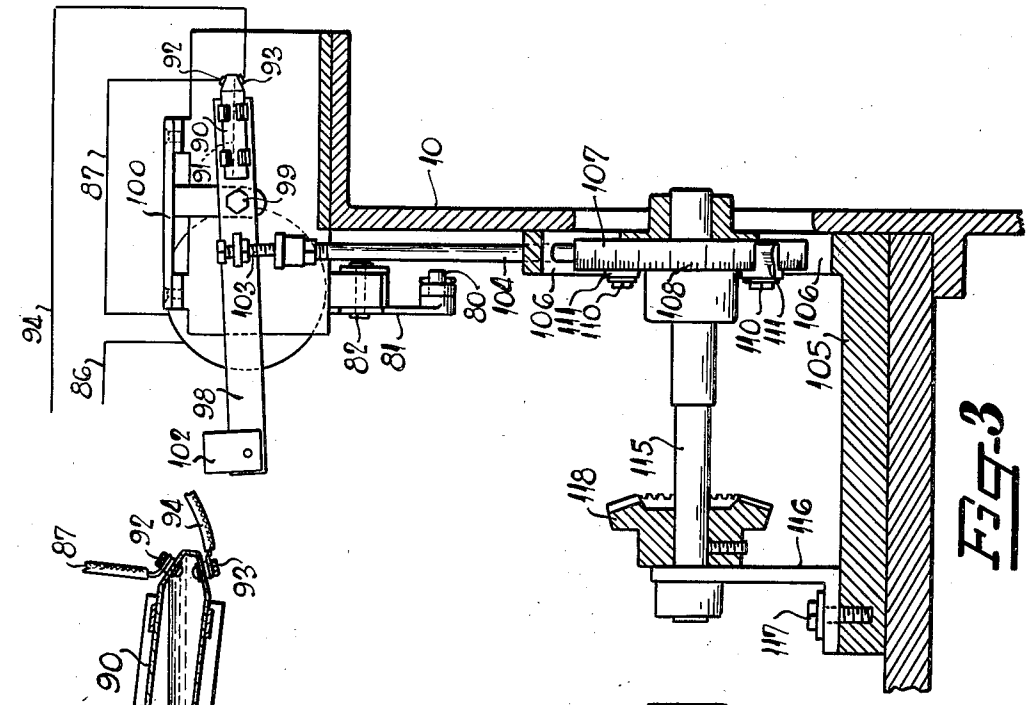

Fig-3

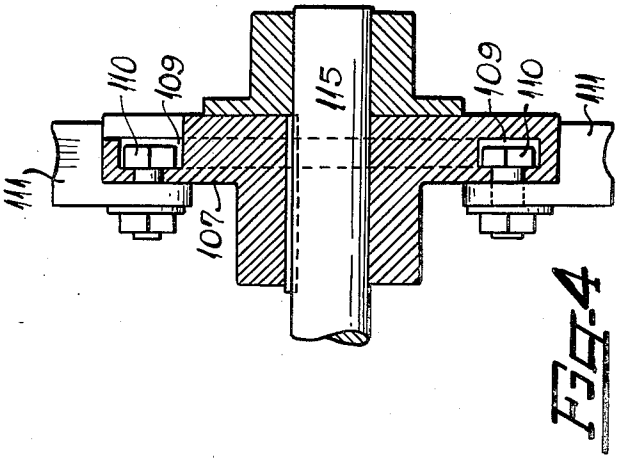

Fig-4

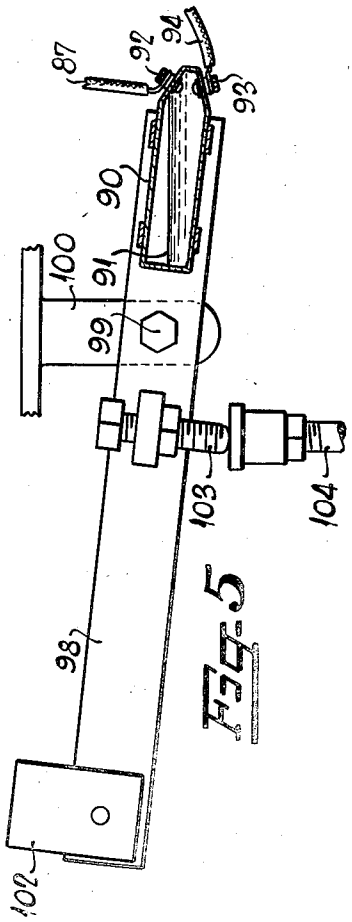

Fig-5

Inventor:
OSCAR C. WILSON
By Russell B Eaton
Attorney

May 21, 1940. O. C. WILSON 2,201,844

SPINNING MECHANISM

Filed March 17, 1939 4 Sheets-Sheet 4

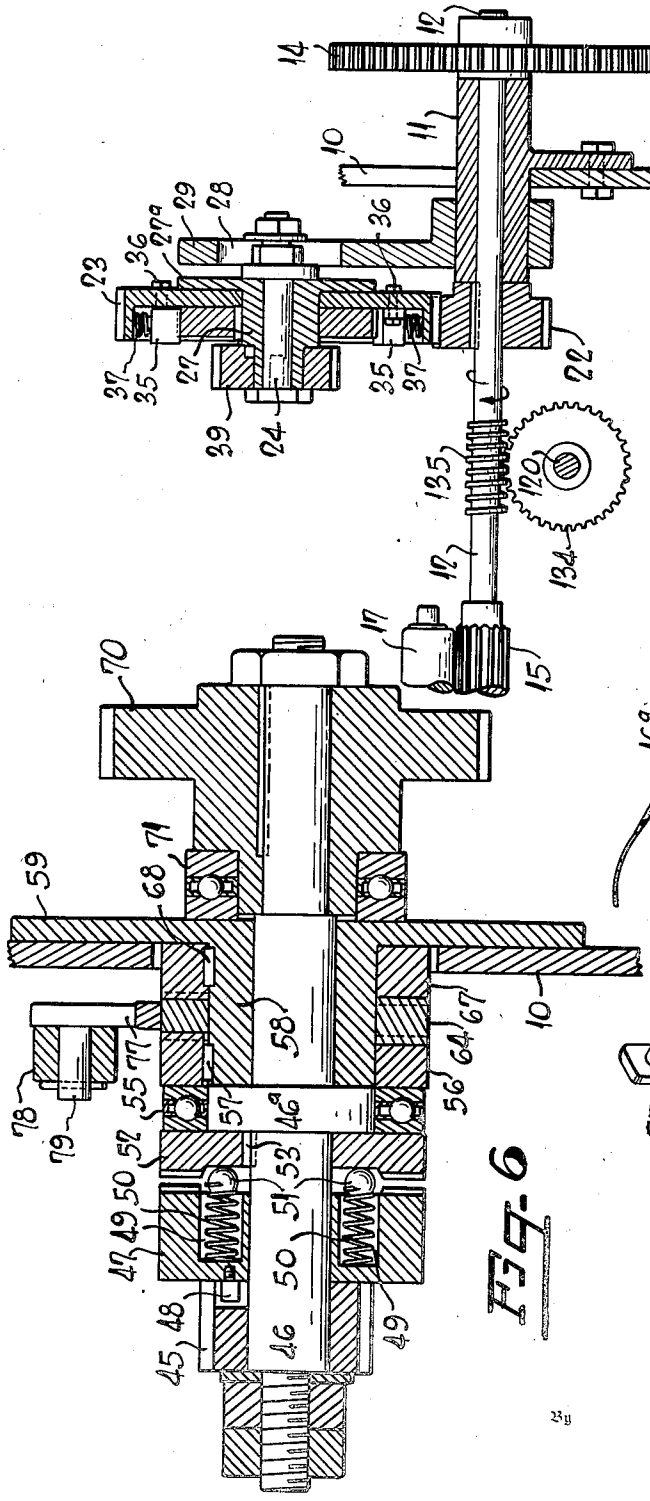

Fig. 6

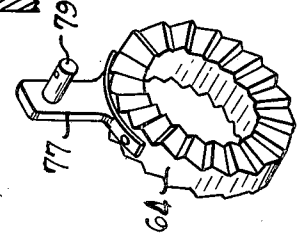

Fig. 7



Fig. 8

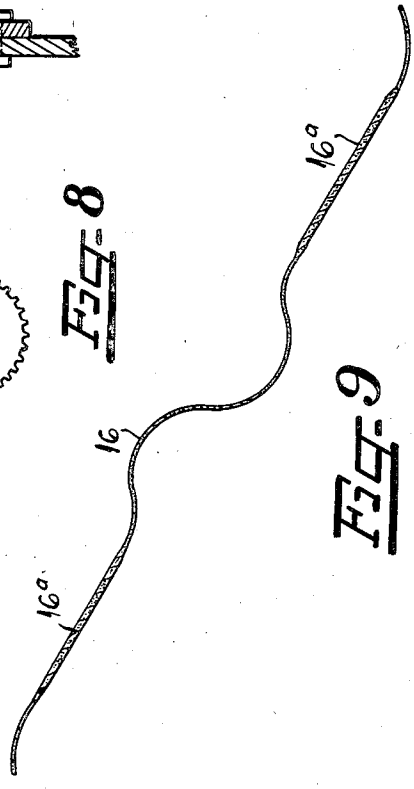

Fig. 9

Inventor:
OSCAR C. WILSON

By Powell & Eaton

Attorney

Patented May 21, 1940 2,201,844

# UNITED STATES PATENT OFFICE

2,201,844

## SPINNING MECHANISM

Oscar C. Wilson, Lexington, N. C., assignor of one-half to Erlanger Cotton Mills Company, Lexington, N. C., a corporation of North Carolina

Application March 17, 1939, Serial No. 262,462

4 Claims. (Cl. 57—39)

This invention relates to an apparatus for making fancy yarns, commonly known as "Himalaya" yarns or flake filling. This type of yarn is irregular in its cross sectional area and is marked by variations in size at successive intervals. When this yarn is woven into a fabric an ornamental appearance is produced by the size irregularities therein.

It is therefore an object of this invention to provide an apparatus which will manufacture this type of fancy yarn in a more economical and feasible manner, the primary consideration being to construct a mechanism which will prove flexible in its application to spinning machinery. In the present invention the bottom rolls are driven at their normal respective speeds as the small diameter of the strand is being formed. At this time, the front rolls revolve at the fastest rate, the intermediate rolls at the next fastest rate and the rear rolls at the slowest rate. This, of course, will produce the maximum draft between the front and the intermediate rolls and the next greatest amount of draft between the intermediate rolls and the rear rolls. When an enlargement or slub is to be formed upon the yarn, the rear and intermediate rolls are accelerated to a speed that is greater than their normal rate which will decrease the draft between the front and intermediate rolls, thus producing an enlarged strand. A special ratchet arrangement is provided in combination with a toothed clutch to prevent any back lash. One of the greatest objections in devices heretofore provided for this purpose is that a short period of time exists, when the speed is changed from high speed to normal speed, in which the back rolls will almost completely stop rotation until the slack between the source of power and these rolls is taken up. Since the front rolls continue to rotate while this slack is being removed, an excessive draft is placed in the strand adjacent the enlargement thus producing a weak place.

In order to prevent this back lash, an assembly has been constructed, comprising a plurality of pawls which are adapted to engage, at times, the teeth in a ratchet. Due to the spacing of the pawls and of the teeth, only one of the pawls is allowed to effectively engage the ratchet, thereby providing an arrangement which is capable of incremental take-up.

It is a further object of this invention to provide an apparatus of the class described controlled by a mercury switch and which has means for varying the length, the position and the size of a slub or enlarged portions on a strand of yarn.

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 plan view, with certain portions thereof shown in section, of one end of a spinning frame showing the invention applied thereto;

Figure 2 is a vertical transverse sectional view taken along the line 2—2 in Figure 1;

Figure 3 is a longitudinal sectional view taken along the line 3—3 in Figure 1;

Figure 4 is an enlarged sectional view through the lower right-hand portion of Figure 3;

Figure 5 is an enlarged view of the upper portion of Figure 3 but showing the mercury switch rotated to a position where the circuit is closed;

Figure 6 is longitudinal sectional view through the clutch arrangement taken along the line 6—6 in Figure 1;

Figure 7 is an isometric view of the expanding ring which is adapted to operate in the clutch arrangement shown in Figures 1 and 6;

Figure 8 is a longitudinal sectional view taken along the line 8—8 in Figure 1;

Figure 9 is an enlarged view showing one form of short strand of filling having enlarged slubs thereon at spaced intervals, which may be manufactured with a spinning frame equipped with my apparatus.

Referring more specifically to the drawings, the numeral 10 denotes an end support of a conventional spinning frame which has secured thereto a bearing 11 in which is journaled a shaft 12, said shaft having secured on its outer end a drive gear 14 which is driven from any suitable source of power not shown. This shaft extends longitudinally of the spinning frame and has secured to its inner end, the front bottom roll of the spinning frame which is designated by the reference character 15. A suitable strand of roving 16 is adapted to pass over this roll and beneath a top roll 17 which rests directly upon the front bottom roll. Also intermediate bottom roll 18 provided which has a top roll 19 associated therewith. Likewise, rear bottom roll 20 and rear top roll 21 are provided. As the strand 16 passes first between rolls 20 and 21 and thence between intermediate rolls 18 and 19, and between front rolls 15 and 17, a draft occurs due to the fact that the speeds of the respective sets of rolls, progressively increase. In other words, the back rolls rotate the slowest, the interme-

diate rolls at a slightly faster rate and the front rolls at a very much faster rate. It is desirable in the manufacture of yarns of this type to provide slubs 16a (Figure 9) at spaced intervals on strand 16. In order to do this, it is necessary to decrease the draft between the front and the intermediate rolls, thereby providing a thick place in the yarn where the slub or enlargement is formed. With this principle in mind, the following description will be devoted to the improved mechanism for carrying out this function.

By referring to Figure 8, it is seen that the shaft 12 has a pinion 22 secured there on which meshes with a larger gear 23. The gear 23 is rotatably mounted around hub 27, said hub having a flange 27a both of which are rotatably mounted around stud 24. Stud 24 has one end thereof mounted in slot 28 of bracket 29 and this bracket has its lower end mounted around the bearing portion of the bracket 11 previously described. The gear 23 has a cavity 31 cut in one face thereof in which a ratchet wheel 32 is mounted, said ratchet being keyed to hub 27; therefore, when the ratchet rotates, the hub will likewise rotate.

Due to the fact that it is necessary for the ratchet wheel 32 to rotate at a higher rate of speed than the gear 23 while the slub 16a is being formed, it is necessary to rotatably mount this gear upon the flanged hub 27 and provide a pawl and ratchet connection between the gear and the ratchet wheel 32. Therefore, suitable pawls 35 are pivoted within the cavity 31 as at 36. Each of these pawls has its pointed end normally pressed against the teeth of ratchet wheel 32 by means of a spring 37. During the slubbing operation, these pawls are so arranged that only one pawl is in engagement with a tooth at any time. If there are four pawls on gear wheel 23, while one pawl is engaged another is spaced one fourth the distance of one tooth from the point of engagement, another is one-half the distance, and the fourth is three-fourths the distance of a tooth from the point of engagement. This practical arrangement of pawls eliminates any possibility of lost motion occurring while changing from slub to regular yarn. The prevention of this lost motion necessarily implies stronger and more ductile slubs because there is no back lash.

The hub 27 also has a gear 39 fixedly secured thereon and this gear is adapted to mesh with a larger gear 40 (Figure 1) on the end of bottom rear roll 20. Integral with the gear 40 is a smaller gear 42 which drives the gear 43 on the end of intermediate bottom rolls 18 through the medium of an idler gear 44 (see Figures 1 and 2). During the normal operation of the machine, that is while the section of yarn 16 of smaller diameter is being drawn out, the front rolls are driven directly from the gear 14 and the shaft 12, and the intermediate and back rolls are driven through the gears and ratchet designated by the reference characters 22, 23, 32, 38, 40, 42, 43 and 44.

When it is desired to form an enlargement or slub 16a upon the yarn, it is necessary to speed up the intermediate and back rolls 18 and 20 respectively. This is done by the clutch arrangement shown in Figures 1, 6 and 7.

It will be noted that the gear 40 also meshes with a pinion 45 which is disposed on the end of shaft 46. This pinion is loosely mounted on shaft 46 and is attached to a clutch face 47 by means of a suitable pin 48 (Figure 6), said clutch face also being rotatably mounted around this shaft. This clutch face has a plurality of cavities 49 therein, each of which contain a spring 50 and a ball 51. The balls are adapted to contact an adjacent clutch face 52 which is keyed to the shaft 46 as at 53. The purpose of the springs 49 and balls 51 is to normally keep the teeth in the clutch faces 47 and 52 in a disengaged position while the normal portion of the strand 16 is being manufactured. In other words, the gear 45 and the clutch face 47 is caused to idle on the end of the shaft 46 during the normal operation when the slub 16a is not being formed. Also at the same time, the shaft 46 is rotated in the same direction and at a faster rate through another train of gears which will be described later, but due to the fact that the clutch faces are not engaged with each other, no rotation can be imparted to the clutch face 47 or to the gear 45.

It should be borne in mind, however, that the clutch face 52 is slidably keyed upon the shaft 46. This clutch face normally assumes the position shown in Figure 6 at which time its right-hand face is abutted against an enlarged portion 46a of the shaft. This portion has mounted around its periphery, a suitable thrust bearing 55 one face of which rests against clutch face 52 and its other face rests against a toothed annular member 56. Member 56 is slidably keyed as at 57 to a hub 58, said hub having a flange 59 which is secured to the end support 10 by any suitable means such as bolts 60. Suitable slots 61 are provided in the flange so that proper adjustment can be made in the event that a change gear is desired to be placed on the end of the shaft 46 instead of the gear 45 shown.

Disposed adjacent the right-hand toothed face of toothed member 56 (Figure 6) is an expander 64, said expander having in one face thereof teeth which are adapted to mesh with the teeth in member 56. This expander also has teeth on its right hand face which intermesh with a toothed member 67 keyed as at 68 to hub 58. The teeth in the members 56, 64 and 67 are beveled so that the expander 64 may be easily rotated to the left in Figure 1 although the teeth on both sides are inter-engaged with the teeth in its companion members. When member 64 is rotated as described above the toothed member 56 is moved toward the observer (Figure 1) to thereby cause the bearing 55 and the clutch face 52 to move in the same direction. Upon a slight movement, the teeth in the clutch face 52 will become engaged with the teeth in clutch face 47. When this engagement takes place it is evident that the gear 45 will then be connected to shaft 46 so that it will rotate at a faster speed. At this time the intermediate and rear rolls will be driven at a faster speed through gears 45, 40, 42, 44 and 43.

During this increased speed of the rear and intermediate rolls, the gear 39 and ratchet 32 will also be rotated at an increased speed, but on account of the dogs 35 engaging the teeth in the ratchet, this increased rotation will not affect the rotation of gear 23 which is driven at its regular rate from the shaft 12.

The shaft 46 has keyed on its right-hand end (Figure 6), a gear 70, said gear being separated from the flange 58 by means of a thrust bearing 71. The gear 70 is driven from the gear 14 through intermediate idler gears 72 and 73 (see Figure 1).

As heretofore stated, it is necessary to rotate the expanding member 64 upon the hub 58 when

it is desired to cause the rear rolls to rotate at an increased speed. This member is adapted to be rotated to cause this expansion to take place, by means of an electro-magnet. The upper portion of the member 64 has an arm 77 secured thereto which arm has a link 78 pivoted to its upper end as at 79 (see Figure 2). The right hand end of this link is pivoted as at 80 to the lower end of soft iron member 81, said member being pivoted as at 82 to the U-shaped member 83. The upper portion of the U-shaped member 83 has a coil 85 mounted therearound and leading from this coil are wires 86 and 87. When the coil 85 is energized by electric current the upper end of member 81 is drawn against U-shaped member 82. In other words, member 81 is rotated in a clockwise manner in Figure 2 to cause the arm 77 and its associated expanding member 64 to rotate in a counterclockwise manner. This rotation will cause the two clutch faces 47 and 52 to become engaged and cause the rolls 18 and 20 to speed up to allow a slub to be produced in the yarn.

The wire 87 as shown in Figure 3 is also connected to one side of a mercury tube 90. This tube is made of a suitable insulation material such as glass and has mercury 91 disposed therein. Leading from this tube is another wire 94 which forms a continuation of wire 87 on the same side of the circuit. The wires 87 and 94 penetrate the tube 90 at the terminals 92 and 93. In Figure 3, the tube is shown in the position where the mercury 91 will not close the circuit; whereas in Figure 5 the tube has been tilted to the position where the circuit between the terminals 92 and 93 is closed. When in a closed position, the magnet 85 will be energized and the upper end of the member 81 will be in contact with one end of the U-shaped member 83.

It is therefore seen that it is necessary to provide some means for tilting this mercury tube at the proper time to cause slub 16*a* to be formed in the yarn. It is also necessary to provide control means for adjusting the time that the tube will remain tilted and also to provide means to cause the tube to resume normal position. This tube is mounted on the right-hand end of a suitable lever 98, said lever being pivoted as at 99 to bracket 100. The left-hand end of lever 98 has a counterweight 102 adjustably secured thereon to insure that the lever will normally return to the position shown in Figure 3 where the terminals 92 and 93 will not be closed by the mercury 91 in the tube.

The lever 98 also has secured intermediate its ends at a point substantially to the left of pivot point 99 a set screw 103, the lower end of which is adapted to rest upon the upper end of rod 104 (Figures 2 and 3). The lower end of this rod penetrates the upstanding leg of bracket 105. This bracket has a circular hole 106 cut therein, in which is mounted a disk 107 the periphery of which has graduations 108 thereon. By observing Figure 4, it is seen that this disk has an annular groove 109 therein in which the heads of suitable bolts 110 are inserted, said bolts being adapted to adjustably secure cams 111 to the periphery of the disk. Also by observing Figure 2, it is seen that the extreme lower end of the rod 103 is beveled, and normally rests upon the periphery of the disk 107. The purpose of placing the cams or dogs 111 at spaced intervals along the disks 107 is to provide means for raising the rod 104 to cause the lever 98 and the mercury tube 90 to be tilted when it is necessary to close the circuit. In the drawings, only two cams 111 have been shown. However, it is to be understood that any number could be provided depending upon the number of slubs 16*a* desired in a given length of yarn. It is evident that the length and shape of the cams or projections 111 may be varied to thereby regulate the length of the slubs. The length and shape of these portions may also be controlled by means of set screws 103, because it is evident that the setting of screw 103 will determine the interval of time during which electro-magnet 85 will be energized. The purpose of providing the graduations 108 is to allow the projections to be spaced at the desired points on the disk to correspond with the positions that the slubs are to be produced in the strand.

The disk 107 is keyed to a shaft 115, said shaft having one end thereof rotatably mounted in the upstanding leg of the bracket 105 (Figure 3) and having its other end rotatably mounted in the upper end of a bracket 116. Bracket 116 has its lower end secured to bracket 105 by any suitable means such as a bolt 117.

Secured to the shaft 115 is a beveled gear 118 and this gear has meshing therewith a pinion 119 on rod 120. The rod 120 is journaled in block 121 which block is supported by bolt 122 and this bolt is adapted to penetrate a slot 123 (see Figure 2) in bracket 124, said bracket having its outstanding leg resting upon bracket 105. The outstanding leg of bracket 124 has a slot 125 therein which is penetrated by a stud bolt 126. By providing the slots 123 and 125 (Figures 1 and 2) it is possible to adjust the right hand end of the rod 120 to the desired height so that the pinion 119 on the end thereof, will properly mesh with beveled gear 118. This rod is set at an inclined angle and the lower end thereof is journaled in a bracket 128, said bracket 128 having a slot 129 in its lower end which is penetrated by a bolt 130. This bolt projects laterally from the roll stand support 131. Likewise this bracket 128 can be moved up or down to suit conditions.

The rod 120 has a worm gear 134 secured thereon which meshes with worm 135 on shaft 12 (see Figure 8). The gear 134 is removably mounted on the shaft and when it is desired to vary the distance between the slubs it is necessary to remove the gear shown and place a gear of a different diameter thereon. When this is done, however, it is necessary to adjust the position of bracket 128 with respect to bolt 130.

As the lower front roller rotates, the worm 135 is turned to cause the disk 107 (Figures 2, 3, 4 and 8) to rotate through the members 134, 120, 119, 118 and 115, and of course as this disk rotates the cams 111 will move beneath the lower end of rod 104 to cause the mercury tube to be tilted at specified intervals which, in turn, will cause the back and intermediate rolls to be speeded up to a speed greater than their normal rate of speed and as a result, produce slubs 16*a*. If desired the size or shape of the projection 111 may be varied and thereby cause the length of the slub to be varied. Also the length of the slub may be varied by manipulating the screw 103 as shown in Figures 2 and 3. When this is done, it is seen that the time at which mercury tube will be tilted can be varied.

In the normal spinning of yarn, the roving or strand is very much larger as it is drawn from bobbins 136 (Figure 1). This yarn is drawn from the bobbins through suitable eyelets 137 in conventional transverse bar 138 and then between

the rear, intermediate and front rolls of the spinning frame at which time a suitable draft is placed in the yarn. After passing between these rolls the strands are considerably smaller in diameter. The strands then pass downwardly through an eyelet 138 through a traveller 140 and then onto a bobbin 141. The traveler is adapted to rotate on a suitable ring 142 disposed on ring rail 143.

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 the purposes of limitation, the scope of the invention being set forth in the appended claims.

I claim:

1. In a spinning frame having front, intermediate and rear rolls, said front roll having an extension at one end thereof, a driven gear fixedly mounted on said extension, a second gear driven by the front roll and having a plurality of spring pressed dogs thereon, a ratchet wheel concentrically mounted with said second gear and having ratchet teeth thereon for engagement by said dogs, a pinion integral with said ratchet wheel, a plurality of pinions driven by the pinion on the ratchet wheel for driving the rear and intermediate rolls at their normal rates of speed, a shaft having a clutch arrangement thereon, means for driving said shaft from the driven gear at an accelerated rate, a third pinion loosely mounted on said shaft and being rotated by said plurality of pinions at the normal rate, pattern means for actuating said clutch arrangement for connecting said third loose pinion to said shaft to thereby drive said plurality of pinions at an accelerated rate of speed to thereby cause the rear and intermediate rolls to be driven at an accelerated rate of speed and to also cause the ratchet to rotate at a greater rate of speed than its associated gear and dogs.

2. In a spinning frame having front, intermediate and rear rolls, an extension on the front roll, a plurality of pinions mounted on said extension, a shaft, an expansion clutch mechanism mounted on said shaft and having a member keyed for sliding movement on said shaft, said member having teeth on one side thereof, a second pinion loosely mounted on one end of said shaft and having teeth on one face thereof engageable with the teeth on said member, a driven connection between the other end of said shaft and said extension on the front roll, and a second driven connection between the pinion on said shaft and the rear and intermediate rolls, both of said driven connections being rotated at an accelerated rate of speed, a third driven connection between said extension and said intermediate and front rolls, and being driven at a normal rate of speed, an over-riding ratchet mechanism disposed in said third driven connection, means for holding the toothed faces on the expansion clutch mechanism in disengaged position to cause the front and intermediate and rear rolls to be driven at their normal rates of speed, and control means for intermittently expanding said clutch mechanism to move the toothed faces into engagement with each other to cause the rear and intermediate rolls to be driven at an accelerated rate of speed and to thereby cause an overriding relation to occur in said ratchet mechanism.

3. In a spinning frame having front, top and bottom rolls and intermediate and back top and bottom rolls, the front bottom roll having an extension on one end thereof, a stud shaft, a sleeve mounted on the stud shaft, a large pinion rotatably mounted on said sleeve, a smaller pinion integral with said sleeve, a ratchet wheel fixed on said sleeve, a plurality of spring-pressed dogs mounted on the larger pinion for engagement with the ratchet wheel, a pinion mounted on each of the extensions on the lower intermediate and back bottom rolls, an additional pinion on the back bottom roll extension engaging and intermeshing with the smaller pinion on said sleeve, whereby when motion is imparted to the larger pinion on the sleeve in one direction by the driven bottom front roll, the ratchet wheel and smaller pinion will be driven by the dogs and rotary motion will be imparted to the bottom rolls, an idler shaft having a pinion rotatably mounted on one end thereof, one side of said last-named pinion having a clutch face thereon, a pinion fixed on the other end of the idler shaft, means driven by the front bottom roll for driving the last-named pinion, a clutch-faced member keyed for sliding movement on the idler shaft, an annular cam member loosely mounted on said idler shaft, and pattern controlled means for intermittently moving the annular cam member for engaging the two clutch faces of the idler pinion and the clutch faced member keyed on the idler shaft for increasing the revolutions per minute of the intermediate and back rolls and also increasing the revolutions per minute of the ratchet wheel to cause it to rotate faster than the pinion carrying the dogs.

4. In a spinning frame having front top and bottom rolls and intermediate and back top and bottom rolls, the front bottom roll having an extension on one end thereof, a stud shaft, a sleeve mounted on the stud shaft, a large pinion rotatably mounted on said sleeve, a smaller pinion integral with said sleeve, a ratchet wheel fixed on said sleeve, a plurality of spring-pressed dogs mounted on the larger pinion for engagement with the ratchet wheel, a pinion mounted on each of the extensions on the lower intermediate and back bottom rolls, an additional pinion on the back bottom roll extension engaging and intermeshing with the smaller pinion on said sleeve, whereby when motion is imparted to the larger pinion on the sleeve in one direction by the driven bottom front roll, the ratchet wheel and smaller pinion will be driven by the dogs and rotary motion will be imparted to the bottom rolls, an idler shaft having a pinion rotatably mounted on one end thereof, one side of the said last-named pinion having a clutch face thereon, a pinion fixed on the other end of the idler shaft, means driven by the front bottom roll for driving the last-named pinion, a clutch-faced member keyed for sliding movement on the idler shaft, an annular cam member rotatably mounted on the idler shaft, a pattern wheel driven by the bottom front roll, a solenoid, connections between the solenoid and the annular cam member, a switch, means controlled by the pattern wheel for intermittently energizing the solenoid for swinging the cam member to engage the two clutch faces to drive the intermediate and rear bottom rolls at an increased rate of speed.

OSCAR C. WILSON.