Oct. 20, 1964 T. N. BUSHEY 3,153,312

FEED ROLL UNIT FOR TEXTILE MACHINES

Filed April 17, 1962 4 Sheets-Sheet 1

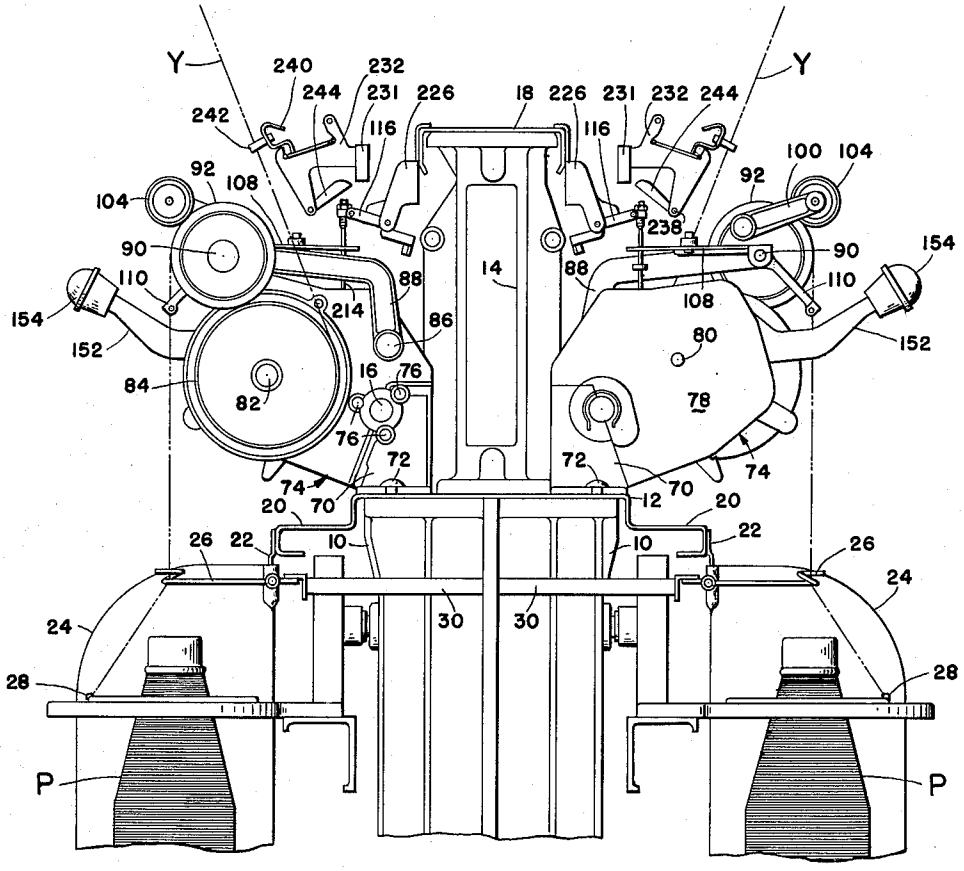

FIG. 1

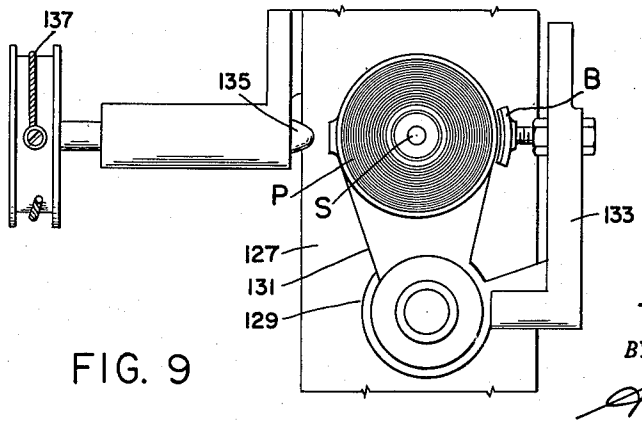

FIG. 9

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FEED ROLL UNIT FOR TEXTILE MACHINES

Filed April 17, 1962 4 Sheets-Sheet 2

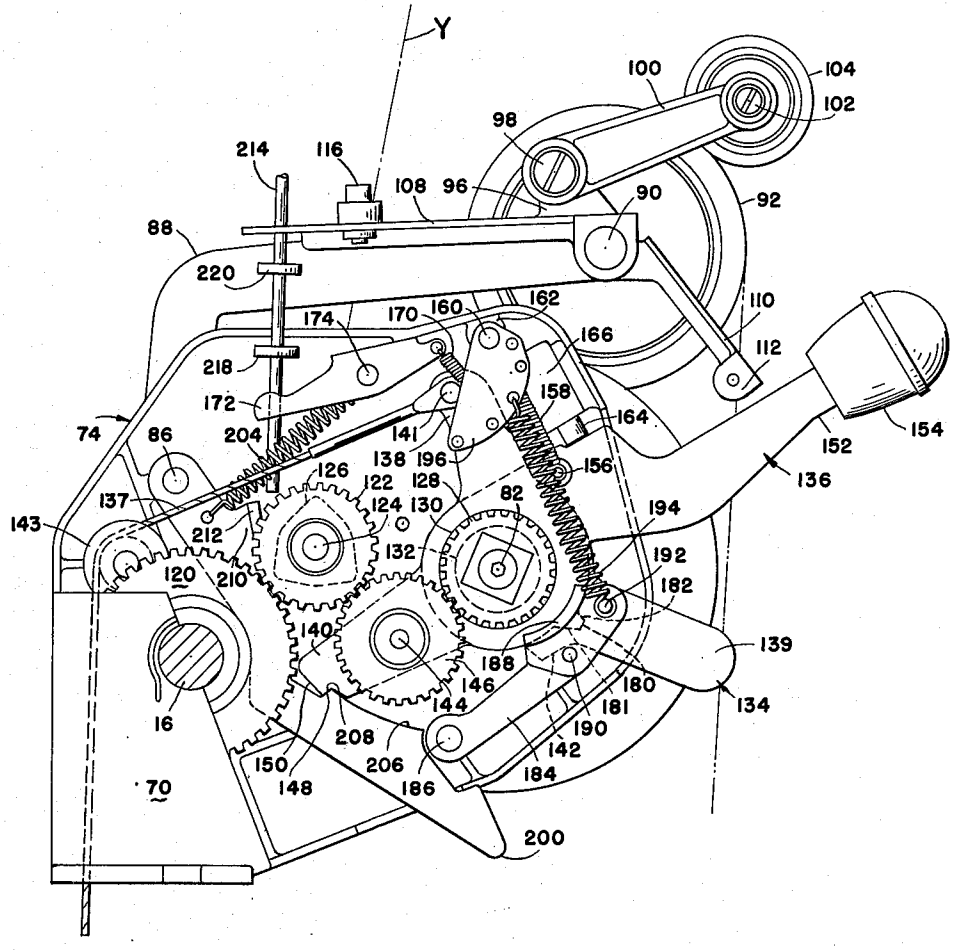

FIG. 2

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FEED ROLL UNIT FOR TEXTILE MACHINES

Filed April 17, 1962 4 Sheets-Sheet 3

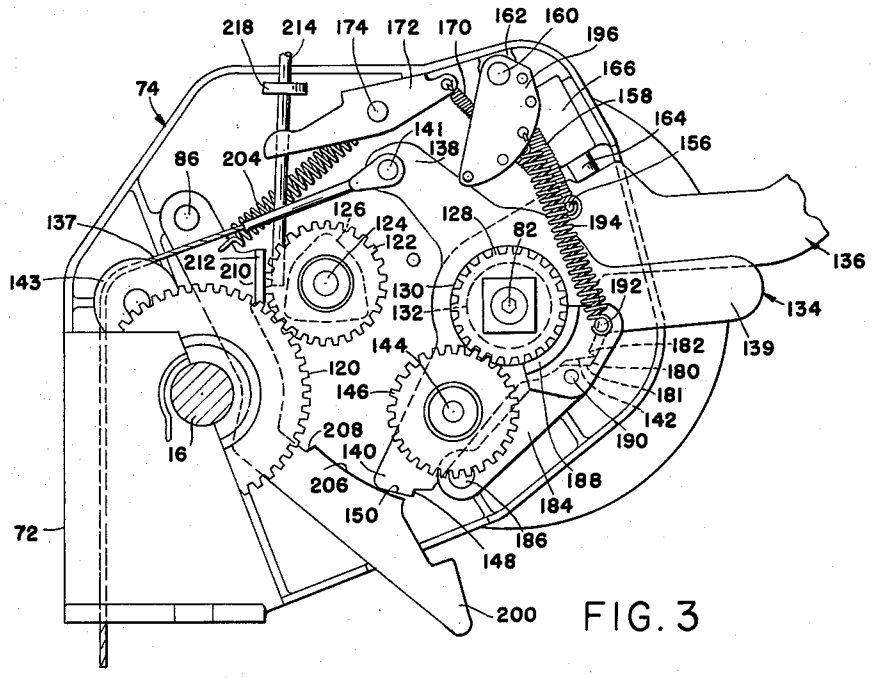

FIG. 3

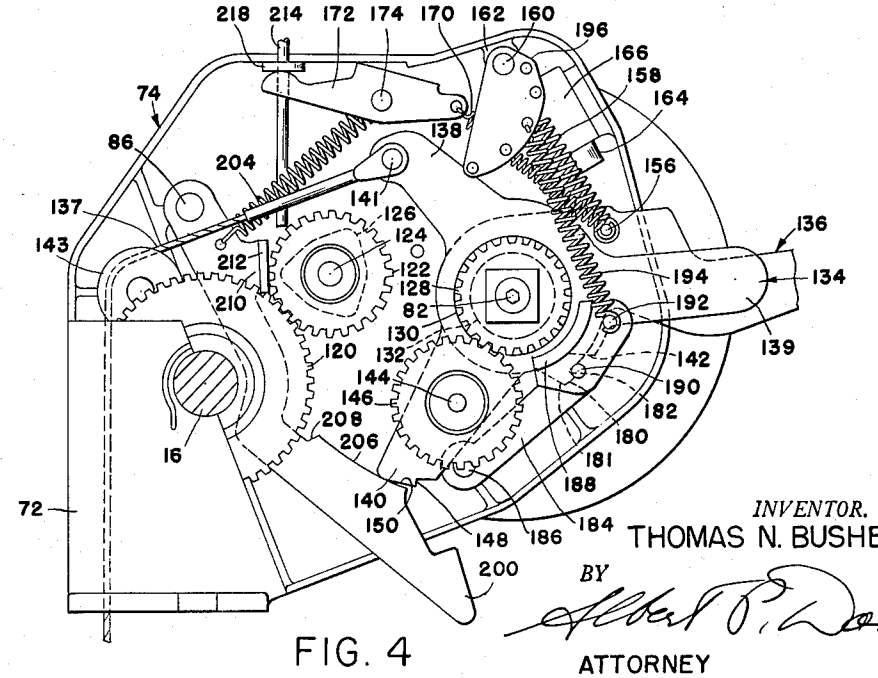

FIG. 4

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FEED ROLL UNIT FOR TEXTILE MACHINES

Filed April 17, 1962 4 Sheets-Sheet 4

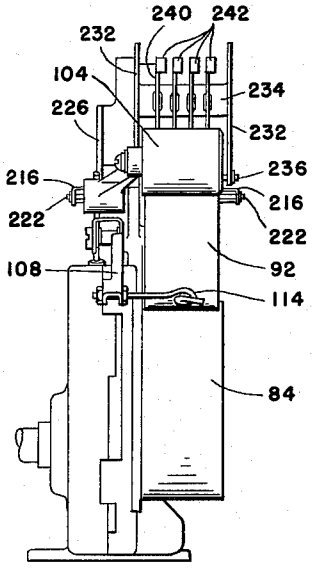

FIG. 5

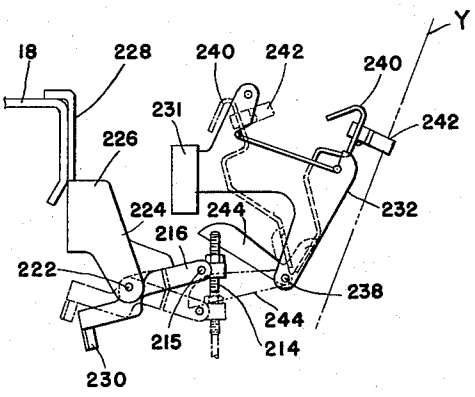

FIG. 6

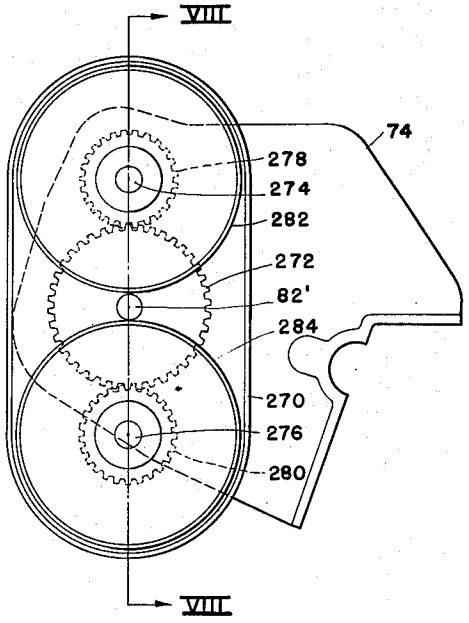

FIG. 7

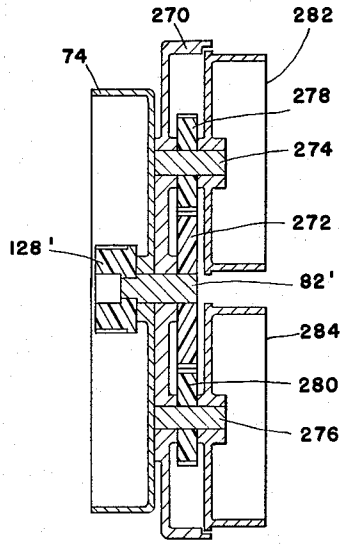

FIG. 8

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3,153,312

FEED ROLL UNIT FOR TEXTILE MACHINES

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Filed Apr. 17, 1962, Ser. No. 188,015
13 Claims. (Cl. 57—82)

The present invention relates to a textile machine and relates, more particularly, to a feed roll unit for use with such a machine.

In the following specification and claims the term "yarn" is used in a general sense to relate to all types of strand material, either textile or otherwise, and the designation "package" is intended to mean the product of a winding or twisting machine whatever its form.

When processing yarn on textile apparatus as, for example, the type commercially known as a twisting frame or twister, it is usual to advance the yarn by drawing it from a supply source and feeding it through the machine by means of feed rolls during which time the yarn may be suitably twisted, plied or otherwise processed. Thereafter it is taken up on a bobbin or other suitable core. Due to the adverse effect of speed fluctuations on the yarn as it is advanced through the machine and so processed it is highly desirable that the yarn flow through the machine at a substantially even rate of speed in order to produce a uniform end product commercially acceptable in the trade. To this end feed rolls operated from a positive driving source are employed.

Known feed roll units utilized one or more positively driven rolls, generally of relatively small diameter, about which several wraps of yarn are taken in order to provide sufficient frictional driving contact between the yarn and the rolls. Such systems have generally been effective to deliver yarn through textile machines at substantially even rates of speed at the relatively slow speeds at which they heretofore operated. However, with the advent of twisting machines capable of twisting the yarn when it is advanced through the machine at speeds on the order of 225 yards per minute and better, it has been found that unsatisfactory results may occur with the use of the known feed roll devices. It has been observed, for instance, that these prior art feed rolls will fail mechanically if accelerated to the speeds required to advance the yarn at the said 225 yards per minute. Further, it has been discovered that when filamentary materials such as glass yarn is wrapped around the relatively small diameter rolls of the prior art devices, the arc of the wrap is so severe to cause fracturing of the rather stiff filamentary material. This condition is aggravated as such relatively stiff yarns passed about the rolls a number of times.

A further factor notable with the use of known feed roll units relates to the ability to arrest their feeding at times of yarn interruption. For instance, when a strand of yarn being fed by these units breaks on the output side of the unit the yarn will continue to feed until the unit is stopped. This yarn will either be fed onto the floor or will be blown about to become entangled with other running strands. In either event the yarn so fed is waste. Therefore, it is highly desirable that the feed roll unit be stopped immediately upon yarn interruption. In the past, it has been a problem to stop the feeding of the unit due to its construction and the action of inertial forces on the rolls.

It is therefore, one object of the present invention to provide a feed roll unit capable of advancing a yarn at a substantially even rate of travel through a textile machine.

A second object of the present invention is to provide a feed roll unit capable of advancing yarn to a textile machine at a substantially even rate of travel while maintaining the thread line of the yarn free of severe bends or arcs of wrap as it passes through the unit.

A further object of the present invention is to provide a feed roll unit capable of advancing yarn through a textile machine at high speeds while maintaining the rate of travel substantially constant.

Another object of the present invention is to provide a feed roll unit capable of being rendered inoperative automatically when the yarn flow thereto is interrupted.

Another object of the present invention is to provide a feed roll unit which may be readily engaged with its driving means when operation thereof is desired.

Still a further object of the present invention is to provide a feed roll unit capable of rapid threading.

Yet a further object of the present invention is to provide a feed roll unit adapted for "ganging" on a textile machine to be driven from a common power source and yet which may be easily and rapidly removed from the ganging arrangement.

Another object of the present invention is to provide a feed roll unit wherein the yarn strand passing therethrough may be severed beyond the output side thereof without disturbing the position of the thread line within the unit.

Still another object of the present invention is to provide a feed roll unit which is simple in operation and durable and reliable in use.

Other objects of the present invention will in part be observed and will in part appear hereinafter.

For a fuller understanding of the nature and object of the present invention reference should be had to the following detailed description taken in connection with the accompanying drawing wherein:

FIG. 1 is an elevational view of a portion of the upper section of a twisting frame and illustrating the present invention arranged thereon;

FIG. 2 is a sectional view through the feed roll unit of the present invention illustrating the relationship of the parts when set in the operative position;

FIG. 3 is a view similar to FIG. 2 but illustrating the relationship of the parts when moved to the inoperative position;

FIG. 4 is a view similar to FIGS. 2 and 3 but illustrating the relationship of the parts when set in the threading position;

FIG. 5 is a front elevational view of the invention and illustrating the detector fingers and knock-off in operative relationship with the unit;

FIG. 6 is a detailed view illustrating the detector finger unit of the present invention;

FIG. 7 is a side elevational view of a modified form of the present invention;

FIG. 8 is a sectional view of the unit of FIG. 7 taken along lines VIII—VIII thereof; and

FIG. 9 is a plan view of the spindle mounting and braking means.

Briefly stated, the present invention comprises a unit including rotatable feed rolls at least one of which is positively driven through a connecting gear train for advancing the yarn. An idler gear is disposed within the train of gears. This idler is permanently meshed with a driving gear affixed to the axis of one feed roll. The idler gear is adapted to be shifted into and out of engagement with a pinion gear arranged in mesh with a continuously driven main gear. When the idler gear is engaged with the main driving gear the feed roll will be rotated and, conversely, when the idler gear is disengaged therefrom the feed roll will be stopped. A second feed roll is positioned tangentially of the positively driven feed roll and in contact with the periphery thereof to be driven

thereby. In like manner a third roller, or guide roller is positioned at a tangent to the second feed roll to rest on the periphery thereof and be rotated thereby. Yarn is passed between the first roll and the second roll and between the second roll and third roll, in each instance contacting but a small sector or portion of each of said rolls and is advanced by frictional contact with these rolls as they are driven. A stop motion mechanism is provided to regulate the passage of yarn through the unit. Thus, if the yarn flow from the supply is interrupted the stop motion mechanism will be actuated to shift the idler gear out of engagement with the main driving gear to stop rotation of the feed rolls. Similarly, if the yarn flow from the output side is interrupted as might occur when the yarn breaks between the feed rolls and the take up package the stop motion will be activated to arrest yarn feeding. Brake means are provided which are responsive simultaneously with the disengagement of the idler gear from the feed roll driving gear to quickly arrest rotation of the feed rools when the power is removed therefrom.

In a modified embodiment of the feed roll unit a central driving gear is employed to positively rotate a pair of feed rolls. It is to be understood that the gear train to the feed roll central driving gear is the same as that employed in the embodiment earlier referred to. Further, the stop motion means and braking means operate in the same manner as previously described.

With particular reference now to FIG. 1 of the drawing, a portion of a ring twister is illustrated wherein a base 10 constructed from cast iron or the like is supported from the floor. Base 10 provides the supporting structure for the various components of the machine including a plate 12 and central frame member 14 both of which, in turn, mount certain of the operating parts of the machine. Plate 12, formed of heavy gauge metal, extends the entire length of the machine being affixed to the top portion of base 10. Plate 12 affords a platform for supporting any suitable number of feed roll units in independent space relationship along each side of the machine to be driven from a common source of power, such as an electric motor not herein shown, the power being transmitted to the units through power shaft 16. A frame member 14 extends upwardly from plate 12 at each end of the machine, only one of said frame members being shown herein. Frame member 14 supports a further plate 18 which extends longitudinally of the machine parallel to plate 12 but spaced upwardly therefrom. In a manner yet to tbe described plate 18 supports certain trip motion or stop mechanisms operable with the feed roll units of the present invention.

Plate 12 is provided with an extension 20 projecting outwardly from each side thereof along the full length of the plate. The outer end of each projection has a plurality of spaced depending tabs 22 atached thereto, each said tab supporting a separator 24 disposed intermediate each take-up position. The separators 24 serve to prevent engagement of the balloon of the yarn being wound on package P by ring traveller 28 from becoming entangled with the yarn ballooning about an abjecent package. Spaced upwardly from each package P is a pigtailed yarn guide 26 acting to direct the yarn to the traveller 28 for winding on package P in a manner well known in the art.

It is to be understood that the foregoing apparatus is old in the art and forms no part of the present invention but is presented for clarity of understanding of the present invention. Further, while but two back-to-back winding positions have been illustrated herein it will be understood that the feeding unit is readily adaptable to "gang" mounting on a machine having a plurality of winding positions and that a separate feeding unit would be employed at each said position. Each gang of feeding units may be driven readily by a common shaft or individually, as desired. Since each unit so employed would be identical it will suffice to explain but one in detail herein. Moreover, while the present invention is shown and described as embodied in a textile machine commonly referred to as a twisting frame, it will be readily apparent that the present invention is equally applicable to other types of textile machines where controlled advancement of yarn is desired.

Turn again to FIG. 1 of the drawing the feed roll unit of the present invention is supported from a footing 70 which is mounted fast to the upper side of plate 12 by bolt 72. A housing 74 is secured to footing 70 by means of bolts 76, one side of housing 74 having a removable cover 78 which is attached firmly to the housing by a screw 80. Housing 74 serves to enclose certain of the operating parts of the feed roll unit to protect them from dust, lint and the like, and also provides a mounting for other parts of the unit.

A shaft 82, suitably journaled for rotation in one wall of housing 74 projects both inwardly and outwardly therefrom, the outer end of said shaft serving to mount a large diameter feed roll 84 fast thereon for rotation therewith. As best shown in FIG. 5, feed roll 84 is provided with a broad faced rim or annulus which receives the running yarn thereon and acts to advance it by frictional contact therewith.

As seen in FIG. 1 a stud shaft 86 is located toward the rearward edge of housing 74. This shaft is press-fitted in a suitable bore in said housing and extends inwardly through the housing wall and protrudes outwardly therefrom. An L-shaped arm 88 is journaled on stud shaft 86 for pivotal movement thereabout. The end of arm 88 opposite from the pivot point has a relatively short horizontal shaft 90 pressed therein and extending from both sides thereof. One end of the shaft 90 is provided with bearings for mounting a feed roll 92 for rotation on the annulus of feed roll 84. As shown in FIG. 5 feed roll 92 is provided with a broad faced annulus of frictional material such as rubber or the like to present a desirable frictional contact surface for driving the roll and advancing the yarn.

Referring to FIG. 2 an upstanding lug or ear 96 is positioned toward the outer end of arm 88 and above stub shaft 90. This ear, in turn, is bored through to receive a stud 98 onto which is secured one end of a relatively short arm 100 for rockable movement thereabout. The other end of arm 100 is drilled through to receive one end of a further stud 102 fast therein and projecting horizontally therefrom. An additional roll 104 which may be appropriately designated a "guide roll" is journaled for rotation on stud 102. In like manner as with the previously described feed roll 92, the guide roll 104 has a broad rim or face which is covered with frictional material for contacting the yarn and, further, for driving from the feed roll 92.

The feed rolls 84 and 92 and guide roll 104 are thus disposed in tangential relationship to each other. In the operative position feed roll 92 is rotated frictionally from its surface contact with feed roll 84. Similarly, the guide roll 104 is rotated by contact with feed roll 92. Additionally, the centers of the three rolls 84, 92 and 104 are in a substantially straight line when the rolls are in their operative position. The yarn is thus threaded about each of the feed rolls 84 and 92 so that it contacts but a portion of the total circumference of either of said rolls. In this manner the yarn is advanced by the unit so that it is not severely bent or crimped at a sharp angle. Rather, the yarn line through the unit is one affording gradual curvature to the yarn as it passes about the rolls during yarn feeding. Moreover, the guide roll provides an advantageous nipping effect to the strand so that the unit is maintained threaded and no yarn ends are lost during strand breaks or when a wound package is doffed. Moreover, the guide roll 104 acts to contain any twist being inserted in the yarn, as when it is rotated by traveller 28. Whereas, if this twist were not so limited it would run back on the winding strand and possibly

around roll 92 to thereby adversely affect the feeding process, the guide roll 104 prevents this. As a result the twist is, at all times, held in the zone between the guide roll 104 and take-up package P.

As has been stated previously shaft 90 projects from both sides of arm 88. The side of shaft 90 disposed oppositely from that supporting feed roll 92 loosely receives a bell crank lever 108 for rockable movement thereabout. The forward end of the lever 108 is formed as an extending leg 110 which depends somewhat and terminates at a point generally in horizontal alignment with the top of feed roll 84 but spaced forwardly therefrom. The outer end of the lever leg 110 has a right angular tab 112, folded therein. A laterally extending pigtail guide 114, see FIG. 5, is pierced through the tab and projects across the front of feed roll 84, spaced slightly forward thereof. The rearward extension of lever 108 mounts a counterweight 116 which may be arranged for slidable adjustment therealong to permit the lever to be set in an overbalanced condition such that the lever may be rocked in a counterclockwise direction when free of any detaining force.

Referring now to FIGS. 2, 3 and 4 it will be observed that power shaft 16 passes through housing 74 and is supported in mated split bearing surfaces in the footing 70 and housing 74. A main large diameter driving gear 120 is secured fast on power shaft 16 within the confines of housing 74 whereby said gear 120 will rotate constantly in response to rotation from the power shaft. A smaller diameter pinion gear 122 is mounted for rotation on a short shaft 124 pressed into a boss in the wall of housing 74. As shown in FIGS. 2, 3 and 4 pinion gear 122 is fixed in mesh with gear 120. A face cam 126 of generally trilobate configuration is formed integrally with pinion 122 on the axis thereof. In a manner to be fully explained hereafter cam 126 serves to actuate certain components of the stop motion upon yarn interruption. It will be appreciated that pinion gear 122 and cam 126 will be subject to constant rotation due to the permanent meshing of this gear with main driving gear 120.

As has already been stated shaft 82 is journaled within housing 74 providing a support at one of its ends for feed roll 84. The opposite end of shaft 82 has a spur gear 128 fixed thereon for driving with feed roll 84. A brake drum 130 corresponding approximately to the major diameter of spur gear 128 and formed concentrically and integrally therewith operates with the braking mechanism, yet to be described to arrest rotation of shaft 82 and its associated elements upon strand interruption. A sleeve 132 is located on shaft 82 inwardly of gear 128 for rockable movement and has a pair of juxtaposed levers 134 and 136 loosely fitted thereon. Lever 134, positioned adjacent the side of brake drum 130 is of spiderlike configuration having three legs 138, 139 and 140 projecting radially from a common hub at equidistant points. Leg 138 thereof has a pin 141 affixed therein to which is secured a cable 137. The cable 137 is extended over a pulley 143 and connects a braking mechanism for the take-up package with the operative braking means of the feed roll unit whereby both braking units will act simultaneously in a manner to be fully described.

The braking mechanism of the take-up package may be of any well known prior art type wherein a brake is urged against the package spindle as by spring pressure. As an example, such a braking means is described in U.S. Patent No. 2,481,185 issued September 6, 1949. FIG. 9 is a view of such braking means. In this view a horizontal bracket 127 is shown, it being understood that this bracket is attached at the lower end of base 10 and in a position to support package P. A vertical support 129 is affixed in bracket 127. A horizontal arm 131 is pivotally attached at one of its ends to support 129. The opposite or distal end of arm 131 mounts an upright spindle S for supporting package P. It will be appreciated that the lower end of spindle S is formed as a spindle whorl in the usual manner as disclosed in the previously cited patent, such whorl not being illustrated herein. A stationary arm 133 is secured at one of its ends to vertical support 129. The opposite end of arm 133 mounts a brake device generally designated at B, this brake device lying in the same plane as and closely adjacent to the whorl portion of spindle S. In the manner fully related in the previously cited U.S. patent cable 137 acts to advance a plunger 135 against a portion of arm 131 whereupon the whorl of spindle S is carried into engagement with brake device B to arrest the rotation of spindle S.

The forwardly projecting leg 139 of lever 134 is of sufficiently length to extend beyond the forward edge of housing 74 through a suitable slot afforded therein and provides a convenient signal means for the operator whereby the particular angular location of this leg readily indicate whether the unit is in its operating or non-operating position. A portion 142 is provided on the lower edge of leg 139 adjacent the hub of lever 134 which serves as a cam surface for securing the braking means in its inoperative position.

The third leg 140 of lever 134 projects generally downwardly and to the rear of the unit and has a laterally projecting stud 144 fastened into the outer wall at the approximate midpoint thereof for rotatably mounting an idler gear 146. So positioned, gear 146 is in permanent mesh with gear 128 on shaft 82. Further, with gear 146 in position on stud 144 it is aligned for selective engagement and disengagement with pinion gear 122. Thus, idler gear 146 is employed to complete the train of gears from the main driving gear 120, through pinion gear 122 to spur gear 128 on shaft 82 for imparting rotation to feed roll 84 as lever 134 is rocked clockwise to mesh gear 146 with pinion 122. Similarly, idler gear 146 serves to break or disconnect the train when lever 134 is swung counterclockwise to disengage gear 146 and 122. As shown in FIGS. 2, 3 and 4 the outer end of leg 140 is notched to provide a shoulder 148 whose function will be related in connection with the means for latching the unit in its yarn advancing position. The outer extreme edge of the leg 140 constitutes a cam actuating surface 150 for purposes concerned with the stop motion means to be explained later.

The further lever 136 is situated on sleeve 132 inwardly from lever 134 and is arranged for rockable movement through a limited arc independenly of said lever 134. However, as will be seen, instrumentalities are present which connect these levers together for common movement during a portion of their respective clockwise travel. Lever 136 includes a forwardly extending handle 152 provided with a knob 154 at its end outside of housing 74 for grapsing by hand to start the unit. A pin 156 is anchored in the side of lever 136 close to the hub thereof and projects laterally terminating beyond the vertical plane of lever 134, thereby being capable, during its clockwise movement, of contacting the top of lever arm 139. A helical spring 158 is connected at one of its ends to a horizontal post 160 embedded in a pad 162 of housing 74, the opposite end of the spring 158 being attached to pin 156. Spring 158 thereby provides a constant counterclockwise bias to lever 136 as viewed in FIGS. 2, 3 and 4. A shock absorbing block of rubber 164 is located in a fixed mounting 166 upwardly of the lever 136 to limit counterclockwise rotation of said lever and to afford resiliency for stopping said lever against the force of spring 158. A second spring 170 is fastened at one of its ends to pin 156 in lever 136 with the opposite spring end being fixed to a bifurcated lifter lever 172 rockably positioned on a fixed stud 174. Stud 174 extends through lifter lever 172 at a point slightly forward of the midpoint thereof so that the lifter lever will tend to tilt counterclockwise or to the rear (see FIGS. 2 and 3). With lever 136 in its uppermost posi-

tion spring 170 does not exert any bias on lifter lever 172 and may actually provide a pushing effect to hold the lever tilted to the rear. However, the tension of spring 170 is set to provide a relatively light biasing load on lifter lever 172 when lever 136 is rocked downward, i.e., in a clockwise direction, so that lifter lever 172 will be urged coincidently in the same direction (see FIG. 4).

In order that the braking mechanism of the invention may be operated in cooperative relationship with rotation of lever 134 an ear 180 is provided which protrudes radially from the hub of lever 136 at a position slightly below arm 139. The ear 180 presents a gradually inclined cam surface 181 on its underneath side. The upper edge of ear 180 is shaped essentially as a flat shelf 182 for locking purposes. Ear 180 thus provides means for operating the braking mechanism of the unit in concurrence with the rocking motions of lever 136.

The braking mechanism, previously alluded to, is constituted as a generally upstanding pivoted brake lever 184 carried on a pin 186 projecting from the interior wall of housing 74. The upper end of brake lever 184 terminates adjacent drum 130, the section of the lever disposed most nearly to the drum being provided with a shoe 188 concaved to conform to the periphery of said drum for frictional contact therewith. A roll 190 is set fast in the outside wall of brake lever 184 and toward the upper central section thereof in alignment to be contacted and shifted by ear 180. A post 192 is affixed to the uppermost end of brake lever 184 and extends horizontally to receive one end of a helical spring 194. The opposite end of spring 194 is secured in one of a plurality of spaced holes in the periphery of a pendant 196 loosely pivoted on a horizontal pin 160 extending from housing 74 whereby the spring serves to exert a constant biasing force on the brake mechanism toward drum 130. Since the holes in pendant 196 are of varying distances from post 192 the tension in spring 194 may be regulated by selection of the proper hold position, thereby providing for adjustment of the force exerted by brake on drum 130.

An angular pendant-like pawl 200 is pivoted from the inner end of shaft 86 toward the rear of housing 74. Pawl 200 depends from its pivot and has a slight bend midway along its length acting to direct it somewhat forwardly through an aperture in the bottom wall of housing 74. Sufficient clearance is provided at the passage point through the housing to permit limited travel of the pawl. A spring 204 which is attached at one end to the upper section of pawl 200 and connected at its opposite end to stud 174 provides a constant bias to the pawl in a counterclockwise direction. However, tendency of pawl 200 to move counterclockwise is controlled by means of engagement of surface 150 of leg 140, previously discussed, with a cam surface 206 on the side of the pawl 200 adjacent said leg 140. Cam surface 206 extends longitudinally along the lower section of pawl 200, being formed generally as a slight concavity and rising as it extends downwardly. The upper end of cam 206 falls sharply into a recess so that a shoulder 208 is formed for locking engagement with shoulder 148 of leg 140, the biasing force of spring 204 serving to urge this mating shoulder into engagement.

Pawl 200 has, in its upper section, a horizontal extension 210 projecting forwardly therefrom. Extension 210 terminates in an anvil 212 which presents a relatively broad face in vertical alignment with cam 126. As is best illustrated in FIG. 2 anvil 212 is disposed in close proximity to cam 126 when pawl 200 and arm 140 are locked together by shoulders 208 and 148. However, when the pawl is unlocked therefrom, as seen in FIGS. 3 and 4, the anvil is moved further apart from the cam due to the pawl being forced rearwardly as leg 140 slides counterclockwise along cam surface 206.

A breakage rod 214 is attached, at its upper end, to a horizontal bar 215 (see FIG. 6) carried on a generally U-shaped rocker arm 216 and suspends vertically therefrom, passing through an opening in the top of housing 74 and terminating at its lower extreme in the zone between anvil 212 and cam 126. Horizontal positioning of the breakage rod 214 in the aforesaid zone is controlled by the rod being guided through a suitable slot (not shown) in the rear portion of lever 108. In order that the breakage lever 214 may be shifted vertically during certain movements of the mechanism the rod is guided between the bifurcations at the rear of lifter lever 172. A collar 218 is fixed on the rod slightly above the lifter lever 172 and, as the lifter lever is rocked clockwise, it will contact the collar 218 and cause breakage rod 214 to be elevated above anvil 212 and cam 126. In this manner the breakage rod is prevented from inadvertently dropping into contact between cam 126 and anvil 212 when the unit is being threaded up. A similar collar 220 encircles breakage rod 214 at a position above housing 74 but below lever 108. It will be seen that counterclockwise rotation of lever 108, as when the lever is free for movement under its own weight assisted by the influence of counterweight 116, will cause it to strike collar 220 thereby driving breakage rod 214 downwardly.

It has been stated that breakage rod 214 is suspended from a horizontal bar 215 attached to rocker arm 216. In turn, rocker arm 216 is supported pivotally on a short shaft 222 held between a pair of spaced forwardly extending legs 224 of a laterally extending U-shaped bearing bracket 226. The bearing bracket 226 is held fast on a depending plate 228 which is secured to longitudinal plate 18. As is shown in FIG. 6 rocker arm has a counterbalance 230 thereon for urging it rotationally counterclockwise, and, in turn biasing breakage rod 214 upwardly to the position illustrated in FIG. 2.

Viewing FIGS. 1, 5 and 6, means are disposed above the rocker arm 216 and related elements for depressing breakage rod 214 in the event of yarn interruption to the unit. As shown, a rail 231 is provided which extends longitudinally of the twisting machine and is rigidly supported therefrom. Rail 231 is preferably adapted for traversing movement by means not herein illustrated but which are well known in the art such as a cam and follower arrangement. A bracket unit comprising a pair of wall members 232, spaced apart by an interconnecting web 234, are attached to the rail in vertical alignment with bracket 226. A pivot pin 238 is held between the two walls 232 at the forward end thereof whereby said pin 238 serves as a mounting pivot for fingers 240 which are spaced at intervals therealong. Each of the fingers 240 has a yarn guide 242 at the upper end thereof which receives a strand of yarn and guides it to the feed rolls. By virtue of the traversing movement of each of said guides 242, imparted from traversing bar 231, the yarn will be shifted to and fro on the feed rolls to thereby distribute wear evenly along the surface of said rolls. The lower end of each pivoted finger 240 has a counterweight 244 affixed thereto which extends rearwardly at generally a right-angle from the plane of said finger passing above and across bar 215. The counterweight 244 has sufficient weight to overcome the biasing effect of counterbalance 230 so that, when counterweight 244 is dropped on bar 215, it will swing rocker arm 216 clockwise as illustrated by the dotted lines of FIG. 6 and, in turn, depress breakage rod 214 to cause it to assume the position as shown in FIG. 3.

The foregoing apparatus is prepared for operation by first releasing the brake shoe 188 from contact with drum 130 thereby setting the elements in their relationship as shown in FIG. 4 in order that feed roll 84 may be freely rotated. This movement is achieved by grasping knob 154 and depressing handle 152 against the tension of spring 158 to rock lever 136 through a short portion of its full arc of rotation sufficient to carry ear 180 past roll 190. In this procedure cam surface 181 of ear 180 is engaged with roll 190 in the first instance. Further

downward motion of lever 136 causes the pin to be cammed up the incline of surface 181 thereby swinging brake lever 184 clockwise about pin 186 (see FIG. 4) causing brake shoe 188 to shift away from drum 130 against the pressure of spring 194. Continued clockwise rotation of lever 136 causes ear 180 to ride past the roll 190 whereupon the roll drops into a locked position on shelf 182, being held securely thereagainst by the pressure of spring 194. Further, lever 136 will be held in the depressed position by roll 190. It will be appreciated that the brake shoe 188 will, at this point, be released from drum 130 so that feed roll 84 may be freely rotated by hand for threading and the like. However, as is clearly shown in FIG. 4 idler gear 146 is removed from mesh with pinion 122.

As a corollary to the motion of lever 136 just described lifter lever 172 will be rocked clockwise from its position as shown in FIG. 3 spaced apart from collar 218 to assume a new position (see FIG. 4) wherein it contacts collar 218 and lifts breakage rod 214 out of the zone between anvil 212 and cam 126 to insure that the breakage rod will not become engaged therebetween and be constantly buffeted while feed roll 84 is being manually manipulated. The motion to rock lifter lever 172 in response to downward movement of lever 136 is transmitted through the connecting spring 170. Thus, with the elements just described set as shown in FIG. 4 the yarns Y may be readily threaded about the unit.

To this end a plurality of yarn ends Y to be plied or twisted together are drawn from suitable supply sources and passed through a guide 242 whereafter the group is threaded, with each yarn end being spaced separate from the others, behind feed roll 84, passing clockwise thereabout as seen in the left-hand unit of FIG. 1. The yarns Y are then directed under feed roll 92 lying on the periphery of feed roll 84, the yarns thereupon being extended for a part of a wrap counterclockwise, i.e., opposite to wrap on feed roll 84, around feed roll 92 being laid under guide roll 104. Upon emergence from the nip between feed roll 92 and guide roll 104 the yarn is thence passed downwardly through the machine being drawn against pigtail guide 114 and directed through the second pigtail guide 26 and traveller 28 to package P. To facilitate threading of the yarns between feed rolls 84 and 92, the feed roll 92 may be swung apart from contact with feed roll 84 by rotating arm 88 about its pivot point on stud shaft 86. Similarly, as an aid to passing the yarn between feed roll 92 and guide roll 104, the guide roll may be swung away from contact by manual rotation of arm 100. Obviously, the unit may also be operated with either or both of the rolls 92 and 104 completely free of any contact with the yarn in which event the only contacting surface which would be employed for advancing the yarn would be on the surface of feed roll 84. With the yarn in position on the feed rolls as described it will have sufficient tension therein to hold each of the fingers 240 on which guides 242 are mounted forward so that counterweights 244 will be out of contact with bar 215, that is, in the position as shown in FIG. 1. Additionally, the yarns will exert sufficient force on pigtail guide 114 to hold the guide down so that the main body of lever 108 will be disposed horizontally and spaced from collar 220 as shown in FIG. 2. Adjustment of the position of counterweight 116 is made with respect to the pivot point of lever 108 to insure that upon release of the yarn from contact with pigtail guide 114 the lever will rock counterclockwise to strike collar 220 and, yet, it is desirable that such rearward overbalance be fixed so as to provide but minimum tension exertion on the running yarn strand from said guide. With the previously described parts set as described, breakage rod 214 will be held in a raised position due to the force of counterbalance 230 on rocker arm 216 such that the rod will be drawn clear of any potential engagement between cam 126 and anvil 212 (see FIG. 2).

With the unit now threaded and ready for operation yarn feeding is initiated by further downward movement of lever 136 from handle 152, such motion acting in the following manner. As lever 136 is depressed further from the previously described position where the brake mechanism is released from feed roll 84 pin 156, protruding from the side of the lever contacts leg 139 of lever 134 thereby, in effect, locking these two elements together for cooperative clockwise movement. As one function of such further clockwise movement of lever 134 cable 137 is drawn generally upwardly by leg 138 to release the usual breaking means holding the take-up package spindle. Additionally, the movement of lever 134 downwardly causes leg 140 to travel upward on cam surface 206 shifting pawl 200 firstly gradually counterclockwise about stud shaft 86 under the influence of spring 204 until shoulder 148 of leg 140 and the shoulder 208 of the pawl 200 meet whereupon these two shoulders drop into engagement interlock under the bias of spring 204.

Simultaneously with the afore-mentioned movement of lever 134 cam 142 thereon is rotated into engagement with the roll 190 of brake lever 184. Cam 142 slides roll 190 from engagement in shelf 182 and, with continued rotation of lever 134 the roll is cammed outwardly by cam 142 thereby swinging brake lever 184 further clockwise away from drum 130 and, as the two previously mentioned shoulders 148 and 208 interlock, the brake lever 184 is set in a locked position with roll 190 engaged at the upper extreme of cam 142 (see FIG. 2).

In conjunction with the clockwise rotative movement of levers 134 and 136, just described, idler gear 146 on leg 140 is swung directionally toward pinion gear 122 and, toward the latter stages of movement of these levers, the two gears 122 and 146 are meshed. Coincidently with the meshing of these gears pawl 200 locks into leg 140 to secure the engaged gears in the driving relationship. Since, as previously stated, pinion gear 122 is constantly driven from main gear 120, the power train will now be completed and gear 128 will be rotated to positively drive feed roll 84.

With lever 136 unlocked from roll 190, this lever will be swung counterclockwise by spring 158 to its rest position, rubber block 164 serving as its locating stop. Further, such counterclockwise motion of lever 136 contracts spring 170 and causes it to relieve its bias on lifter lever 172 and push the lever counterclockwise about stud 174 an amount sufficient to free it from contact with collar 218, the yarn serving to act at this point on instrumentalities previously described to hold the breakage rod 214 in an elevated position as seen in FIG. 2.

The yarn detecting means and stop motion of the feeding unit operate in the following manner to inactivate the unit upon yarn interruption thereto. In the event of a failure in the yarn supply on the input side of the unit of the finger 240 supporting yarn guide 242 will be released to rock counterclockwise as seen in FIG. 6 and strike bar 215. This causes rocker arm 216 to rotate clockwise thereby dropping breakage rod 214 into the zone between anvil 212 and cam 126. Cam 126 which is driven constantly from gear 120 rotates against the rod forcing it against the anvil 212. This action thrusts pawl 200 clockwise on its pivot to unlatch it from arm 140. At this time lever 134 will snap counterclockwise as by a spring, not herein illustrated but which would form a part of a conventional spindle braking unit, acting through cable 137, the extent of this movement of lever 134 being limited as arm 140 contacts pin 186. As leg 140 moves down cam surfaces 206 pawl 200 is restricted from yielding to the counterclockwise urging of spring 204 and is, in fact cammed outward to expand the distance between anvil 212 and cam 126 due to the rise in the cam surface from shoulder 208 toward the lower end of the pawl thus preventing chattering of the pawl by random contact of breakage rod 214 therewith.

It will be seen from FIGS. 2, 3 and 4 that as a con-

comitant to the above-described knock-off motion of pawl 200 from lever 134 and the succeeding counterclockwise motion of the lever that cam portion 142 is slid past roll 190, the roll thereafter dropping into a dwell adjacent the hub of lever 134, thus permitting brake lever 184 to pivot under the influence of spring 194 to force brake shoe 188 onto drum 130 for rapid stopping of feed roll 92. As previously mentioned, cable 137 simultaneously initiates a similar braking action to the spindle supporting package P.

Having described the stop motion action when the yarn supply to the input side of the unit fails, it will now be related how the stop motion operates upon interruption of the yarn flow to the take-up package P from the output side of the unit. As earlier stated, pigtail guide 114 receives the yarn strands Y which serve to hold leg 110 down and the remainder of the lever generally horizontal in spaced relationship to collar 220 as shown in FIG. 2. Should the plied or twisted yarns being fed to package P break said guide 114 will be free to swing up immediately thereby causing lever 108 to rock downward and strike collar 220. The weight of lever 108 assisted by counterweight 116 bearing on collar 220 of breakage rod 214 will serve to push the rod downward against counterbalance 230 so that the lower end of the breakage rod is disposed in the clearance between cam 126 and anvil 212 for stopping the unit as described previously.

Once the condition of the yarn has been corrected, either on the input or output side of the unit, the unit is restarted by depressing handle 152 to actuate the instrumentalities previously described in connection therewith in the sequence indicated.

It will be apparent to those skilled in the art that the feed rolls of the present invention may have a variety of arrangements other than that already described and may be arranged and supported in numerous other ways. No attempt will be made to illustrate and describe all of the possible variations along these lines as most will be obvious to those skilled in the art. However, there is shown in FIGS. 7 and 8 one modification wherein the general driving arrangement and stop motion may be employed to operate a pair of positively driven feed rolls for yarn, it being understood that, but for the components hereinafter referred to in FIGS. 7 and 8, the operatively mechanism of FIGS. 1 through 6 would be employed therewith. Moreover, it will be readily apparent that the modification of FIGS. 7 and 8 may be employed as an alternative unit or attachment suitable for ready application to the earlier described embodiment necessitating only removal of the earlier described feed rolls therefrom, the drive for the instant embodiment being taken off the common shaft 82.

Thus, in FIGS. 7 and 8 a flange 270 is shown having a central transverse passageway therethrough which flange, if desired, may be readily adapted for mounting on the outer face of housing 74 of the unit. Alternatively flange 270 may constitute the same component related to by the reference numeral 74 in the embodiment of FIGS. 1–6. A shaft 82' is positioned in the transverse passageway, said shaft 82' being comparable to shaft 82 of the embodiment of FIGS. 1–6. The outer end of shaft 82' mounts a driving gear 272 which, if this unit were used as an alternative adaptation of the earlier described unit, would replace feed roll 84. A pair of stud shafts 274 and 276 are journaled for rotation in flange 270 at diametrical points relative to gear 272. Each of the stud shafts 274 and 276 mounts a spur gear 278 and 280 respectively, thereon in mesh with main gear 272. Further, shaft 274 has a feed roll 282 secured thereto for rotation therewith and, in like manner, the opposite shaft 276 mounts a like feed roll 284 for rotation as the shaft is driven.

In the operation of FIGS. 7 and 8 a strand of yarn is drawn from a supply source and wrapped any desired number of times about feed rolls 282 and 284. No particular illustration of a supply means or take-up mechanism has been shown, it being understood that they can be of any conventional type as, for example, that shown in FIG. 1. When rotation is imparted to gear 272 through shaft 82', it will be seen that feed rolls 282 and 284 will be positively rotated to advance the yarn.

Since certain changes may be made in the foregoing apparatus and modification thereof without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in the limiting sense.

What is claimed is:

1. Yarn handling apparatus comprising in combination,
- means for advancing a strand of yarn,
- driving means for said advancing means including,
  - a driven member spaced apart from and operably connected with said advancing means,
  - a driving member connected to a power source, and
  - an intermediate member engaged with said driven member;
- a rockable element for mounting said intermediate member,
  - said rockable element being movable to dispose said intermediate member in a first position in engagement with said driving member and in a second position disengaged from said driving member;
- a detector for sensing an interruption in the yarn being advanced by said advancing means,
- trip means responsive to said detector for initiating movement of said intermediate member to said second position,
- a brake arranged to engage said driven member when said intermediate member is in said second position,
- means for biasing said brake into engagement with said driven member, and
- cam means connected with said rockable element,
  - said cam means being operable to maintain said brake in an inactive position spaced from said driven member when the intermediate member is in said first position,
  - said cam means being movable with said rockable element to release said brake for operation by its biasing means to engage said driven member when said intermediate member is moved to said second position;
- whereby to arrest rotation of said advancing means.

2. Apparatus as set forth in claim 1 wherein said advancing means includes a pair of coacting feed rolls, and a guide roll rotatable through said feed rolls.

3. Apparatus as set forth in claim 1 wherein said trip means is normally held in an inoperative position and is releasable to an operative position in response to said detector, and a rotatable cam arranged to actuate said trip means upon release thereof to said operative position whereby said trip means initiates movement of said driving member from said first position to said second position.

4. Apparatus as set forth in claim 2 including traversing means for moving the yarn laterally of said feed rolls.

5. Apparatus as set forth in claim 3 including a latch disposed to interlock with said rockable element and locate said intermediate member in said first position, said trip means when actuated by said rotatable cam being engageable with said latch to release said latch from interlocking relationship with said rockable member to permit said intermediate member to move to said second position.

6. Yarn handling apparatus as set forth in claim 5 wherein said latch includes a cam surface, and said rock-

able member engages with said cam surface when the latch member is released from interlocking relationship with said rockable member, to thereby disconnect the trip means from said latch member.

7. Yarn handling apparatus comprising in combination, rotatable means for advancing a strand of yarn, means for driving said rotatable means including a movable driving member, a rockable element for mounting said driving member, said rockable element being adapted to locate said driving member in a first position whereby said rotatable means is engaged with said driving means and in a second position whereby said rotatable means is disengaged from said driving means, a brake arranged to arrest rotation of said rotatable means when said driving member is in said second position, first cam means for moving said brake to an intermediate released position whereby said rotatable means is rendered freely rotatable while said driving member is maintained in said second position, and second cam means for moving said brake to a terminal released position when said driving member is moved to its first position.

8. Yarn handling apparatus as set forth in claim 7 including means for adjusting the braking force of said brake.

9. Yarn handling apparatus as set forth in claim 8 wherein said adjusting means includes a spring and means for controlling the force of said spring on said brake.

10. In a textile machine wherein yarn is drawn from a source of supply and advanced to a rotating collecting bobbin, said machine being provided with a first brake and means for operating said brake to arrest rotation of said bobbin, the improvement therein comprising,

means for advancing a strand of yarn,

driving means for said advancing means including,

a driven member spaced apart from and operably connected with said advancing means,

a driving member connected to a power source, and

an intermediate member engaged with said driven member;

a rockable element for mounting said intermediate member,

said rockable element being movable to dispose said intermediate member in a first position in engagement with said driving member and in a second position disengaged from said driving member;

a detector for sensing an interruption in the yarn being advanced by said advancing means,

trip means responsive to said detector for initiating movement of said intermediate member to said second position,

a brake arranged to engage said driven member when said intermediate member is in said second position,

means for operating said last mentioned brake into engagement with said driven member,

connecting means between said rockable element and said first brake,

cam means connected with said rockable element,

said cam means being operable to maintain said first and second brakes in an inactive position when said intermediate member is in said first position,

said cam means being movable with said rockable element to release said first and second brakes for actuation by the operating means of each when said intermediate member is moved to said second position,

whereby to arrest rotation of said collecting bobbin and said advancing means substantially simultaneously.

11. Apparatus as set forth in claim 10 wherein said trip means is normally held in an inoperative position and is releasable to an operative position in response to said detector, and a rotatable cam arranged to actuate said trip means upon release thereof to said operative position whereby said trip means initiates movement of said driving member from said first position to said second position.

12. Apparatus as set forth in claim 11 including a latch disposed to interlock with said rockable element and locate said intermediate member in said first position, said trip means when actuated by said rotatable cam being engageable with said latch to release said latch from interlocking relationship with said rockable member to permit said intermediate member to move to said second position.

13. Yarn handling apparatus as set forth in claim 12 wherein said latch includes a cam surface, and said rockable member engages with said cam surface when the latch member is released from interlocking relationship with said rockable member, to thereby disconnect the trip means from said latch member.

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