Sept. 17, 1929. W. W. COLLINS 1,728,663

TWISTING MACHINE

Filed Feb. 3, 1928 3 Sheets-Sheet 1

Fig. 1.

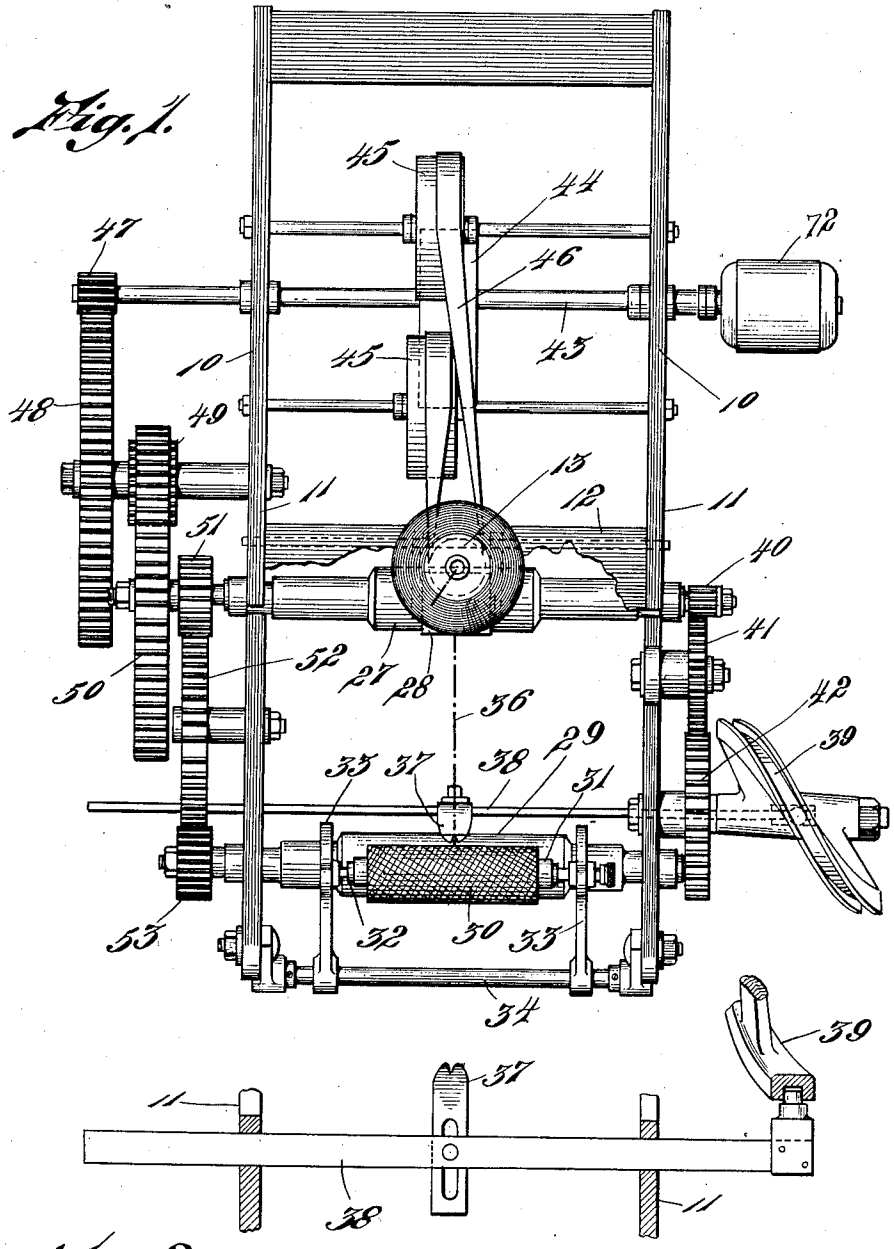

Fig. 2.

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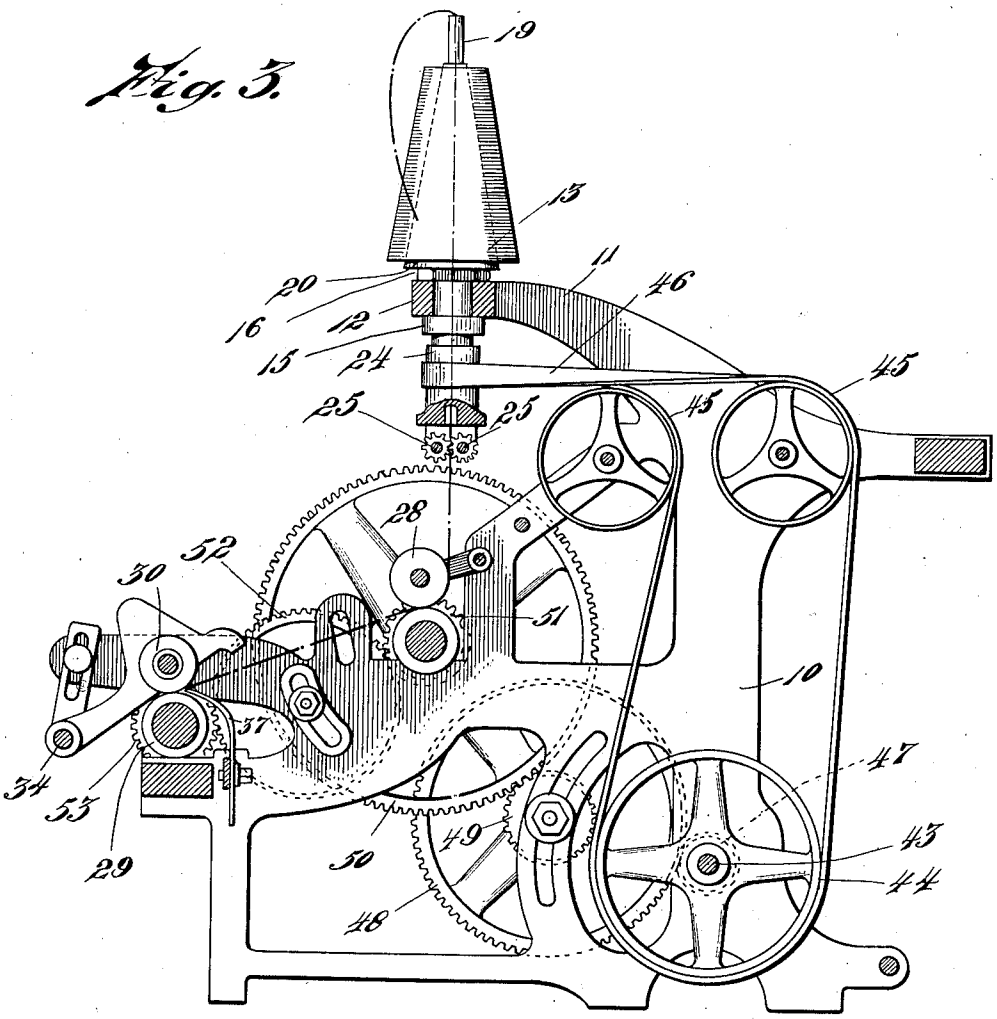
Fig. 3.



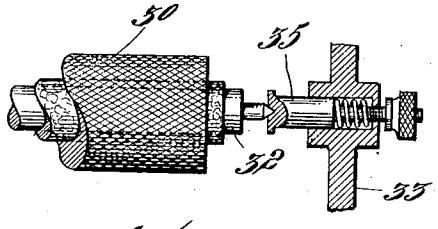


Fig. 4.

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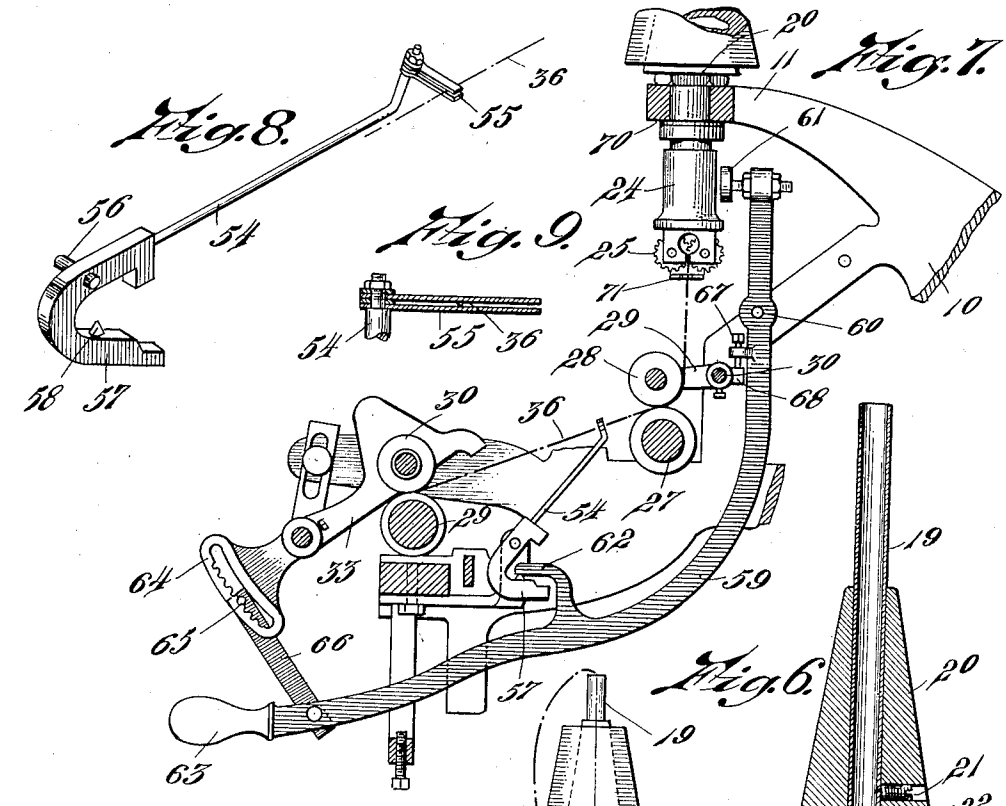

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TWISTING MACHINE

Application filed February 3, 1928. Serial No. 251,671.

This invention relates to an improved machine for and method of twisting yarns; and has for its object to provide a machine of this character having a rotatable yarn twister head designed to carry a yarn supply package and a yarn twist holder or twisting member through which the yarn is led from the package, the head being mounted to be rapidly rotated and a pair of feed rolls being provided and spaced from the twist holder through which the yarn is led from the twister and means also being provided for taking up or packaging the twisted yarn as fed by the feed rolls.

A further object of the invention is the provision of a guide tube carrying a yarn package at its upper end and a yarn engaging member at its lower end, the yarn being led from the package through the tube and through the engaging member to a pair of yarn twist holding feed rolls which are spaced from the yarn engaging member, means being also provided for winding the twisted yarn into package form as led from the feed rolls.

The invention further consists in the provision of a traverse motion for controlling the lay of the yarn as wound upon the package.

The invention still further consists in the provision of a stop motion for arresting the action of the yarn feeding mechanism when the yarn breaks; also the provision of means for catching the loose end of the yarn, and breaking the yarn if it should be released from its guide and start to balloon at the lower end of the twister head, being also engaged to prevent it from unthreading from the twister head and from doubling with yarn of the next adjacent twister head.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a plan view of my improved twisting machine.

Figure 2 is a detail showing the slide rod of the yarn guiding traverse motion.

Figure 3 is a side elevation of the machine as illustrated in Figure 1 partly in section.

Figure 4 is a detail illustrating the spring center member for releasably holding the package of twisted yarn while being wound.

Figure 5 is a skeleton or diagrammatic view showing the members directly employed for supplying, feeding, twisting and packaging the yarn.

Figure 6 is a sectional elevation of the twister head.

Figure 7 is a side elevation partly in section showing a stop motion mechanism as applied to my improved twisting machine.

Figure 8 is a perspective view showing a detail of the yarn feeler member engaging the travelling yarn.

Figure 9 shows the yarn feeler fingers in section between which the yarn runs and which also serves as a slub catcher.

Figure 10 is a perspective view of the feed twister showing the teeth for engaging and breaking the yarn to prevent it from ballooning and then unthreading through the twister head and to prevent it from flying into engagement with the yarn in the next twister head to cause doubling of the ply.

It is found in practice that my improved method of twisting has many advantages over the old methods of ring twisting, cap twisting and flyer twisting for a number of reasons, among others being that the twisting speed may be increased from 50% to 100% over that of any of the above mentioned methods of twisting, this high rate of speed being obtained, among other reasons, by the elimination of friction on the yarn caused by drawing it through a traveler and drawing the traveler about the ring as in ring twisting. Then again the yarn by my improved method is also much stronger than when twisted by any of the old methods because it is subjected to less disintegrating strain and wear during the twisting operation; therefore it naturally follows that the stronger the yarn the faster it can be run without breaking down.

Another great advantage of my improved method of twisting is that the distance between the twisting points remains constant

thereby providing a more even twist which is not the case with ring twisting. Then again the twisted yarn may be wound direct as fed from the feed rolls into package form and thus eliminate the intermediate winding operation usually employed. I have also provided simple and effective means for engaging and severing the yarn if for any cause it is released from the twister members below the twister head to balloon out of its proper path of travel, thus preventing slack twist and doubling.

I have also provided a simple and effective stop motion for arresting the yarn feed mechanism when the yarn breaks; and the following is a detailed description of the present embodiment of my invention and showing one arrangement of mechanism by which these advantageous results may be accomplished:

With reference to the drawings 10 designates the end frames which, of course, may be placed any desired distance apart or arranged to support any desired number of spaced twister heads and their operating mechanism one complete unit only being herein shown. Each end frame is herein shown as being provided with an upwardly and forwardly extending arm 11 supporting a cross-bar 12 in which the twister head 13 is rotatably mounted.

This twister head comprises a sleeve 14, see Fig. 6, having a collar 15 below the bearing rail 12 with a nut 16 threaded on to the upper end to bind against the upper face of this rail. Within this sleeve is mounted a brass bushing 17 and inside of this brass bushing I mount an anti-friction bushing 18 both being secured against rotation to the sleeve 14. Extending upwardly through this anti-friction bearing is a yarn guide tube 19 on the upper portion of which is mounted a metal package-supporting cone which is fixed to this tube by a binding screw 21 and an anti-friction ball bearing is mounted in the bottom recess 23 of this cone to carry the weight of the tube and the parts secured thereto.

To the lower end of this guide tube is secured a whirl 24 and on the lower end of this whirl I have herein shown as being mounted a pair of yarn nipping twist rolls 25 which are preferably corrugated to loosely mesh with each other and these rolls are mounted on their respective pivot pins 26 to rotate freely thereon to nip the yarn and set the twist therein as the head is rapidly rotated and the yarn is drawn therethrough between these rolls, but any other desired means may be employed on this head for holding this twist.

I have provided a pair of feed nip rolls which are spaced from the twist holder the required distance which perform a double function; first, they cooperate with the twist rolls to hold the yarn as the twist is set therein; and second, they serve to feed the twisted yarn at such a speed relative to that of the twister head as to accurately determine the amount of twist, per inch, which shall be set into the yarn. The bottom roll 27 of this pair of feed rolls has its bearing in the end frames and is driven in the manner presently described while the upper roll 28 of these feed rolls is mounted in the arms 29 which are pivoted at 30 in the frame and rests by its own weight upon the lower roll 27. The yarn guiding surface of one of these feed rolls is preferably positioned to lead and guide the yarn in alignment with the axis of the spindle so as to reduce traveling friction and not affect the twist.

Any desired means may be employed to take up the twisted yarn as delivered from these feed rolls, but I have herein shown a drive roll 29 which has suitable bearings in the end frames 10 and is driven by mechanism presently described upon which roll rests the surface of the package roll 30 to be rotated by frictional contact therewith. This package may be in any desired form, that herein shown being provided with a tubular core 31 mounted on a shaft 32 with its ends supported in the arms 33, which arms are mounted on the cross shaft 34, whereby the arms may be swung to lift the package from contact with its drive roll 29 when desired.

One end of the spindle package is shown as supported by a spring pressed center 35, in Figure 4, whereby the package may be readily removed and positioned as desired.

In order to lay this yarn 36 upon this package in the desired manner, I have provided a traverse motion which includes a yarn guide 37 mounted upon the sliding bar 38 which bar is moved back and forth at the desired speed by means of the cam 39 which receives its motion from the feed roll 27 through the train of gears 40, 41 and 42.

My improved machine may be driven from any source of power but I have herein shown the driving power as being supplied in the electric motor 72, and the whirl 24 is shown as being driven from the main shaft 43, from the pulley 44 through the idlers 45 by the belt 46 and the feed rolls 27 and 28 are driven from this main shaft 43 through the gears 47, 48, 49 and 50, while the take up package driving roll 29 is driven from and in time with the feed roll 27 through gears 51, 52 and 53.

In some instances, it is found advisable to provide a stop motion for this yarn driving mechanism, one form of which is herein shown which is operated by a feeler member 54 which is provided with a pair of closely spaced extended fingers 55 between which the yarn is drawn. This feeler member is pivotally mounted on the pin 56 and has a U-shaped tripper head 57 in which is a bear-

ing pin 58. An operating lever 59 is pivotally mounted at 60 near its upper end and is provided with a friction shoe 61 to engage the whirl 24.

This lever 59 is provided with a finger 62 which engages and is balanced on the pin 58 on the tripper head 57 and this lever then extends forwardly to the front of the machine and is provided with an operating handle 63.

A notched quadrant 64 is connected to one of the package supporting holding arms 33 and a pin 65 is mounted in an arm 66 connected to the lever 59 whereby as the diameter of the package 30 increases the pin 65 is lifted to successively engage the different notches in the quadrant so that when the thread breaks and the feeler 54 drops the fingers 62 are released permitting the operating lever 59 to drop which serves to first apply the brake 61 to the whirl to arrest rotation of the spindle; second, it lifts the package 30 from contact with its drive roll 29 and arrests its winding action; and third, the screw 67 on the arm 59 engages the rearwardly extending portion 68 on the nip roll arm 59 lifting the feed roll 58 from contact with its drive roll 57, thus arresting their feeding action. In this way, all of the yarn driving mechanism is arrested when the yarn breaks. In some instances I also provide a yarn engaging member 69 which is provided with a loop portion 70 bound against the underside of the frame arm 11 and is provided with a toothed portion 71 which extends down into position to engage the yarn, if for any reason it should become disengaged from the herein shown corrugated twist rolls 25 and start a ballooning action in which case the yarn would engage these teeth 71 and be severed to prevent such detrimental action and so prevent loose twist and doubling of the yarn by stopping the machine.

It is found in practice that the required twisting tension on the yarn is obtained by the ballooning of the yarn as it feeds from the supply package into the upper end of the guide tube 19.

My improved method of twisting yarn is extremely simple and practical and effective in its operation and by its use the speed of the twisting operation may be greatly increased and a stronger and better quality of yarn produced.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. A method of twisting yarn which consists in supporting a yarn package, leading the yarn through the center of the package, establishing twist holders for the yarn at fixed distances, rotating the package and one twist holder in unison relative to the other twist holder, feeding the yarn through the said other twist holder not rotated in unison with the package and permitting and causing the ballooning of the yarn about the package to tension the same while being fed.

2. A method of twisting yarn which consists in rapidly rotating a yarn package leading the yarn from the package down through the center of the package and through a twist holder positioned adjacent the holder end of the package and rotating the package and holder in unison, causing and permitting the yarn to balloon upon leaving the package to exert the required tension on the yarn while being twisted, establishing another twist holder a fixed distance from the first mentioned twist holder in which distance the twist in the yarn is laid, causing said second twist holder to also advance the yarn and at a speed in timed relation to that of the rotaton of the first twist holder, and packaging the twisted yarn.

3. In a twisting machine, a fixed frame, a rotatable twister head comprising a yarn package holder at one end and a twist holder at its opposite end, all rotated on a common axis, twist holding feed rolls journaled in a fixed frame and spaced a fixed twisting distance from the twist holder to hold the twist and feed the yarn as led through the package and the twist holder, means for driving the twist holding feed rolls, and means for driving the twister head at a speed in timed relation to that of the feed rolls.

4. In a twisting machine as claimed in claim 3, the provision of means whereby the ballooning of the yarn under the action of centrifugal force set up by the rotation of the twister head is utilized to produce a tension on the yarn during the twisting operation.

5. A twisting machine as claimed in claim 3 in which the twist holder comprises a pair of yarn nipping twist rolls free tc rotate on their axes as the yarn is drawn therethrough.

6. In a twisting machine, a rotatable twister head comprising a hollow yarn guide spindle carrying a yarn package at its upper end and a twist holder at its lower end all rotatable on a common vertical axis, a pair of twist holding feed rolls spaced a fixed distance from the spindle carried twist holder for holding the twist and feeding the yarn as led through the package, said guide spindle and guide spindle twist holder, means for driving said twster head and sad feed rolls in timed relation, and means for packaging the yarn as fed.

7. In a twisting machine, a rotatable twister head comprising a hollow yarn guide spindle carrying a yarn package at its upper

end and a twist holder at its lower end all rotatable on a common vertical axis, a pair of twist holding feed rolls spaced a fixed distance from the spindle carried twist holder for holding the twist and feeding the yarn as led from the package through said spindle and spindle twist holder, means for driving said twister head and said feed rolls in timed relation, means for packaging the yarn as fed, and means for arresting the yarn feeding mechanism when the yarn breaks.

8. In a twisting machine, a rotatable twister head comprising a yarn guide tube carrying a yarn package at its yarn entering end and a pair of twist holding nip rolls at its yarn discharge end, means for rapidly rotating said head to cause the yarn to balloon and twist, a pair of twist holding feed rolls spaced from the said nip rolls, the ballooning yarn being led from the outside of the package through the package, the guide tube and the nip rolls to said feed rolls, the ballooning of the yarn serving to exert the required tension on the yarn during the twisting operation.

9. In a twisting machine, a rotatable twist head comprising a yarn guide tube carrying a yarn package at one end and a pair of corrugated twist holder rolls at its opposite end, all rotatable on a common vertical axis, a pair of twist holding feed rolls spaced from the corrugated rolls for holding the twist and feeding the yarn as led from the package through said guide tube and said corrugated rolls, and means for driving the twisting head at a speed in timed relation to that of the feed rolls.

10. In a twisting machine, a rotatable twister head comprising a tubular spindle having a yarn package holder at one end and and a twist holder at its opposite end all rotated about a common axis, a fixed frame, combined twist holding and feeding means operatively mounted in said frame and spaced a fixed distance from the twist holder in the head to hold the twist and feed the yarn as led through the package, the tubular spindle and twist holder, and means for driving said twister head at a speed in timed relation to that of the feeding means.

11. In a twisting machine, a rotatable twister head comprising a yarn guide tube carrying a yarn package holder at one end and a twist holder at the opposite end all rotatable about a common axis, a fixed frame, combined twist holding and feeding means operatively mounted in said frame and spaced a fixed distance from the twist holder in the head for holding the twist and feeding the yarn as led through the package, said guide tube and twist holder, and means for driving said twister head and said feeding means in timed relation.

12. In a twisting machine, a rotatable twister head comprising a tubular spindle having a yarn package holder at one end and a twist holder at its opposite end all rotated about a common axis, a fixed frame, combined twist holding and feeding means operatively mounted in said frame and spaced a fixed distance from the twist holder in the head to hold the twist and feed the yarn as led from the package through the tubular spindle and twist holder, means for driving said twister head at a speed relative to that of the feeding means, and means for arresting the yarn feeding mechanism when the yarn breaks.

13. A method of twisting yarn, which consists in supporting all of the yarn to be twisted on a rotatable axis, leading the yarn to be twisted through the center of all of the yarn to be twisted, establishing twist holders for the yarn at fixed distances, rotating the supported yarn and one twist holder in unison relative to the other twist holder, feeding the yarn through the said other twist holder not rotated in unison with the supported yarn and permitting and causing a ballooning of the yarn about all of the said supported yarn to tension the same while being fed.

14. A method of twisting yarn, which consists in rapidly rotating a package of all the yarn to be rotated, leading the yarn from the package down through the center thereof and through a twist holder positioned adjacent the lower end of a package of the yarn to be twisted, and rotating the yarn to be twisted and holder in unison, causing and permitting the yarn to balloon upon leaving the package to exert the required tension on the yarn while being twisted, establishing another twist holder a fixed distance from the first mentioned twist holder in which distance the twist in the yarn is laid, causing said second twist holder to also advance the yarn and at a constant speed relative to that of the rotation of the first twist holder, and packaging the twisted yarn.

15. In a twisting machine, a rotatable twister head comprising a tubular spindle, means at one end of the head carried by the spindle for and serving as the sole support for the yarn to be twisted, a twist holder in the opposite end of the head and rotatable therewith, a fixed frame, twist holding and feeding means operatively mounted on said frame and spaced a fixed distance from the twist holder in the head to hold the twist and feed the yarn as led through the tubular spindle, the package and twist holder, and means for driving the twister head at a constant speed relative to that of the feeding means.

16. In a twisting machine, a fixed frame, a rotatable twister head comprising a yarn package spindle at one end serving as the sole supporting means for the yarn to be twisted and a twist holder in the opposite end of said head, means for rotating said head and all of the yarn to be twisted mounted thereon

about a common axis, twist holding feed rollers operatively supported in the fixed frame and spaced a fixed distance from the twist holder to hold the twist and feed the yarn as led through the package and the twist holder, means for driving said twist holding feed rollers, and means for driving the twister head at a speed in timed relation to that of the said rolls.

17. In a twisting machine, a rotatable twister head, a fixed bearing for supporting said head intermediate its ends, a spindle having a yarn package supporting portion at one side of the bearing and twist holding means at the other side of said bearing, said head having a hollow axis between said yarn package supporting portion and said twist holding means, a pair of feeding and twist holding rolls spaced from said rotatable twist holding means, and packaging means spaced from said feed rollers, said yarn being led from the package through the hollow axis of said head and through said twister holding means to the feeding and the packaging means.

18. In a twisting machine, a fixed frame, a rotatable twist head operatively supported in said frame, said head carrying an upright package supporting spindle unsupported at its upper end and a twist holder at the lower end of said head all rotated on a common axis, twist holding feeding rolls operatively mounted in said frame, one of said rolls having a yarn guiding face in substantial alignment wth the spindle axis, and means for driving said twister head and said feeding rolls at different relative speeds to twist and feed the yarn.

In testimony whereof I affix my signature.

WILLIAM W. COLLINS.