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UNIFORM STRAND TENSION DEVICE

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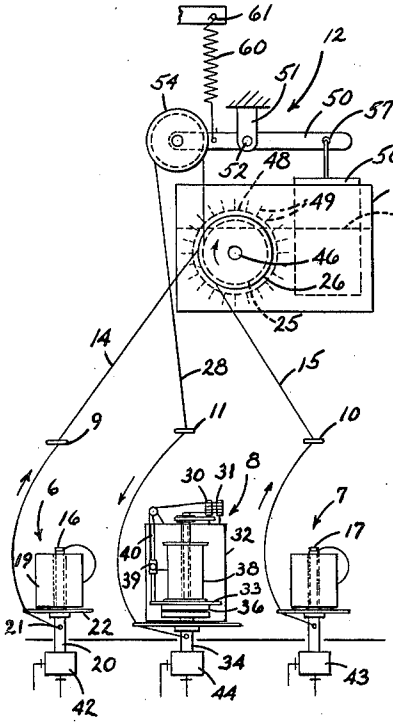


Fig. 1

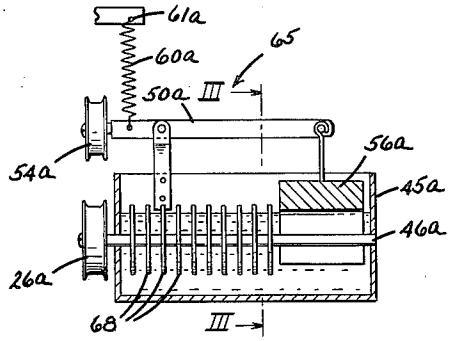


Fig. 2

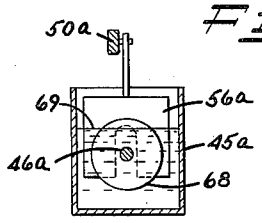


Fig. 3

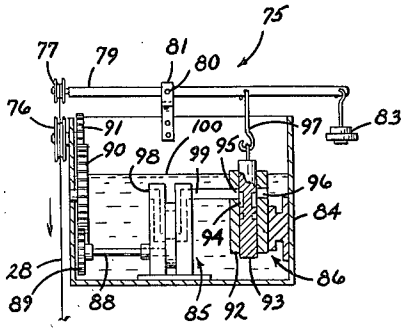


Fig. 5

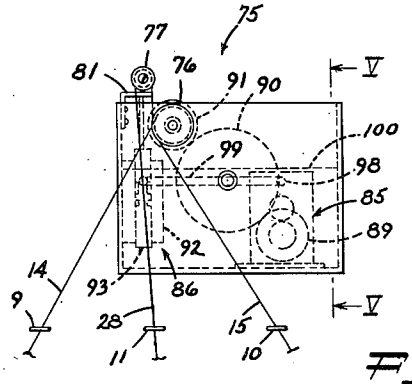


Fig. 4

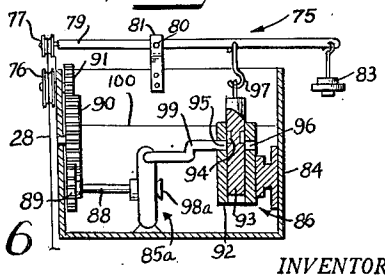


Fig. 6

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UNIFORM STRAND TENSION DEVICE

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12 Claims. (Cl. 57—58)

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This invention relates to mechanism for regulating the balloon size and contour and the tension in the strands passing through this balloon to a strand doubling unit from the supply sources.

It is an object of the present invention to provide cord-twisting apparatus capable of continuous operation with freedom from trouble arising from variable strand tensions. It is also an object to provide a cord twister of the down-twisting type which operates with a stable balloon. Still another object is to provide cord-twisting apparatus for doublers of the down-twisting type which automatically controls, by self-compensating means, the strand tension within the balloon formed around the doubler as the strand passes thereinto. Other objects, features and advantages will be apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is a diagrammatic elevation of doubling apparatus having an adjustable automatically compensating tension control system;

Fig. 2 is an elevation, partly in section, of a modified tension-controlling system;

Fig. 3 is a section view taken along line III—III of Fig. 2;

Fig. 4 is an elevation, partly in section, of another modified tension-controlling system; and

Fig. 5 is a section view taken along line V—V of Fig. 4.

Fig. 6 is a modification analogous to Fig. 5.

To accomplish the above stated objects and others ancillary thereto, cord-twisting apparatus is provided comprising supply sources for a plurality of strands, a doubler of the down-twister type having a strand-drawing device for positively engaging the strand which is driven in synchronism with and by the drive means for the doubler, and mechanism for receiving the plurality of strands, gathering them into a group, and discharging them toward the doubler. This latter mechanism comprises a gathering roll or pulley engaged by the strand group and an automatically adjustable system for controlling and restraining the rotation of the roll, or other rotatable strand-gathering member, which is inversely responsive to the tension in the strand group traversing a balloon formed around the doubler, i. e. the greater the tension, the less is the restraint exerted on the rotation of the roll.

Fig. 1 diagrammatically illustrates a doubling system comprising up-twisting type singles twisters 6 and 7, a down-twisting type doubler 8, guides 9, 10, 11 and an automatic or self-compensating tension device 12. The initial tension of individual supply strands 14 and 15 passing from their respective singles twisters is established by tension devices 16 and 17 respectively, mounted over, or supported by, packages being unwound while supported on the singles twisters. The

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strand 14 is led through the device 16 in being unwound from the package 19. The strand passes downwardly through a hollow spindle 20, out of the lateral opening 21, over the periphery of a flyer 22, and upwardly through the guide 9. The strand 15 traverses a similar path. Both singles strands pass onto an annular surface 25 of the gathering roll 26 to be wrapped therearound and discharged as a strand group hereinafter designated as strand 28. The strands 14 and 15 are preferably wrapped around the surface 25 to the extent of one or more windings to provide sufficient frictional engagement of the strands with the surface to prevent slippage as a result of the difference between (*a*) the aggregate tension in the strands received by the surface 25 and (*b*) the tension in the strand 28 discharged therefrom. It is for the utilization of this difference in tension that this invention is designed in order to control and maintain a substantially uniform tension in the strand within the balloon of the doubler 8. In a doubling system wherein the aggregate tension in the strands passing from the supply sources to the gathering mechanism exceeds that in the doubled strand passing into the doubler, the strands may be fed to the gathering mechanism, or the gathering roll or rotor thereof may be connected with a driving means. Normally, however, the tension in the doubled strand exceeds that of the sum of the tensions in the supply strands, and the gathering roll operates as an idler being driven merely by the strands wrapped therearound. The embodiments of this invention are hereinafter described with respect to this latter condition.

The strand 28, as well as the strands 14 and 15 which constitute the larger strand 28, are pulled through the doubling system by a means such as a pair of capstan rolls 30 and 31 rotatably mounted on a cage 32. The cage, as well as a package holder 33, are rotatably mounted on the hollow spindle 34 of the doubler. The cage, however, is held from rotation by being weighted on one side (the spindle being in this case inclined) or by a stationary magnetic holding device (not shown) mounted exteriorly of the balloon and the strand 28, such as well known in the art; the package holder, on the other hand, is driven by the spindle through a slip drive transmission, such as a magnetic clutch 36 having a driving member attached to the spindle and a driven member attached to the holder. The strand 28 is guided onto a package 38 by reciprocating a guide 39 which traverses an elongate member 40 extending longitudinally of the cage 32. Any well known arrangement for traversing the guide 39 may be used. For example, the guide may be mounted on the member 40 which may comprise a rod having a reverse thread in threaded relationship with the guide 39 and be rotated by a

pawl and ratchet system driven by a cam surface disposed along an annular surface of the package holder such as illustrated in application Serial No. 93,939, filed May 18, 1949. The twisting units 6, 7 and 8 may be driven by hydraulic motors 42, 43 and 44, respectively, such as described in the U. S. Patent 2,576,936, December 4, 1951, or by individual electrical motors, or connected together in drive relationship by gears or belts, and pulleys.

It is very desirable to control the tension and the contour of the balloon of the strand 28 as it passes from the guide 11 into the doubler 8 in order that the quality of the doubled strand may be satisfactory and that the doubler system may be operated without shut-downs as the result of the balloon getting out of control and the strand becoming fouled in the machine. To obtain a balloon of a desired contour, it is merely necessary to control the tension in the strand 28 so as to maintain it at a substantially uniform value. Heretofore, in strand doubling practice, it was extremely difficult to maintain a uniform tension in the strand passing into a doubling unit because of, for example, the variation of tension occurring in the strands being supplied to the unit, or in the doubled strand being withdrawn from the balloon. However, in the practice of the present invention, the several strands being twisted into a cord are first passed around the gathering roll 26 of Fig. 1. The rotation of the roll is controlled in such a manner such as to produce substantially uniform tension in the strand after leaving the roll.

The gathering roll 26 is rotatably supported exteriorly of a container 45 on a shaft 46 having an axis which is fixed with respect to the container. Suitable bearings, (not shown) associated with the container, support the shaft 46. A rotor 48 having radially extending blades 49 is supported interiorly of the container in coaxial relationship on the shaft 46 and fixed to the shaft to rotate with the roll 26. The rotor 48, in a preferred embodiment, extends substantially through the space between opposite sides of the container. A lever 50 is pivotably supported by a stationary bracket 51. At one side of the pivot axis 52 of the lever, a pulley 54 is rotatably supported by the lever in a position spaced above, and to one side of, the strand-gathering surface 25 of the gathering roll 26 to receive the grouped strands discharged from the roll 26; the axis of rotation of the pulley 54 extends transversely of the lever 50. The pulley 54 is spaced sufficiently to one side of the roll 26 to avoid contact with the strand 28 as it passes between the pulley 54 and the guide 11. In the preferred structure, the axes of pulley 54 and roll 26 are substantially parallel. From a portion of the lever 50 on the side of the pivot opposite that on which the pulley 54 is supported, a liquid displacement member 56 is suspended pivotably with respect to the lever at 57. The relationship between the displacement member 56 and the volume enclosed by the container 45 below the level corresponding to the uppermost portions of the rotor 48 is such that a small degree of vertical movement of the member will produce substantial and proportional rise or fall in the level of the liquid 57, supported within the container 45 and having a level 58 as shown in Fig. 1. The displacement member 56 may or may not be buoyant since the force required to force the member into the liquid may be balanced in any suitable manner such as by a tension spring 60 attached to the lever 50 at a point between the pivot 52 and the pivot axis of the pulley 54. The spring 60 is attached also to a stationary anchorage at 61. A great many combinations and variations in the magnitude and moment arm of the various forces applied to the lever 50 on the opposite sides of the pivot 52 to obtain a desirable balance in the forces will be apparent to the skilled mechanic. Device 12, as herein described and shown, is merely illustrative of the general arrangement that may be used.

In operation, the device 12 automatically controls the tension in the strand 28 within the small working range of variation needed to actuate the device by utilizing any change in tension from a predetermined norm to return the system to its previous state of balance. For example, when the tension in the strand 28 increases from a normal level preset according to operating requirements for the yarn weight, cord twist, and spindle speeds selected, the pulley 54 is pulled downwardly in opposition to the force exerted on the lever 50 by the spring 60. The net force exerted by the member 56, if buoyant, will counteract some of the force exerted by the spring; if the member 56 is not buoyant, the net force exerted by it will supplement that exerted by the spring. As the pulley 54 moves downwardly, the end of the lever 50 supporting the member 56 is tilted upwardly carrying the member 56 to a position wherein it displaces less liquid in the container 45. The level of the liquid drops correspondingly to expose a greater portion of the rotor 48. The rotor 48, being driven by the running group of strands wrapped around the pulley 26, turns with greater freedom as the result of the vanes or blades 48 having less contact with the liquid. As a result of this lessened restraining force on the gathering roll 46, tension is relieved in the strand in that portion thereof extending from the gathering roll 26 over the pulley 54, through the guide 11, and through the balloon formed in the strand as it passes into the doubler 8. This causes a reversal of the above sequence and a return to the normal preset level of tension balance. Conversely, a reduction of the tension in the strand 28 below the desired tension level results in an upward movement of the pulley 34 and a downward movement of the member 56 into the liquid held within the container 45 to raise the level of the liquid and to submerge a greater portion of the rotor 48. The increased drag on the rotor caused by this greater submersion within the liquid applies more tension to the strand 28 which in turn lowers the pulley 54 toward the doubler 8 and the tension therein is increased until the desired operating level is reached. The volume of the liquid and the height at which the displacement member 56 is supported are so adjusted and interrelated that, at approximately the middle of the tension range within which the device 12 is adapted to operate, the level of the liquid may be raised or lowered to expose less or more, respectively, of the surface of the rotor 48 within the tension range, and the member 56 is provided ample freedom of movement either upwardly or downwardly to effect the degree of immersion of the rotor corresponding to any portion of the tension range.

Figs. 2 and 3 illustrate a modified automatically adjustable tension apparatus 65 of which the operating principle is somewhat similar to that of device 12 of Fig. 1. The letter "a" is added to the numerals of Fig. 1 to indicate portions of the device 65 analogous to portions of the device 12 of

Fig. 1. A gathering roll 26a is mounted in fixed relationship on a shaft 46a which supports a plurality of discs 68 fixed thereto. A pulley 54a is rotatably supported at the end of a lever 50a with its axis of rotation extending generally parallel to the longitudinal direction of the lever. When the device 65 is viewed in a direction parallel with the axes of the roll 26a and pulley 54a, their relative positions in the preferred form of the apparatus is generally similar to that shown for roll 26 and pulley 54 of Fig. 1. The roll 26a is driven by the strand 28 in the manner shown for the previously described embodiment. Retardation of the rotation of the roll 26a is effected by increasing the immersion of the discs 68 within a liquid contained within the vessel 45a shown at a level 69. The drag exerted is approximately proportional to the percentage of the area of the discs 68 submerged within the liquid. The level of the liquid is raised or lowered in the manner described with respect to the embodiment of Fig. 1 by lowering or raising a bifurcate liquid displacement member 56a which straddles but need not engage the shaft 46a. The apparatus 65 is adjusted to operate at a desired average tension in the strand 28 with respect to which increases in the tension within the operating tension range of the apparatus produce downward movement of the pulley 54a and consequent raising of the displacement member 56a and lowering of the level in the container in the vessel 45a. The resulting reduction in drag on the discs 68 causes the gathering roll 26a to turn with greater freedom to relieve the tension in the strand 28. Conversely, a decrease in the tension below the average value results in an upward movement of the pulley 54a and a downward movement of the displacement member 56a with raising of the level of the liquid and an increase in the drag on the disc 68. The momentarily slower rotation of the roll 26a brings about a restoration of the strand tension to the desired level.

Figs. 4 and 5 illustrate an automatically compensating tension system 75 which may be substituted for the apparatus generally indicated by numeral 12 of Fig. 1. The apparatus 75 is similarly mounted in superimposition over the guides 9, 10 and 11. In using apparatus 75, strands 14 and 15 pass onto a gathering sheave or pulley 76 and are discharged over the pulley 77 together and toward or through the guide 11. The pulley 77 may move in a direction toward and away from the guide 11 as the result of being mounted on a lever 79 which is pivotably attached by a pivot pin 80 to a stationary bracket 81 secured to and extending above a stationary container 84. In operation, the lever 79 is tilted as the result of changes in tension in the strand 28. The end of the lever supporting the pulley 77 and the pulley are urged in a directed away from the guide 11 by weights 83 suspended from a portion of the lever having the pivot 80 between the point of suspension for the weights and the portion on which the pulley 77 is supported. Supported within the container 84 is a positive displacement pump, such as the gear pump 85, and also a valve 86. For this arrangement, a drive shaft 88 supports a gear 89 in drive relationship through an intermediate gear 90 with a gear 91 secured to a shaft on which is mounted the gathering sheave 76. Thus, the forward motion of the tension within the strand 28 drive the sheave 76 and the pump system through the train of gears 89, 90 and 91.

The valve 86 comprises a body portion 92 and a cylindrical plunger 93 in slidable relationship with a bore through the body portion. The plunger 93 is provided with a circumferential groove or recess 94 along which fluid passes through the valve when the plunger is elevated to a position in which the recess 94 or a portion thereof is disposed at a common level with an intake port 95 and an outlet port 96 of the valve. The plunger 93 is raised or lowered within the bore of the valve body 92 in consequence of tilting of the lever by being connected therewith by a link 97.

In operation, when the plunger 93 is raised to a level at least partly coinciding with the ports 95 and 96, fluid may enter the pump 85 through an inlet port 98, passed therethrough, and discharged through a feed tube 99. The liquid is maintained at a level 100 above the pump port 98 and discharged by the valve 86 into the main body of the liquid supported by the container 84.

Apparatus 75 accomplishes automatic tension adjustment and controlling of the balloon in the strand entering the twister 8. For example, when the tension in the strand 28 increases and the balloon between guide 11 and the twister shrinks to less than the desired contour, the end of the lever 79 supporting the pulley 77 is tilted downward. Simultaneously, the plunger 93 is raised to bring a greater portion of the recess 94 into alignment with the ports 95 and 96. More liquid is permitted to pass through the valve and the pump turns with greater freedom to exert less restraint on the pulley 77 through the train of gears 89, 90 and 91. Conversely, when the tension in the strand 28 is lessened for any reason, the balloon in the strand passing between the guide 11 and the twister 8 expands; simultaneously, the end of the lever supporting the pulley 77 rises. The plunger 93 is lowered to restrict the flow of liquid through the valve 86. The operation of the pump 85 is retarded with consequent lessening in the rotation of the sheave 76. The tension in the strand is thus increased to a desired level. The quantity of weight comprising the weight 83 may be increased or decreased to maintain higher or lower tenisons, respectively, in the strand 28. In practice, it has been found that "hunting" of the device may be avoided if the valve 86 is constructed or adjusted so that it never completely closes, i. e., the plunger should never be allowed to rest in a position wherein the recess 94 is completely below the ports 95 and 96. The valve and the pump shown are merely illustrative of the types of valves and pumps that may be substituted in this embodiment of the invention.

The operation of device 75, as set forth above, is that obtained when the design and condition of the pump 85 is such as to obtain positive displacement operation. However, as shown in Fig. 6, a pump which does not positively forward the liquid which passes therethrough in accordance with its speed of operation, such as a centrifugal pump 85a, may be substituted for the positive displacement pump 85. To operate the device 75 equipped with a centrifugal pump, it is necessary to reverse the operation of the valve 86. Whereas, the speed of operation of a positive displacement pump is proportional to the liquid passing through it, and a reduction in the passage of the liquid, such as by adjusting the valve 86, slows the operation of the pump 85 to produce a retarding force on the gathering roll 76, a centrifugal pump may be loaded, or retarded in operation, by increasing the amount of liquid available to its intake region. To operate the device 75 when equipped with a centrifugal or other

non-positive displacement pump 85a, the valve 85 is connected with the lever 79 so that it is closed, rather than opened, by an increase in tension of the strand 28 and the accompanying upward movement of the portion of the lever 79 connected therewith. For example, the link or hook 97a is shortened (relative to that in Fig. 5) so that the annular recess or groove 94 is normally partially above the inlet and outlet ports 95 and 96 and when tension in the cord increases, the communication between the recess 94 and ports 95 and 96 is restricted and vice versa. With the plunger 93 connected in this manner, the device 75 when equipped with the non-positive displacement pump 85a provides self-compensating regulation of the tension in the strand 28 passing into the doubler 8.

While preferred embodiments of the invention have been shown and described, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. Cord twisting apparatus comprising supply sources for a plurality of strands, a doubler having strand-feeding means for positively engaging a strand material, said strand-feeding means being connected in positive drive relationship with the drive means, a stationary strand guide mounted in spaced axial relationship with the doubler and an adjustable automatically compensating tension control mechanism for receiving the plurality of strands, gathering them into a group, and discharging the group toward and through the guide, said mechanism comprising a container, a rotor supported within the container on a fixed axis of rotation, a gathering roll rotatably mounted outside the container, means for connecting the roll and the rotor in positive drive relationship, said rotor having radially extending blades, a pulley, a lever for rotatably supporting the pulley on an axis generally parallel to the axis of rotation of the roll and along an ambit extending toward, and away from, the guide, a liquid displacement member suspended from said lever within the container, stationary means for pivotably supporting the lever above the container, said support means being connected to the lever at a portion thereof spaced between the portion from which the displacement member is suspended and the portion supporting the pulley, resilient means connected with the lever for urging it in a direction to carry the pulley away from the guide and the displacement member downwardly into the container, and a liquid supported within the container at a lever which substantially submerges the rotor when the displacement member is positioned at the bottom of its vertical ambit.

2. Cord twisting apparatus comprising supply sources for a plurality of strands, a doubler having strand feeding means for positively engaging a strand material, drive means for the doubler, said strand feeding means being connected in positive drive relationship with the drive means, a stationary strand guide mounted in spaced axial relationship with the doubler, an adjustable automatically compensating tension control mechanism for receiving the plurality of strands, gathering them into a group and discharging the group toward and through the guide, the mechanism comprising a container, a rotatable shaft supported within the container, a plurality of spaced discs supported coaxially on said shaft within the container, a gathering roll rotatably supported outside the container, means for connecting the roll and the shaft in positive drive relationship, a lever, stationary means for pivotably supporting the lever by an intermediate portion thereof above the container, a pulley rotatably supported by a portion of the lever spaced from its connection with the support means and spaced laterally with respect to the strand-gathering roll on an axis substantially parallel to that of the roll, a liquid displacement member supported in said container by a portion of the lever spaced further from the connection of the lever with the support means than the pulley, resilient means for engaging the lever and urging it about its pivot in a direction to carry the pulley away from the guide and to lower the displacement member further into the container, and a liquid supported within the container at a level such that the discs are substantially submerged when the displacement member is positioned at the lowest portion of its vertical ambit.

3. A multiple-spindle twisting apparatus comprising a plurality of singles twisters, a cord twister having a driving spindle and take-up means connected in positive drive relationship with the spindle for positively forwarding the strand, and an adjustable automatically compensating tension control device mounted to receive strands from the singles twisters and discharge them as a group toward the cord twister at substantially uniform tension, said device comprising a pulley for receiving the strands from the singles twisters and for gathering them into a group, a positive displacement pump having an inlet port and an outlet port, means for connecting the pump and the pulley in positive drive relationship, a fluid reservoir in communication with both of the pump ports, a valve connected with one of the ports for regulating the communication of liquid between said port and the reservoir, control means for adjustably opening and closing the valve, a second pulley, means for movably supporting the second pulley along an ambit centered over the cord twister disposed laterally of the gathering pulley, said ambit extending in a direction toward and away from the cord twister, means connected with, and responsive to movement of, the means for supporting the second pulley and connected with the control means for opening the valve in proportion to movement of the second pulley toward the cord twister, and resilient means in engagement with the support means of the second pulley for urging the second pulley along said ambit away from the cord twister.

4. A multiple-spindle twisting apparatus comprising a plurality of singles twisters, a cord twister having a driving spindle and take-up means connected in positive drive relationship with the spindle for positively forwarding the strand, and an adjustable self-compensating tension control device mounted to receive strands from the singles twisters and discharge them as a group toward the cord twister at substantially uniform tension, a stationary strand guide supported between the device and the cord twister in an axially spaced direction from the driving spindle, said device comprising a pulley for receiving the strands from the singles twisters and for gathering them into a group, a centrifugal pump having an inlet port and an outlet port, means for connecting the pump and the pulley in drive relationship, a valve connected with one of the ports for regulating the communication of liquid between said port and the reservoir, control means

for adjustably opening and closing the valve, a second pulley, means for movably supporting the second pulley along an ambit centered over the guide and disposed laterally of the gathering pulley, said ambit extending in a direction toward and away from the guide, means connected with, and responsive to movement of, the means for supporting the second pulley and connected with the control means for opening the valve in inverse proportion to movement of the second pulley toward the guide, and resilient means in engagement with the support means of the second pulley for urging the second pulley along said ambit away from the guide.

5. A multiple-spindle twisting apparatus comprising a plurality of singles twisters, a cord twister having a driving spindle and take-up means connected in positive drive relationship with the spindle for positively forwarding the strand, an adjustable automatically compensating tension control device mounted to receive the strands from the singles twisters and discharge them as a group toward the cord twister at substantially uniform tension, and a stationary strand guide supported in an axial position over the cord twister, said device comprising a pulley for receiving the strands from the singles twisters and for gathering them into a group, a positive displacement pump having an inlet port and an outlet port, means for connecting the pump and the pulley in positive drive relationship, a fluid reservoir in communication with both of the pump ports, a valve connected with one of the ports for regulating the communication of liquid between the reservoir and said port, control means for adjustably opening and closing the valve, a second pulley, means for movably supporting the second pulley along an ambit extending toward and away from the stationary strand guide and disposed laterally of the gathering pulley whereby the strand group in passing from the gathering pulley over the second pulley to the stationary guide traverses a sinuous path, means connected with the valve control means and connected with, and responsive to the movement of, the support means of the second pulley as it traverses said ambit, said valve being opened in proportion to movement of the second pulley toward the guide, and means acting on the second pulley for urging it along said ambit away from the guide.

6. A system for doubling a plurality of strands into a cord comprising a plurality of strand supplies, doubling means, means mounted on the doubling means for drawing the strands from the supplies through the doubling position and then the cord through the balloon of the doubling means, and a tension device for engaging the strands and retarding the passage of the cord into the doubling means, said device comprising a member around which the strands pass and are discharged as a group, tension-sensitive means for engaging the strand group, means connected with tension-sensitive means for restraining the passage of the strands around the member in inverse proportion to the tension in the strand group.

7. A system for doubling a plurality of strands into a cord comprising a plurality of strand supplies, a multiple-twist type of twister for doubling the strands and collecting the cord, means mounted on the take-up twister for drawing the strands from the supplies through the doubling position and then the cord through the balloon of the take-up twister, and a tension device for engaging the strands between the supplies and the take-up twister, said device comprising a member around which the strands pass and are discharged as a group, tension-sensitive means for engaging the strand group, means connected with the tension-sensitive means for restraining the passage of the strands around the member in inverse proportion to the response of the tension-sensitive means to the tension in the cord between the device and the twister.

8. A system according to claim 7 wherein the supplies are up-twisters.

9. A system according to claim 7 wherein the supplies are two-for-one twisters.

10. A system according to claim 7 wherein the take-up twister is a down-twister.

11. A system for doubling a plurality of strands into a cord comprising a plurality of strand supplies, a multiple-twist type of twister for doubling the strands and collecting the cord, means mounted on the take-up twister for drawing the strands from the supplies through the doubling position and then the cord through the balloon of the take-up twister, and a tension device for engaging the strands between the supplies and the take-up twister, said device comprising a rotary member having an annular surface for gathering the strands and discharging them as a group, means for restraining the rotation of the rotary member, tension-sensitive means for engaging the strand group between the member and the twister, said tension-sensitive means being mechanically connected with the restraining means to retard the rotation of the member in inverse proportion to the response of the tension-sensitive means to tension in the cord.

12. Cord twisting apparatus comprising supply sources for a plurality of strands, a doubler having strand-feeding means for positively engaging a strand material, drive means for the doubler, said strand-feeding means being connected in positive drive relationship with the drive means, a stationary strand guide mounted in spaced axial relationship with the doubler and an adjustable self-compensating tension control mechanism for receiving the plurality of strands, gathering them into a group, and discharging the group toward and through the guide, said mechanism comprising a container, a strand-gathering roll mounted rotatably outside said container, a lever, stationary means for pivotally supporting the lever by an intermediate portion thereof above the container, a pulley rotatably supported by the lever on an axis generally parallel with that of the roll, said lever thereby supporting the pulley for motion along an ambit extending toward and away from the guide, a liquid within the container, rotatable retarding means supported within the liquid, means for connecting the retarding means and the gathering roll in direct drive relationship, means for adjustably loading the retarding means by the liquid, means for connecting the loading means and a portion of the lever spaced from its pivotal axis, said lever, the loading means and connecting means being influenced by the pulley to decrease the loading of the retarding means when the pulley is moved in a direction toward the guide, and means connected with the lever for urging it in a direction corresponding to movement of the pulley away from the guide.

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