THREAD SUPPLY DEVICE FOR TEXTILE MACHINERY

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References Cited

UNITED STATES PATENTS
3,419,225 12/1968 Rojen........ 242/47.12
3,490,710 1/1970 Muhlhausler........ 242/47.01
3,648,939 3/1972 Rojen........ 242/47.01

FOREIGN PATENTS OR APPLICATIONS
1,196,928 7/1965 Germany........ 242/47.01

ABSTRACT
A rotatable drum has a restraining ring slipped thereover. It is held in position towards the bottom end of the drum by magnets located inside the drum, the restraining ring being either of magnetic material or plastic, incorporating magnetic material; the magnetic force holds the ring floatingly. The ring is flexible and, in one embodiment, can just be slipped over a restraining bulge formed on the drum. During operation, the ring slightly deforms into elliptical shape to permit thread to pass therebeneath and over the bulge. Rotation of the drum is controlled pneumatically by intermittently engaging the drum with a continuously rotating drive, for example from the main drive of the machine (which may be a circular knitting machine) or, over clutches, with individual motors in the drums.

18 Claims, 11 Drawing Figures
THREAD SUPPLY DEVICE FOR TEXTILE MACHINERY

CROSS REFERENCE TO RELATED PATENTS


The present invention relates to a thread supply device and system for textile machinery, and more particularly for circular knitting machines, in which the thread supply automatically delivers as much thread as required to the point at which it is incorporated into the fabric being made by the machine.

Self-regulating thread supplies have previously been proposed - U.S. Patent Nos. 3,490,710 and 3,625,444, for example. Self-regulating thread supplies can utilize photo cells or pneumatic sensing arrangements to sense the amount of thread being wound on a thread supply drum. The pneumatic arrangements provide a fine air jet which escapes from a fine nozzle through the windings of threads being wrapped around the drum. If more than a required number of threads are looped around the drum, the air jet is blocked and rise in air pressure, internally of the drum, is utilized as a signal to disconnect the drum from its drive, so that it will continue to coast and lose speed, thus delivering thread faster to the machine than thread being spooled at the other end on the drum. As more thread is spooled off, the pneumatic nozzle becomes unblocked and the drum is again engaged with a drive, thus increasing its speed and pulling off more thread from a supply cone.

Thread supply apparatus of this type are particularly useful with multi-feed circular knitting machines since they provide an especially uniform supply of threads to the various knitting systems. The thread supply drums act as buffers, from which thread can be removed as needed by the various knitting systems. Variations in thread tension which could be caused by uneven winding of the yarn on a cone are practically eliminated; the storage drums inhibit transfer of excessive tension from the cone to the knitting systems. Thread supply drums do not affect the yarn itself, which is not pinched or deformed as occurs when the yarn is pulled between a pair of matching rollers (or a tape and a roller) which have been proposed as positive yarn supplies.

Thread supply drums in which the yarn is pulled off over the end can store a fair amount of thread; they do, however, require some kind of a guide for the thread as it is pulled off at the end.

It is an object of the present invention to provide an improved thread supply drum in which the thread is positively and smoothly, floatingly guided at the point of pull-off from the drum, and in which the accumulation of lint, and dirt is effectively suppressed; and which has an improved drive for the drum itself.

Subject matter of the present invention: Briefly, the thread supply drum is formed, at least at the end, of nonmagnetic material, in which magnets are embedded. A ring, of magnetic material (or incorporating magnetic material) and having a smooth inside, preferably sufficiently flexible to be slightly deformable is held by the magnets at the bottom of the drum floatingly in position, so that the thread can be pulled off from between the drum and the ring. By holding the ring by magnetic forces, the diameter of the ring can be made to be just slightly larger than the outside diameter of the drum, the ring itself being of extremely light weight and being positively held in axial position with respect to the drum. Relative movement between the ring and the drum, during operation, is effectively inhibited by the magnetic holding force - floating the ring - and friction of the thread upon pull-off, both against the drum as against the inside surface of the ring is reduced to a low value.

The thread can be easily inserted since the ring can be pulled off against the magnetic force and the thread pulled therethrough. After threading, the ring will snap back into proper position, under magnetic force and will be automatically properly positioned with respect to the drum.

In a preferred form, the drum has permanent magnets located therein, and the ring consists of, or includes a spring steel of small wall thickness, so that it is capable of elastic deformation. The inner surface of the ring is highly polished. The ring can also be covered with plastic, and streamlined or shaped to provide a particularly advantageous profile for pull-off of the thread. Plastic material having magnetic particles embedded therein are also useful.

In accordance with a feature of the invention, the other, or attached end of the drum is provided with a guide surface which, in axial cross section, is essentially triangular. Friction can still be further reduced by forming this guide surface not as a continuous surface but rather as a plurality of essentially triangular ribs projecting radially, and tapering outwardly from the drum. The surface of contact between the thread and the guide surface is thus reduced and continuous spiralling of the thread about the drum is facilitated. The entire path of the thread, from supply over the drum, is improved, and overall friction decreased by the combination of the magnetically held floating pull-off ring and the upper guide surfaces. Air which is trapped, or pulled between the ribs can be directed to form a constant stream so that any lint from the threads is immediately blown away. Soiling due to sizing or lubricant applied to threads or yarn, and collecting on the guide surfaces where the yarn first impinges on the drum is also effectively inhibited since the flying ribs forming the guide surface act as self-cleaning, wiping contacts with the yarn being supplied thereto. The drum permits use without guide rollers or pulleys and thus the entire machine can be threaded more easily.

The invention will be described by way of example with reference to the accompanying drawings, wherein:

FIG. 1 is a general schematic illustration, partly in section, of the thread control device in an operative environment, applied to a circular knitting machine;

FIG. 2 is a transverse cross-sectional view along lines II - II of FIG. 1;

FIG. 3 is a perspective view, partly in section, of the thread storage drum to an enlarged scale;

FIG. 4 is a perspective view, partly in section, of a different embodiment of the storage drum operating with an exclusively pneumatic control;

FIG. 5 is a perspective view, partly in section, of
the attachment of the drum of FIG. 4 to a textile machine, in the illustrated example, a circular knitting machine;

FIG. 6 is a schematic perspective view of a portion of a circular knitting machine, illustrating the storage drum and its attachment thereto;

FIG. 7 is a fragmentary side view, partly in section, of a circular knitting machine, in combination with the thread storage device of the invention;

FIG. 8 is a longitudinal cross-sectional view of an electrically driven, coaxially arranged drive motor in combination with a storage drum; and

FIGS. 9a, b and c are cross sections of the ring, showing different embodiments.

Thread 1 is delivered from a thread supply which preferably includes a thread brake through a guide eye 39 to a drum 3. The thread is guided to meet drum 3 in the region of guide surfaces formed by projecting ribs 2, which are radially arranged vanes of generally triangular cross section to the extent that they project beyond the surface of drum 3. The inclined surface or edge of the triangular ribs 2 pushes the thread downwardly so that it will spiral along the drum 3, as it is wrapped therearound, during rotation of the drum. A supply of thread 4 will be wound on the drum, which has a generally smooth surface. As the thread supply increases, a nozzle 49 (FIG. 3) is closed by a tongue 5 lying thereover, the tongue 5 being depressed towards the nozzle by the increasing number of spirals 4. Nozzle 49 penetrates through the surface of drum 3, and has a fine stream of air emanating therefrom. When the tongue 5 is pressed towards the nozzle, the stream can no longer escape from nozzle 49 and a tube 6, connected to nozzle 49 will have an increased pressure arising therein which is transmitted to a storage space 7 of a membrane housing 8. Air is supplied from a circular supply 9 which is secured by clamps 10 on holders 11 fixed to a carrier ring 12 attached to the machine, and connected with individual supply lines 13, each one connected over a choke 14, controllable by a regulating screw 15, and connected to inlet line 16. Inlet line 16 terminates in the coupling duct or tube 6, so that air is supplied form the ring connection 9 with uniform pressure to the duct 6.

Operation: Upon closing of nozzle 49, space or chamber 7 will have an increase in pressure occurring therein. Membrane 17, in membrane housing 8 is bulged upwardly (with respect to FIG. 1), thus lifting a permanent magnet 18 counter the force of a weak retraction spring 20. Permanent magnet 18 is attached to a spring disk 19. The return spring 20, upon decrease in pressure, pulls the magnet 18 again downwardly. Upon lifting of magnet 18, it approaches a sealed reed switch 21, thus opening its contacts, to control an electrical circuit, to be described below. When the magnet drops under force of the spring 20, that is, when the pressure in tube 6 drops again due to opening of nozzle 49 upon decrease of the length of the spirals 4 on drum 3, the switch 21 will close. Thus, with decreased threads 4 on the drum, switch 21 is closed; with increased threads, switch 21 is open. A vent 235 drilled through membrane housing 8 equalizes air pressure, so that the pressure acting on membrane 17 need only be that which is in excess of ambient atmospheric.

The contacts of magnetic reed switch 21 are in series with the coil circuit 24 of a relay 23 which, when closed, connects a motor 22 with power supplied through terminals C, D. Motor 22 drives a pulley 25 and over it a belt 26 which runs in a pulley 27 connected to drum 3. The motor will thus drive the drum when it is connected over relay 23. Since the tube 6 can be located most anywhere in the apparatus, motor 22 can be arranged coaxially with the drum 3, thus avoiding the necessity of a separate pulley and belt drive. The membrane housing 18 can then be located adjacent the motor.

Operation of the thread supply system: Thread which is used up by the textile machine, for example upon knitting, is pulled off the bottom end of drum 3. When the thread storage loops 4 decrease to the extent that the nozzle 49 is freed, the pressure in tube 6 will drop and motor 22 will be connected, thus driving drum 3. The speed of the motor is so adjusted that drum 3 will have a higher circumferential speed than the speed of the thread being pulled off the drum. Thus, as the drum rotates at a higher rate, thread will loop over the drum and will be spiralled thereover. As the spirals 4 increase, the nozzle 49 will be closed, thus increasing pressure within tube 6 and disconnecting the motor, permitting more thread to be pulled off the drum.

The capacity of thread stored on the drum can readily be changed by mounting the tongue 5 which closes the nozzle 49 longitudinally adjustable along the surface of the drum 3. Such longitudinal adjustment can be obtained, for example, by forming an elongated slot in tongue 5, not shown in the drawings for simplicity.

The thread 28 pulled off from the supply spirals 4 over the head of the drum 3 is threaded beneath a ring 29 (see FIG. 2). The ring is made of spring steel or the like, of very thin wall thickness, for example in the order of about 0.3 mm. The ring is endless, closed for example by welding, brazing, and is finely finished, particularly on its inside surface, to have a highly polished smooth circumference throughout. The ring 29 is roughly coaxial with the drum 3. Its inner diameter is slightly greater than the outer diameter of the drum 3 in the region where it is to be located with respect to the drum. The ring 29 is held, floatingly, with respect to the drum 3 by a suitably polarized toroidal magnet 30 which is located within the drum 3, in a region where drum 3 is made of non-magnetic material. Thus, the ring is held always at the same height—with respect to the axis of the drum 3—and cannot substantially deviate from this axial position. The non-magnetic material of drum 3 does not interfere with the magnetic field from magnets 30. The magnetic force of magnets 30 should be such that the ring 29 is held in its position with sufficient force so that it cannot be slipped or stripped off the drum by the thread 28 being pulled off the head of drum 3. As the thread 28 is removed from the drum 3, ring 29 is subjected to a wobble motion about the circumference of drum 3. The gap between the ring and the drum travels circumferentially around the drum (see FIG. 2), the ring itself, however, remaining approximately stationary, and non-rotatable with respect to the drum due to the forces of magnets.
30. If the ring is made of wire material, spring steel or the like, the elasticity of the material itself assists this motion. Ring 29 thus offers little frictional resistance to thread 28, the friction being merely sufficient to keep the thread in the region between the ring and the lowest winding of the drum 3 secure against the drum 3, so that, upon rotation of drum 3, it does not loop, or blow outwardly by centrifugal force.

The ring 3, if desired, can be made of plastic material with magnetic material embedded therein, either as finely divided particles, or as a plastic-coated steel wire or the like. The plastic itself can be of non-friction material.

For threading, the ring can be removed from the drum by merely being slipped therebelow. The thread then can be pushed through the ring—which will have an opening even larger than the drum diameter—and the ring is then placed over the drum, and will snap into position opposite the magnets within drum 3. The difference in diameters between the drum and the ring should be so arranged that the thread can just pass therethrough, possibly with a very small amount of clearance (see FIG. 2); threads of different diameters can readily be accommodated in the system of the present invention by utilizing the same drums, only with rings of slightly different inner diameter.

The thread tension to be required at the textile machine, for example at a knitting feed, is adjusted by a thread brake of customary construction, secured to a holder 32 which, in turn, is connected to a bottom wall 33 of a housing 34 enclosing the drum drive, and forming a dust cover protecting the drive parts of the drum against lint, dust and dirt. The various parts are all secured to a carrier ring 35 secured to a structural element, such as ring 12 of the textile machine.

The details of the drum are best seen in FIG. 3. The drum 3 has a thin wall and is floatingly supported by a ball bearing 37 which is secured to a shaft 36. Shaft 36, itself, is secured to carrier 35 (FIG. 1). The drum, at its upper end, is formed with an enlarged ring 38 into which the belt groove 27 is cut. The thread guide surface is formed by the slanting edges of the radially projecting ribs 2, which are located roughly midway of the axial length of the drum. Shaft 36 is formed with a central bore in which the pressure tube 6 is located. A pair of pins 41, engaging a projection 40, secure tube 6 against rotation. The lower end of the tube 6 is connected with a flange 42. A spring 43 presses flange 42 with a polished face surface against a disk 45, likewise polished, and secured to the drum 3. The spring 43 abuts against a ring 44 on shaft 36. Disk 45 is located in a depression of a dished element 46 having a shoulder 47 and bearing against the inner surface of drum 3. The element 47 is formed with a transverse bore 48 which interconnects with the exit nozzle 49. Nozzle 49 is covered by tongue 5. Shaft 36 and tube 6 are stationary; disk 45 and dished element 46 as well as drum 3 rotate. Air can escape from nozzle 49 until the elastic tongue 5 is not pressed against nozzle 49 by a spiral of thread supply 4, traveling downwardly along the tongue. The tongue itself is replaceable, and is removable held by a screw 50 so that, upon damage or wear, it can be easily replaced. It is preferably made of a thin elastic plastic material which is easily movable and very sensitive to a fine air stream. The tongue has a slight projection 51 matching the nozzle 49 to improve the sealing effect of the tongue against the nozzle as the tongue is pressed against the nozzle if a number of threads spiral thereabout.

FIG. 4 illustrates an embodiment of the supply drum of the present invention in which the control of the drum is wholly effected by pneumatic means. The drum is driven by a gear from a main drive, not shown in FIG. 4. An axial shaft 70 secures the drum to a carrier, not shown. A cover plate 62 is secured thereto by means of screws 60. Shaft 70 has, centrally, a cover bushing 58. Shaft 70, cover 62 and bushing 58 are stationary, that is, they do not move during operation of the drum. They do, however, retain an axially movable membrane piston 571, as well as the supply drum 64 by means of an intermediate ball bearing 63. Control is effected as in the embodiment of FIGS. 1–3 by an air stream escaping from a fine nozzle, in FIG. 4 from tube 78. Thread spirals 90, as they press against tongue 79, cause a rise of pneumatic pressure in tube 69, channel bore 71, nozzle openings 72, 73, chamber 61 and connecting bore 74. As pressure increases, the inner side of membrane 56 will bulge upwardly, thus lifting a membrane piston 571 secured thereto by means of nut 87. Additionally, membrane 56 is formed with a cross connection in order to guide air from the nozzle opening 72 to opening 73 counter the force of back spring 59. Piston 571 is guided by balls 89 in races 88 and is easily movable with deflection of membrane 56. Thus, the pneumatic force which can build up can lift the coupling wheel 67. Coupling wheel 67, being outwardly toothed and forming a gear, is rotatable, and held for rotation by ball bearings 68. The member 57, carrying the inner race of ball bearings 68 is formed with openings through which tines of the axial tube pass, so that the axial movement of the membrane piston 571 can be transferred.

Drum 64 is freely rotatable over ball bearings 63 with respect to cover 62. A plunger 77, and non-rotatably held but yieldingly located by means of spring 76 is centrally positioned within the drum 64. The upper surface of plunger 77 is carefully finished, for example ground and lapped and is pressed against an equally finished surface of cover 62 formed with a cross connecting bore 74. Since the tube 74 is also flexible, the interconnection for the pneumatic control is sufficiently tight in view of the small pressures arising during operation of the entire system.

Operation: As the spirals 90 travel down the surface of drum 64, tongue 79 closes the nozzle tube 78. Again, tongue 79 is preferably formed with an inwardly extending bulge. As pressure builds up on nozzle tube 78 and the connecting central duct, membrane 56 will bulge upwardly, and the constantly rotating coupling gear is slightly lifted axially. Thus, clutching between the clutching surface 671 and a clutch plate cover 66 located on ring 65 is interrupted. Ring 65 is secured with drum 64, and drum 64 will slow down, until the thread stored thereon is used to the extent that the tongue 79 is again freed, permitting air to escape through tube 78. As soon as pressure in space 61 drops, gear wheel 67 drops and clutch surfaces 671, 66 will engage and transmit rotation from a drive to the gears of wheel 67 from an outside source to the drum 64.
The drum is made of non-magnetic material. Ring 80, of thin wire, is held in position by magnet 81. The thread is controlled by guiding it between the outer surface of drum 64 and the inner surface of ring 80. Additional thread braking can be obtained by making the outer surface of the drum 64 tapered (see FIG. 4), and locating the magnet to be longitudinally adjustable with respect to the axis of the drum. Thus, a carrier disk 82 is threaded on a thread 84 formed on a central post 83 extending into the drum. The longitudinal location is adjustable by engaging a tool in holes 85 and rotating the carrier disk 82. To prevent spurious movement, not desired and not controlled, means are provided to secure and lock the disk 82 in position, in the present instance by inserting a plastic holding ring 86 within a groove threaded on thread 84. Thus, depending on the axial position of the magnets, the gap between the ring and the drum can be adjusted, and thus friction of the thread as it is pulled off the drum can be regulated. Additionally, various thread thicknesses can be accommodated with a single ring by suitable choice of axial position of the magnet 81.

The drum of FIG. 4 can easily be assembled to an existing machine, and FIGS. 5 and 6 illustrate the combination of such a drum with a circular knitting machine.

As seen in FIGS. 5 and 6, a carrier tube 91 is located at a suitable height on a ring around the circular knitting machine. The tube has an approximate square cross section and serves not only as a carrier for the apparatus, that is, as a mechanical support for the various thread supply drums, but additionally as a supple tube for compressed air. A plastic profiled element 97 is located parallel to the tube 91. The plastic profiled element is grooved and has electrical conductors embedded therein. The entire thread supply unit can be secured by means of a single screw 94 and a clamp 93 to a thread holder 103. The ring 91 is formed with openings at suitable locations, which are closed off by resilient plugs. Plugs 92 are formed as sealing rings, through which a pressure tube 69 can be inserted. Mere vertical insertion of the unit, at a suitable location, and securing by one screw 94 attaches the supply drum to the machine. Electrical connection can be made by an electrical plug 95 engaging the conductors in the plastic tube. The assembly is secured to carrier 99 by means of C-clamps 98, 98 engaging around an opening formed in carrier 99. A pinion 101, secured to motor 100 drives coupling gear 67, covered by housing 102 and protected against dirt and contamination.

If the embodiment of FIG. 4 is utilized, the motor can be constantly rotating, and gear 67 being selectively engaged by clutching of surfaces 671, 66 (FIG. 4); if the drum assembly of FIG. 3 is to be mounted in this way, then the ring 38 has a gear formed thereon (rather than the belt groove 27) and the electrical control discussed in connection with FIGS. 1-3 is used to control motor 100.

Assembly of a thread supply unit to a circular knitting machine is best seen in FIG. 6; carrier 99 is clamped by means of clamp 93. Its backside, that is, the side facing the interior of the machine, is supplied with a vertical plate on which a clamping plate 110 is secured which holds a thread guide rod 109 carrying thread eyes 105 and 108. Housing 102 covers and seals against carrier plate 99 and likewise covers the gearing and drive of motor 100. Thread 113 from cone 104 is first guided through pull-off eye 105, then over thread brake 106, then through a stop motion, thread break detector 107 and is then guided about drum 64. After leaving drum 64, the thread is guided between the drum and ring 80 and is then guided to the knitting feed or knitting position through eye 108. The entire assembly can be readily be secured to an existing knitting machine. For shipping, the thread guiding rods 109 and 112 can be removed, so that the entire assembly can be shipped with a minimum of space requirements. Rod 112 is inserted into a bore of an extension 111 formed on holder 98, or plate 99 and held in exact alignment, for pull-off of thread, and orientation with respect to stop motion 107, by an adjustment screw, as well known.

When the thread control system of the present invention is assembled with a circular knitting machine, it is sometimes desirable to mount the thread supply at an angle, rather than straight. FIG. 7 illustrates tilt of the units by about 20 degrees with respect to the vertical; thread supply cone is located in front of thread brake 106 and thread break detector 107 for ease of accessibility of the thread supply.

The thread supply drum 64 can be driven by a motor which is coaxially arranged. FIG. 8 shows a drive in which windings 115 of the motor are secured on a stationary (that is, non-rotatable) part of the apparatus, connected to an axial tube 130 and secured to a carrier 132 by means of a pair of C-rings 131. The outer shell 120 of the motor rotates, and is held at its top end by means of a pair of ball bearings on the axial tube 130. Electric power is supplied over wires 133, carried through axial tube 130. The storage drum operates exactly as that discussed in connection with FIG. 4. Pressure in chamber 123, when the tongue 124 is closed, causes lifting of disk 126 and interruption of drive connection between clutch disk 128 and the constantly rotating disk 117. Disk 117 is axially movable, and radially held in position by interengaging surfaces 118-119. As pressure drops, that is, if threads are removed and tongue 124 again lifts off tube 125, spring 129 carries back the membrane, and causes engagement of clutch disk 117 with clutch surface 128, and more thread will be wound on the drum, for storage thereon.

FIG. 8 illustrates an additional embodiment of the invention relating to the ring 80. The lower end of drum 64 has a catch ring or bulge 135 formed thereon to hold ring 80 securely in position. This catch bulge or ring becomes effective only if the thread should have a knot, or other defect therein which would tend to pull ring 80 downwardly, and counter the magnetic holding force. The outer diameter of the ring, or bulge 135 is so matched to the inner diameter of ring 80 that the ring 80 can just be slipped over the bulge 135. Under normal conditions, that is, during thread supply, the ring will be slightly eccentric or non-round, that is, slightly elliptical so that when thread is placed between the ring and the circumference of the drum 64, it cannot be pulled off even under substantial stress being applied thereto, and even if no magnetic holding forces were provided.

FIG. 9a illustrates, in cross section a ring 180, having a generally streamlined configuration, in which a plastic body 182 surrounds a steel wire core 181. FIG. 9b illustrates a ring 185 of generally teardrop, stream-
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lined cross section, formed of plastic low-friction material 186 and having finely dispersed particles of magnetizable material embedded therein. FIG. 9c is a cross-sectional view of a solid steel ring 29 (see also FIG. 1), formed of flat spring steel, and rounded at top and bottom, and having polished outer surfaces.

Various changes and modifications may be made within the scope of the inventive concept.

I claim:

1. Thread supply system for textile machines comprising
   a rotatable drum (3);
   means supplying thread to the drum;
   means for rotating said drum so as to spirally wind the thread onto the drum to be withdrawn in generally axial direction over the end of the drum;
   means sensing the amount of thread looped on the drum;
   a restraining ring coaxially located at the end of the drum over which the thread is withdrawn, said ring having a smooth inner surface and including magnetizable material, the inner diameter of the ring being just slightly greater than the outer diameter of the drum;
   and magnetic means acting on the magnetizable material of the ring and maintaining the ring floatingly in position around the drum.

2. System according to claim 1, wherein the drum (3), at least in the region of location of the ring (29) is of nonmagnetic material and the magnetic means comprises permanent magnets (30) located within the drum.

3. System according to claim 1, wherein the ring comprises thin spring steel.

4. System according to claim 1, wherein the ring has a streamlined cross section.

5. System according to claim 1, wherein the ring is plastic material and has a core of magnetizable material.

6. System according to claim 5, wherein the core is magnetizable wire.

7. System according to claim 1, wherein the ring is a plastic material in which fine particles of magnetizable material are embedded.

8. System according to claim 1, including a bulge (135) formed at the end of the drum below the location of the ring, said bulge being of outer diameter just slightly smaller than the inner diameter of the ring to permit the ring to be slipped thereover, the difference in diameters between bulge and ring being small enough to act as a knot catcher.

9. System according to claim 1, wherein the drum is formed at the end remote from the free end with guide means having a generally triangular cross section.

10. System according to claim 9, wherein the guide means comprises a crown ring having a plurality of radially extending ribs, the ribs having generally triangular cross section projecting beyond the surface of the drum.

11. System according to claim 1, wherein (FIG. 4) the drum (64) has a decreasing diameter towards the free end over which the thread is being pulled and the magnetic means comprises a magnet (81) axially movably located inside the drum to vary the clearance between the ring (80) and the outer surface of the drum in dependence on the axial position of the ring with respect to the tapering drum.

12. System according to claim 11, including a carrier disk (82) securing the magnet to the inside of the drum;
   a threaded spindle (82), the disk being axially adjustably secured on the spindle;
   and means (86) securing the disk against rotation on the spindle after axial adjustment thereof.

13. System according to claim 1, said sensing means including a pneumatic (49) nozzle formed in the surface of the drum, and a cover tongue (5) closing the nozzle, the nozzle and tongue being located at a position on the drum of increasing thread storage on the drum;
   and an air duct (6) in pneumatic communication (48) with the nozzle.

14. System according to claim 13, wherein the tongue (5) is formed with a sealing projection (51) entering into and closing the nozzle when pressed thereagainst by stored thread spirally looped about the drum.

15. System according to claim 13, wherein the textile machine includes a carrier member (91) for a plurality of thread supply drums, said carrier member being hollow and connected to a pneumatic supply;
   plug means (92) formed in the carrier member;
   and a pneumatic tube means (69) extending from the interior of the drum and insertable into the plug means.

16. System according to claim 15, wherein the carrier member (91) carries an electrical bus (96);
   and electrical plug means connected to the drum and engageable with the bus.

17. System according to claim 16, said rotating means including (FIG. 8) a motor (115, 120) to drive the drum (64);
   a clutch (117, 128) interconnecting the motor and the drum;
   a membrane (56) centrally located between the drum and the motor and controlling, in accordance with pneumatic conditions of the nozzle, relative clutching or unclutching between the drum and the motor;
   the motor, clutch and membrane being coaxially located with respect to the drum.

18. In a circular knitting machine having knitting feeds, a thread supply system comprising a rotatable drum (3);
   means supplying thread to the drum;
   means for rotating said drum so as to spirally wind the thread onto the drum to be withdrawn in generally axial direction over the end of the drum;
   means sensing the amount of thread looped on the drum;
   a restraining ring coaxially located at the end of the drum over which the thread is withdrawn, said ring having a smooth inner surface and including magnetizable material, the inner diameter of the ring being just slightly greater than the outer diameter of the drum;
   and magnetic means acting on the magnetizable material of the ring and maintaining the ring floatingly in position around the drum;
   and means guiding the thread pulled off over the end of the drum to a respective knitting feed of the knitting machine.

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