

[54] APPARATUS FOR READING WOUND BOBBINS

[75] Inventors: Thomas Edgar Pitts, Cranston;
William Emil Stoppard, Warwick,
R.I.

[73] Assignee: Leesona Corporation, Warwick, R.I.

[22] Filed: July 24, 1973

[21] Appl. No.: 382,144

[52] U.S. Cl. 242/18 R, 242/18 EW, 242/35.5 A,
242/35.6 R, 242/164

[51] Int. Cl. B65h 49/12

[58] Field of Search 242/18 R, 18 EW, 35.5 R,
242/35.5 A, 35.6 R, 35.6 E, 164

[56] References Cited

UNITED STATES PATENTS

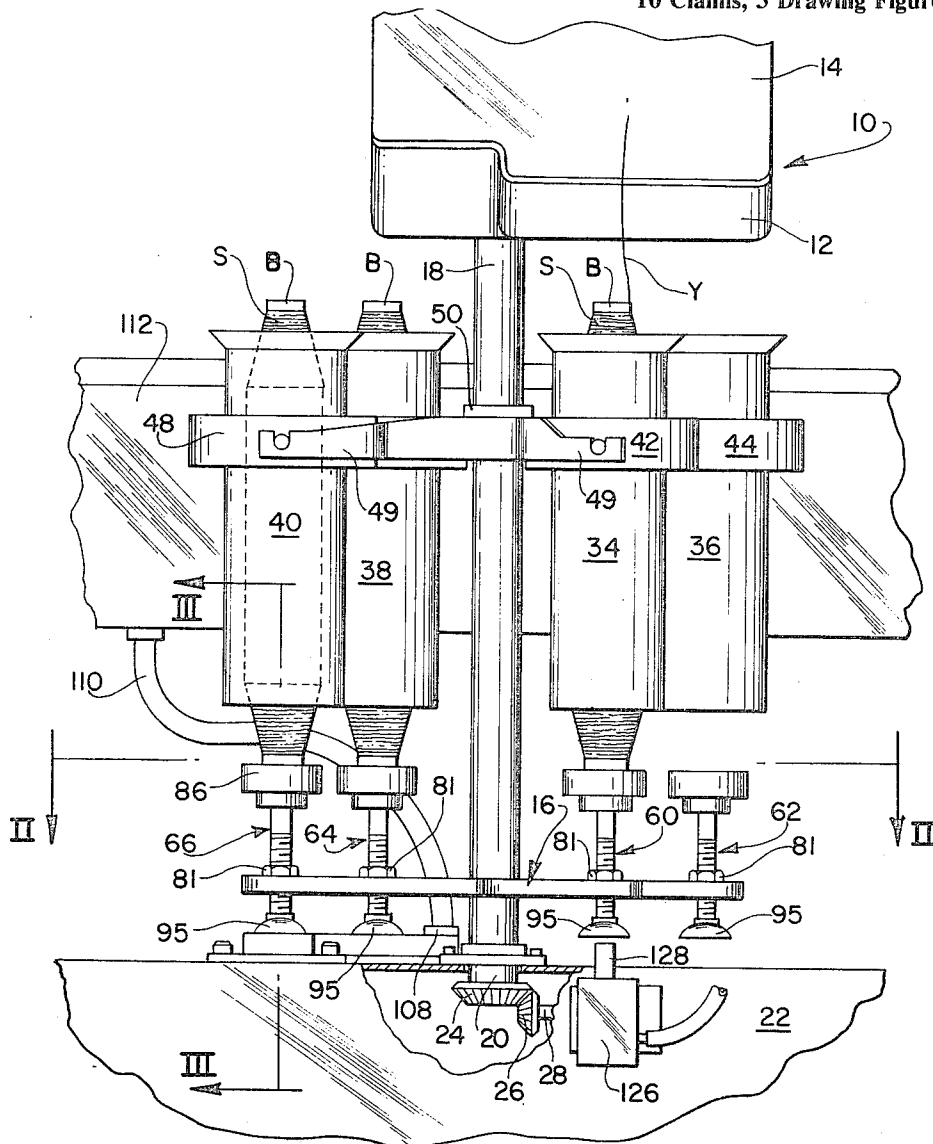
3,081,045	3/1963	Pitts et al.	242/35.6 R
3,279,712	10/1966	Furst	242/35.5 R
3,295,775	1/1967	Raasch et al.	242/35.5 R
3,563,478	2/1971	Bell	242/18 R
3,603,518	9/1971	Cochran, Jr. et al.	242/35.6 R

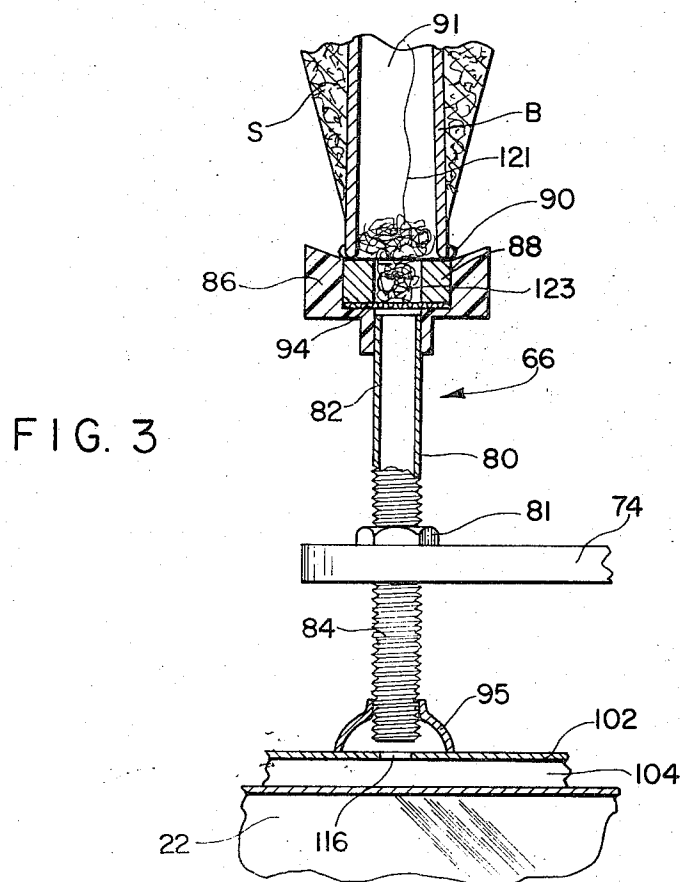
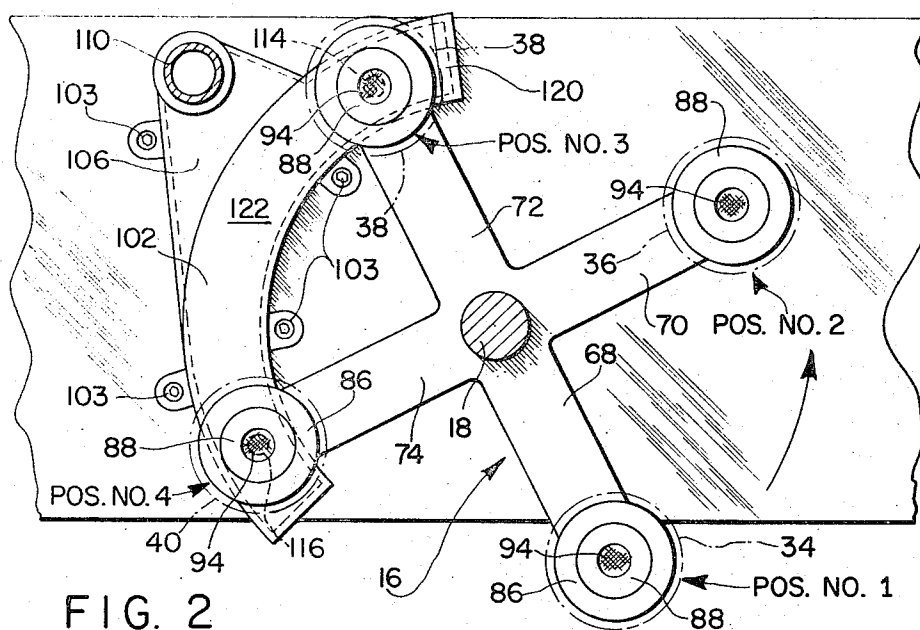
Primary Examiner—Stanley N. Gilreath
Attorney, Agent, or Firm—Albert P. Davis; Burnett W. Norton

[57] ABSTRACT

Apparatus for readying wound bobbins having a bore axially therethrough is described. The apparatus includes support means mounting the wound bobbin for delivery from a reserve position to an active unwinding position. Means are provided to create a zone of negative pressure through the bore of the bobbin when the wound bobbin is disposed in its reserve position. This zone of negative pressure acts to induce the outer yarn end of the wound bobbin into the bore when the yarn end is positioned proximate to the bore. A perforated member is provided adjacent the lower end of the bore. This member serves to control the extent to which the outer yarn end is drawn into the bore. This member also serves as a surface on which the yarn may be formed into a bunch if a bunch is desired and controls the amount of yarn drawn into the bore.

10 Claims, 3 Drawing Figures





APPARATUS FOR READYING WOUND BOBBINS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to bobbin handling mechanism and relates more particularly to apparatus for readying a wound bobbin for utilization by the bobbin handling mechanism.

As used herein the term "yarn" is employed in a general sense to relate to all kinds of strand material, either textile or otherwise; the designation "bobbin" refers to a spool or carrier for receiving a supply of yarn; "wound bobbin" and "supply bobbin" are intended to mean the product of a winding or twisting machine, whatever their form; and, the term "ready" or "readying" when referring to wound bobbins connotes the condition where the outer unwinding end of yarn on the wound bobbin is disposed in a predetermined location.

2. Description of the Prior Art

In U.S. Pat. No. 2,764,362 to Goodhue et al., entitled "Winding Machine" and issued Sept. 25, 1956, there is disclosed and claimed a fully automatic winding machine for winding yarn and the like into various forms of packages, especially cones. In essence, the machine of this patent consists of a winding section, including a winding mandrel mounted for controlled movement between a winding position, a braking position, and a reverse rotation position, and a driving drum provided with a groove to transverse the yarn being wound on the mandrel; an end-finding, knot-tying section operable in the event of thread breakage and including a knot-tying device and separate means for finding the respective free ends of the broken yarn and conveying them to the knot-tier to be joined together; a preliminary yarn servicing section including means for detecting, tensioning and cleaning the yarn supplied to the mandrel; and an enclosed control section for superintending the various other sections and controlling the functioning thereof.

U.S. Pat. No. 3,081,045 of Mar. 12, 1963 to Pitts et al. entitled "Automatic Supply Package Indexing Mechanism for Winding Machines" is directed to improvements in winding machines, particularly of the fully automatic type just described, wherein a self-activating yarn supply package indexing mechanism is provided, which said mechanism is adapted to index a fresh supply package from a reserve position to an active unwinding position and the exhausted supply package from the unwinding position to a reserve position at the same time as the free end from the reserve supply is introduced into the winding operation.

In U.S. Pat. No. 3,727,852 to Nelson et al., entitled "Bobbin Processing" and issued Apr. 17, 1973, there is disclosed and claimed method and apparatus for readying wound supply bobbins for reception on mechanism such as that disclosed in the Pitts et al. patent just mentioned, and for eventual utilization by an automatic winding machine such as that referenced above. Wound bobbins readied in accordance with the Nelson et al. patent just mentioned are processed so that the outer unwinding end of yarn on each supply bobbin is deposited into the bore of the bobbin. These supply bobbins, so readied, may then be transported by known conveying means to the yarn supply bobbin supporting creel or spider (such as that shown in U.S. Pat. No.

3,081,045) where the outer free end of yarn is ultimately released for tying in with the free yarn end on the package being wound on the automatic winding machine, whereafter the winding cycle on the winding machine is reinitiated.

SUMMARY OF THE INVENTION

While the completely automatic system just described functions admirably in achieving completely automatic handling of supply bobbins from the initial readying of each wound bobbin with its outer unwinding end disposed in a predetermined position, through the transporting stage to the bobbin being positioned on the supply bobbin indexing creel in a reserve position for ultimate arrangement in an active unwinding position where the outer unwinding end is delivered for uniting with the unwinding end from the supply package being wound on the automatic winding machine, nevertheless, occasions may arise where it is desirable to manually provide supply bobbins to the supply bobbin supporting spider. Such instances may be, for example; (1) where the particular requirements of a mill do not justify the provision of automatic supply bobbin readying apparatus; (2) where short runs of supply bobbins wound with a particular type of yarn are to be rewound on the automatic winding machine, such short runs not justifying setting up the normal automatic supply bobbin readying apparatus; (3) or where a redundant system is desired to back-up the automatic bobbin readying system and thereby maximize the productivity of the automatic winding machine.

The present invention uniquely provides means for permitting the manual loading of supply bobbins into the reserve positions of the supply bobbin supporting spider and for readying the outer unwinding end of each supply bobbin for ultimate uniting with the outer unwinding end of the supply package being wound on an automatic winding machine when the reserve supply bobbin is transferred into an active winding position.

From a broad or general point of view, the present invention may be characterized in the following manner. The supply bobbin supporting spider is provided with a plurality of positions, the positions being sequentially indexed so that each, in turn, assumes the active unwinding position while the remainder of the positions are, in fact, unloading or reserve supply bobbin positions. The spider is provided with a plurality of bobbin holders, each of which acts to seat each supply bobbin in a vertical or upright position. Each bobbin holder includes a centerless tube provided at its lower end with a flexible sealing member. The upper end of each bobbin supporting member is provided with a screen or other perforate element through which air can pass and which is operable to preclude passage of yarn. At least a portion of the path followed by each bobbin supporting member during the indexing of the spider is formed as a vacuum or suction chamber, the chamber having one or more ports or apertures therein which mate in sealing engagement with the sealing member at the bottom of each bobbin supporting member. Thus, in operation, the operator manually finds the outer unwinding end on each supply bobbin, drops the supply bobbin onto a yarn supporting member, and delivers the outer unwinding end into a position aligned with the upper end of the bore through the bobbin tube. The suction at the lower end of the supply bobbin supporting member, when the supply bobbin is in a reserve position,

creates a zone of negative pressure within the bore of the bobbin which acts to draw the outer unwinding end of yarn down into the bore. Excessive unwinding of yarn under the influence of this negative pressure is precluded by virtue of the fact that as the yarn is drawn down into the bore it encounters a screen or perforate member. Consequently, the yarn acts to shut off the suction effect as it builds up on the screen and this, in turn, arrests further withdrawal of the yarn from the supply package into the bore of the bobbin.

With the foregoing in mind it is one object of the present invention to provide new and improved apparatus for readying a wound bobbin having a bore axially therethrough by mounting the supply bobbin in a reserve position, drawing the outer unwinding end of yarn from the supply bobbin into the bore of the bobbin, and subsequently transferring the supply bobbin to an active unwinding position.

A further object of the present invention is to provide apparatus for readying a wound bobbin having a bore axially therethrough by drawing the outer unwinding end of yarn from the wound bobbin into the bore under the influence of negative pressure and providing means for restricting the amount of yarn drawn into the bore.

Still another object of the present invention is to provide new and improved apparatus for readying a wound bobbin which is simple in construction, and yet durable and reliable in use.

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

BRIEF DESCRIPTION OF THE DRAWING

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

FIG. 1 is a front elevational view of one winding station of an automatic winding machine such as that disclosed in the cited Goodhue et al. patent equipped with the automatic supply package indexing mechanism as discussed hereinbefore, and incorporating the present invention;

FIG. 2 is a view taken along lines II — II of FIG. 1; and

FIG. 3 is a view taken along lines III — III of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Before commencing a detailed description of the drawings, it should be brought out that while the invention is capable of adaptation to various types of winding machines, it was designed for use in the fully automatic winding machine of U.S. Pat. No. 2,764,362 and is shown in association with the automatic supply package indexing mechanism of that machine. However, only enough of the unmodified structure of the patented machine and supply package indexing mechanism is set forth in the drawing as is necessary to an understanding of the relationship of the patented structures to the structure of the invention.

Thus, turning now to FIG. 1, the automatic winding machine 10 includes a yarn servicing section which includes a housing generally indicated by the numeral 12 which is capped by a top plate 14. In operation a running length of yarn Y extending between a supply bob-

bin S in the active unwinding position and the package being wound (not shown) on the automatic winding machine 10 passes through and is acted upon by various yarn tensioning and servicing mechanisms (not herein illustrated) supported on or operable with respect to the top plate 14 of yarn servicing section 12. Since none of these elements is germane to an understanding of the present invention such parts have not been shown herein. Additionally, the motive means for the parts of the yarn servicing section just referred to may be incorporated within the yarn servicing section housing 12 and again, here, since these parts are not relevant to an understanding of the present invention, these parts are omitted.

With continuing reference to FIG. 1 the supply package indexing mechanism is situated below housing 12 and includes a multi-arm creel or spider 16 which is secured fast on a shaft 18. In turn, shaft 18 is journaled for rotation in suitable bearings. Thus, a first bearing (not shown) is affixed in the lower side of yarn servicing section housing 12 to support the upper end of shaft 18 and a further flanged bearing 20 is affixed on the upper surface of housing 22 of the winding machine to support the lower portion of shaft 18. The lower end of shaft 18 has a beveled gear 24 affixed fast thereon which mates with a beveled pinion 26 secured on a horizontal drive shaft 28. In turn, drive shaft 28, which extends the full length of the automatic winding machine and is provided with a plurality of like pinions 26 for driving all of the spiders along one side of the machine, is connected to a suitable source of power (not shown). As is more fully discussed in the prior cited U.S. Pat. No. 3,081,045, shaft 18, and consequently spider 16, are periodically rotated through a limited arc via the motive force from drive shaft 28, pinion 26 and gear 24 to transfer a supply bobbin S from a reserve winding position to an active unwinding position and to transfer a spent bobbin B from an active unwinding position to a position where the spent bobbin is ejected from the spider 16.

Additionally, viewing FIG. 1 the supply bobbin indexing mechanism is seen to include four elongated tubes 34, 36, 38 and 40 which are supported in collars 42, 44, 46 and 48 respectively. In turn, each of the collars is rockably mounted on an individual arm 49, all of the arms merging into a common hub 50 which is tightly connected to shaft 18. Since each of the tubes is rockable it may be tilted by means not shown herein but which is fully set forth in commonly assigned U.S. Pat. No. 3,048,349 to Pitts et al. entitled "Ejector for Supply Package Indexing Mechanism" to effect removal of a spent bobbin therefrom.

The parts of the machine thus far described as well as their function may be the same as that described in the previously identified Goodhue et al. and Pitts et al. patents and reference may be had to those patents for a more complete description thereof than shall be provided herein. These parts have no essential relationship to the subject matter of the present invention and consequently will not be described further herein.

The description will now be directed to the novel features of the present invention and, with continuing reference to FIG. 1, the yarn supply creel or spider 16 is provided with four supply bobbin supporting members 60, 62, 64 and 66 all of which are identical in construction. As best seen in FIG. 2 each supply supporting member is carried at the outer end of a respective

branch 68, 70, 72 and 74 of the spider 16. Consequently as shaft 18 is indexed each of the supply supporting members is shifted through an arc coincident with the movement of the shaft 18.

Since each supply supporting member is identical in construction with the others, it will suffice to describe but one in detail. Thus, with reference to FIG. 3 each supporting member includes a rigid, threaded hollow stem 80 which is engaged in a tapped hole in the outer end of its respective branch, for example, stem 80 of yarn package supporting member 60 is secured in branch 74 as seen in FIG. 3. A check nut 81 threaded onto stem 80 and drawn against branch 68 acts to secure the stem in position. An upper section 82 of the supply supporting member extends upwardly above its supporting branch and a lower portion 84 depends below the branch. The upper terminus of stem 80 has a saucer-like concave element 86 affixed thereto. Element 86 is centerless and is counterbored to receive and securely seat a magnetic ring 88 centrally therein. The diameter of magnetic ring 88 is of sufficient size to mate with a conductive metallic ferrule 90 affixed to the base of bobbin B. Consequently, as the bobbin is dropped onto element 86 the metal ferrule is seated and held by a magnetic force on ring 88. The configuration of element 86 is such as to induce alignment the bobbin with the ring. Ring 88 is centerless so that an air passage is provided through stem 80 from its lower extreme upwardly through the center of the ring 88 and into the bore 91 of a bobbin B seated on element 86.

As was just mentioned, element 86 is counterbored to receive ring 88. At the base of this counterbore and below ring 88 there is positioned a screen or other perforate disc 94. As will be explained in more detail hereinafter, disc 94 acts as a catcher on which yarn collects and, consistent therewith, the perforations in this screen or plate should be smaller than the yarn diameter.

With further consideration to FIG. 3 it will be seen that the lower end of each stem 80 is provided with an elastomeric suction cup 95 which is threaded onto the lower end of the stem and which, in fact, depends somewhat below the lower end of said stem.

Turning now to FIG. 2 spider 16 may be considered to have four stopping positions as it is indexed through a full circle. For convenience of expression herein the designation Pos. No. 1 represents the active unwinding position of a yarn supply bobbin, i.e., the locus on the circle of movement of the spider where the supply bobbin which is being unwound is situated. In this active unwinding position strand of yarn Y is unwound from the supply bobbin S and is delivered through the various servicing mechanisms of the automatic winding machine to be taken up on a yarn take-up package (not herein illustrated) at the upper end of the machine. Pos. No. 2 may be deemed to be the position toward which the denuded supply bobbin from the active unwinding position, i.e., Pos. No. 1 is indexed to after the yarn on the bobbin at Pos. No. 1 is exhausted or after such other circumstances occur which may make it desirable to present a fresh supply bobbin to Pos. No. 1. In practice the denuded or rejected bobbin from Pos. No. 1 is normally transferred to a stand-by locus at Pos. No. 2, then doffed or kicked off spider 16 during the movement of the bobbin toward Pos. No. 3 from Pos. No. 2. Pos. Nos. 3 and 4 may be deemed to be a loci

at which fresh yarn supply bobbins may be mounted on the spider.

With continuing reference to FIG. 2 it will be seen that the upper surface of housing 22 mounts a channel 102 thereon. This channel is held in sealing engagement with the upper surface of housing 22 by bolts 103 to thereby define a vacuum chamber 104 between the channel and the housing. In further detail, channel 102 is configured to lay in the path of travel of each bobbin supporting member 60-66 as each member is positioned in the locus identified by Pos. Nos. 3 and 4. Channel 102 includes an integrally formed flared portion or leg 106 which also securely overlays the upper surface of housing 22 and which connects with an upstanding connector pipe 108. In turn pipe 108 is connected by means of a flexible hose 110 into a suction duct 112, this latter suction duct being a normal part of the automatic winding mechanism and being connected to means to provide a suction or negative pressure therein. Two outlet ports 114 and 116 are formed within the upper face of channel 102, these ports being aligned respectively with Pos. Nos. 3 and 4. As spider 16 is indexed the elastomeric cup 94 is caused to ride up an incline 120 and onto the upper surface 122 of channel 102. The vertical adjustment of stem 80 of each member 60-66 is such as to insure that the stem clears the upper surface 122 of channel 102, but that cup 95 mates tightly on said surface 122. Therefore, this cup 95 provides a substantially air tight seal between ports 114 and 116 and the tube 80 of each supply bobbin holder aligned with these. Consequently, the negative pressure induced from duct 112 is transmitted via hose 110 and pipe 108 into chamber 104, and therethrough into stem 80 and upward through the screen 94 to the bore 91 of bobbin B.

The operation of the present invention will be quite obvious from the foregoing description. Thus, by way of summary in operation the operator manually finds the outer unwinding end of yarn on each supply bobbin S, unwinds a portion of this end, and drops the supply bobbin through the appropriate tube 34-40 which is aligned with either or both of Pos. Nos. 3 or 4, the supply bobbin sliding over the saucer-like inclined surface on element 86 and seating itself on this element with its metal ferrule 90 engaged with magnetic ring 88. In this position the constant suction from duct 112 induces a negative pressure through the bore 91 of supply bobbin S. By the utilization of a continuous suction or negative pressure the operator need not be present at the bobbin when it is indexed to Pos. Nos. 3 and 4, but can tend the bobbin at these positions during her normal patrolling of the machine. At this time the operator manually places the outer unwinding end 121 of the supply bobbin S over the top of bore 91 of the bobbin and sufficiently close thereto to cause the suction to induce the outer unwinding end of yarn to be drawn into the bore. The outer unwinding end migrates downwardly under the influence of the suction until it engages on screen or perforate member 94 after which the yarn end starts to build into a disoriented bunch 123 within the confines of the interior of magnetic ring 88 as seen in FIG. 3. When the bunch has attained sufficient mass to substantially shut off the openings through the screen the suction is effectively precluded in bore 91. This halts further withdrawal of the outer unwinding end 121 into the bobbin bore 91. With the reserve supply bobbin or bobbins so readied and as the reserve supply bobbin at

Pos. No. 4 is indexed into the position identified as Pos. No. 1 a burst of compressed air is discharged through valve 126 and directed upwardly through nozzle 128 through and through bore 91 to dislodge bunch 123 therefrom and deliver it upwardly to the servicing section 12 where this outer yarn end is prepared for attachment to the outer unwinding end of yarn on the take-up package. Operation of valve 126 may be accomplished as a function of the indexing of spider 16. It will be appreciated that the present invention could operate to provide a readied bobbin with only the outer unwinding end loosely within the bore of the bobbin rather than its being bunched as, for example, where the end was constrained by some means from freely flowing into the bore to a sufficient degree to create a bunch.

Unwinding of the yarn supply on bobbin S at Pos. No. 1 continues until such time as this supply of yarn is exhausted. At that point, and through mechanisms more particularly identified in the prior cited patents, a fresh reserve yarn supply bobbin located at Pos. No. 4 is indexed into the locus of Pos. No. 1 where the same procedure of unwinding is followed. It will be appreciated that the reserve supply bobbin at Pos. No. 4 will have been previously readied by having the outer yarn end introduced into the bore thereof and, advantageously, such readying of the bobbin at Pos. No. 4 and Pos. No. 3 may be achieved in accordance with the present invention. It will be appreciated that while the readying apparatus of the present invention has been shown and described as adapted for use at Pos. Nos. 3 and 4 such apparatus is readily adaptable to a single position only, or to a number of positions greater than the two shown herein, the illustration of two reserve winding positions provided with the readying apparatus being an arbitrary number selected for purposes of illustration herein.

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

What is claimed is:

1. Apparatus for readying a bobbin wound with a supply of yarn thereon and having a bore axially there-through comprising, carrier means for supporting said bobbin in a reserve position and an active unwinding position, means operable to provide a zone of negative pressure through the bore of said bobbin when said bobbin is in said reserve position, said zone of negative pressure acting to induce the outer unwinding end of the yarn on the bobbin into the bore, and means for actuating said carrier means to move said bobbin from said reserve position to said active unwinding position after the yarn end has been deposited in said bore.

2. Apparatus as set forth in claim 1 wherein said carrier means includes support means for said bobbin, said

support means having a bore therethrough, the bore through said support means being in alignment with the bore through said bobbin supported thereon when in said reserve position, said support means when in said reserve position having its bore connected with said negative pressure zone.

3. Apparatus as set forth in claim 1 wherein said actuating means is operable to move said carrier means in a predetermined path to dispose said bobbin sequentially in said reserve position and active unwinding position.

4. Apparatus as set forth in claim 1 including controlling means for confining the movement of the yarn into said bore to a predetermined zone therein.

5. Apparatus as set forth in claim 4 wherein said controlling means including a perforate element having apertures therein smaller in size than the diameter of the yarn wound on said bobbin.

6. Apparatus as set forth in claim 5 wherein said actuating means moves said carrier means along a predetermined path to move said bobbin from said reserve position to said active unwinding position, a fluid port along said predetermined path and proximate said reserve position, said port being connected to said means for providing said zone of negative pressure, said carrier means including support means having a bore therethrough, said bobbin being mounted on said support means with the bore of the support means being aligned with said port when said support means is in said reserve position, the negative pressure being communicated through the bore in said support means to the bore in said bobbin to induce the outer unwinding end of yarn on said bobbin into said bobbin bore and onto said perforate element.

7. Apparatus as set forth in claim 6 including a suction cup affixed at one end of said support means for sealing engagement around said port.

8. Apparatus as set forth in claim 2 wherein said bobbin has a base provided with a ferrule of conductive material, and said support means includes a magnetic portion engageable with said ferrule.

9. Apparatus as set forth in claim 2 wherein said carrier is adapted to mount a plurality of said support means at spaced locations thereon, each said support means being sequentially shifted from a first position where a wound bobbin thereon is disposed in said active unwinding position to a further position where it is adapted to receive a reserve bobbin wound with yarn.

10. Apparatus as set forth in claim 9 wherein a plurality of fluid ports are provided at said reserve position, each said fluid port being connected to said zone of negative pressure, said reserve position being adapted to receive a plurality of said support means, each said support means being aligned with a fluid port when in said reserve position.

* * * * *