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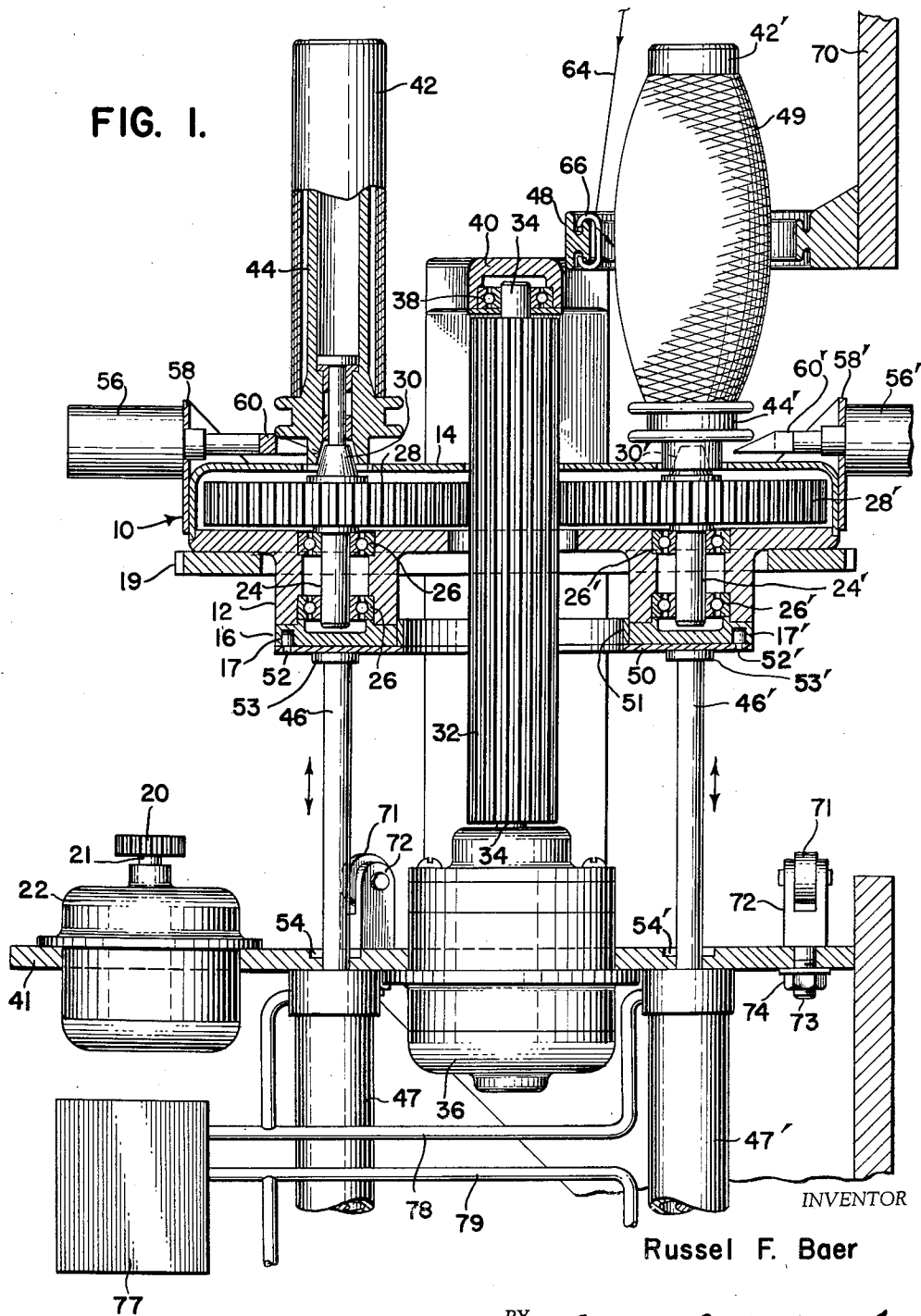
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AUTOMATIC BOBBIN TRANSFER DEVICE

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3 Sheets-Sheet 1

FIG. 1.



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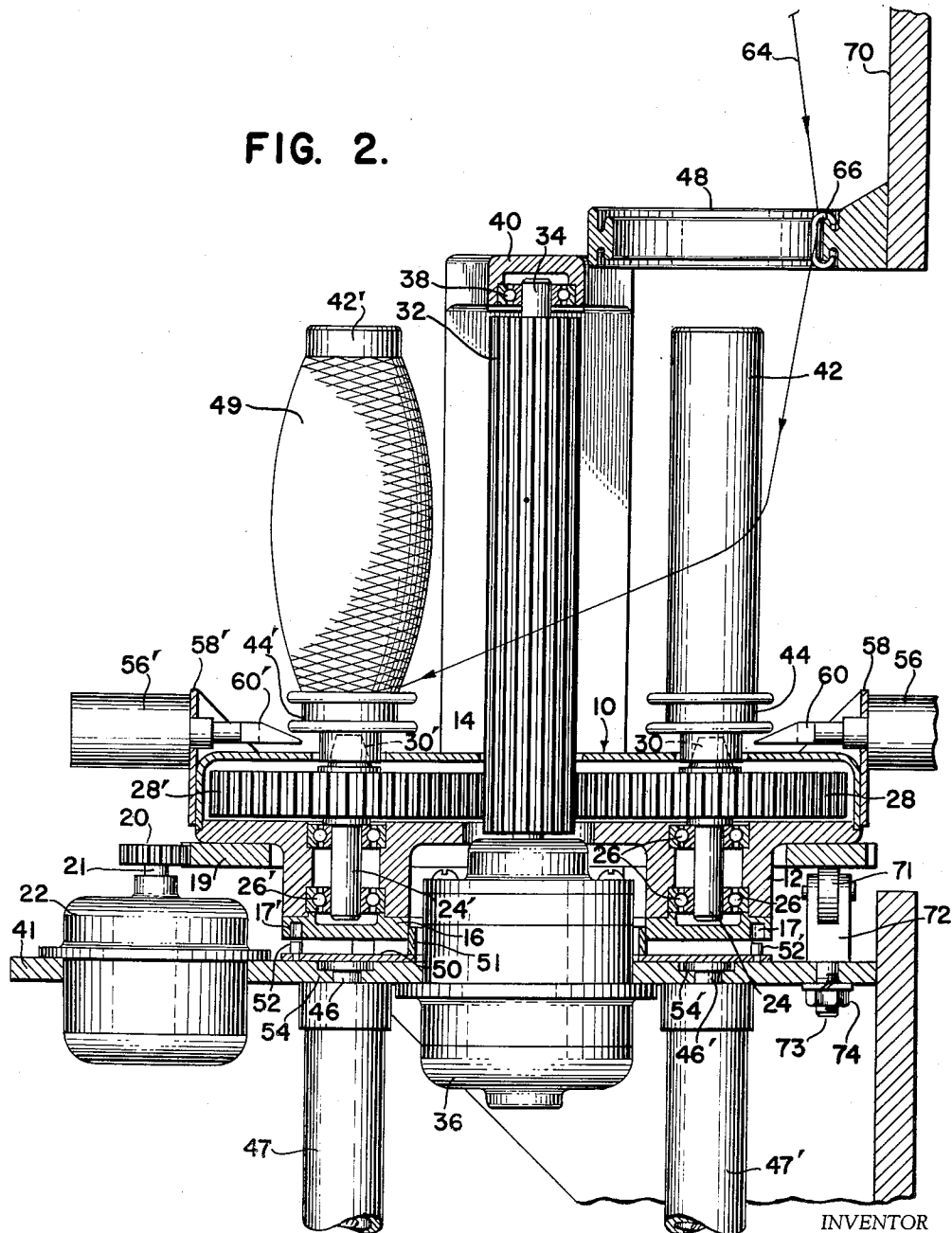
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FIG. 2.



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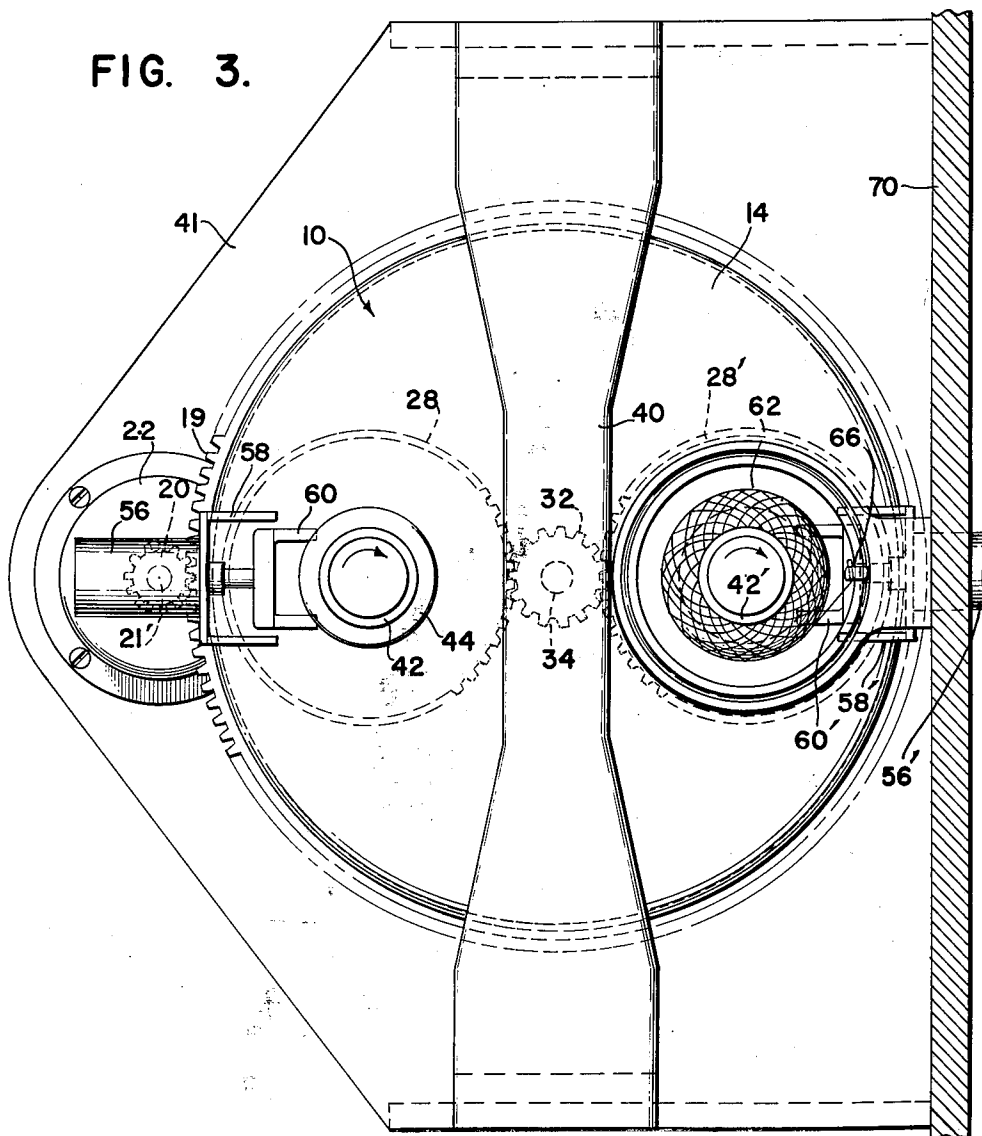
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AUTOMATIC BOBBIN TRANSFER DEVICE

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AUTOMATIC BOBBIN TRANSFER DEVICE

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9 Claims. (Cl. 57—54)

This invention relates to an automatic bobbin transfer device and more particularly to a device for the automatic transfer of yarn from a full bobbin to an empty bobbin as the yarn is being wound on a draw-twist machine.

In the present day drawtwisting operations wherein yarn is passed from a feed bobbin through various guiding or drawing means and thence through a traveler ring and onto the drawtwist bobbin, it is necessary when the drawtwist bobbin becomes full to halt the feed of the yarn while the full bobbin is removed and replaced by an empty one. The operator must then, by hand, restrung the yarn in its path of travel over draw rollers and pins onto the empty bobbin in order to start the winding operation again. Even with highly skilled operators, there is a considerable lag between the removal of a full bobbin and the replacement thereof by an empty bobbin because of the above required hand operations. Such non-productive time, of course, represents a considerable economic loss.

It is an object of the present invention to provide an apparatus for automatically doffing bobbins on a draw-twist machine wherein the yarn travel is transferred from a full to an empty bobbin without requiring the cessation of the yarn feed.

It is a further object of the invention to provide such an apparatus which is relatively inexpensive, safe and efficient.

The invention in its preferred form comprises a turntable upon the opposite sides of which are rotatably mounted the bobbins to be filled with yarn. Means are provided to continuously rotate these bobbins while the turntable upon which they are mounted is vertically reciprocated so that the bobbins move in a traversing relationship to a fixed traveler ring which is aligned about one of said bobbins. When the bobbin becomes full the reciprocation is halted while the turntable is rotated to place the empty bobbin in operational relationship with the traveler ring.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which:

FIGURE 1 shows a side elevational view partly in section of a preferred embodiment of the invention;

FIGURE 2 shows a side elevational view of the apparatus similar to FIGURE 1 at a different stage of the operation; and

FIGURE 3 is a top plan view of the apparatus shown in FIGURE 1.

Referring now to the drawings, reference numeral 10 indicates a turntable assembly which includes a base support 12 and a cover plate 14. United to the bottom of the base support 12 is a base plate 16 having sockets 17 and 17'. A ring gear 19 is secured to the bottom of the base support 12, so that the teeth thereof extend somewhat beyond the peripheral edge of the base support (FIGURE 3).

Reference numeral 20 indicates a pinion mounted on a shaft 21 and driven by a transfer motor 22. The pinion 20 is adapted to engage the ring gear 19 for rotation of the entire turntable assembly.

Associated with the turntable assembly there are two

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groups of elements of identical structure, one of which groups appears on the left side of the drawing and the other of which groups appears on the right side of the drawing. For the sake of simplicity and clarity the reference numerals used to describe the elements on the left side of the drawing (FIGURES 1 and 3) will also be used to denote the corresponding elements on the right side of the drawing with the addition of a "prime" (') notation. In FIGURE 2, the relative position of some of the elements has been reversed, but all elements retain the same reference numerals employed in FIGURE 1.

Reference numerals 24 and 24' indicate shafts which are journaled within bearings 26 and 26' and which shafts support and are keyed to driven gears 28 and 28'. Reference numerals 30 and 30' denote conical apexes of the shafts 24 and 24'.

Reference numeral 32 indicates a central elongated pinion or toothed shaft which is supported on a shaft 34 which is driven by a motor 36. The top part of the shaft 34 extending above the central pinion or toothed shaft 32 is journaled within a bearing 38, which bearing is located within a bearing support arm 40. It will be noted that the motor 36 and the transfer motor 22 are mounted on the machine frame base, which is indicated by the reference numeral 41.

Reference numerals 42 and 42' denote bobbins which are mounted on spindle assemblies or bobbin holders 44 and 44', said spindle assemblies being adapted to engage the shaft apexes 30 and 30' so as to be rotated by the shafts 24 and 24'.

Reference numerals 46 and 46' denote reciprocating rods connected to pistons within air cylinders 47 and 47'. The air cylinders are shown fragmentarily since the particular structure and arrangement of the fluid conduits and valves are conventional and, as such, form no part of the present invention. Nevertheless, means are provided so that said rods 46 and 46' may be moved from a lowermost nonreciprocating or "transfer" position (FIGURE 2) to a raised reciprocating or "operative" position as shown in FIGURE 1. In this latter position, the path of reciprocation is of such a length as to permit the bobbin 42' to traverse a traveler ring 48 within the area covered by a yarn package 49.

Attached to the top of the rods 46 and 46' is an annular plate 50 having an upwardly extending side flange 51. Also extending upwardly from the annular plate 50 are stop pins 52 and 52' which are adapted for insertion into the sockets 17 and 17' so as to prevent rotation of the turntable assembly during the reciprocating movement (FIGURE 1). Reference numerals 54 and 54' indicate depressions in the face of the machine frame base 41 to accommodate the top flange sections 53 and 53' of the rods 46 and 46' when the rods are at their lowermost position (FIGURE 2).

Reference numerals 56 and 56' indicate solenoids which are mounted on opposite sides of the turntable cover plate 14 by brackets 58 and 58'. Bifurcated fingers 60 and 60' extend from the solenoids (FIGURE 3) and are sloped or beveled in such a manner so as to lift and disengage the spindle assemblies 44 and 44' from the shaft apexes 30 and 30' when the solenoids are actuated. FIGURE 1 shows the solenoid 56 so actuated.

As stated, the reference numeral 49 denotes a yarn package which is wound on the bobbin 42'. The thread line, indicated by the reference numeral 64, descends from the feed bobbin and other guide elements (not shown) before it passes through a traveler 66 which is mounted for rotation about the traveler ring 48 in the conventional manner. The traveler ring is mounted on a portion 70 of the machine frame so that it is stationary with regard to the bobbin reciprocating within it.

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Reference numeral 71 denotes rollers which are mounted upon spacer supports 72 affixed to the machine frame base 41 by bolts 73 and nuts 74. Three of these assemblies are spaced at equidistant points beneath the turntable assembly to prevent the turntable assembly from descending to a lower position than is illustrated in FIGURE 2. In this position the pinion 20 engages the ring gear 19 to rotate the turntable assembly supported through the ring gear 19 on the rollers 71.

In the operation of the apparatus disclosed, the start-up is commenced by energizing the motor 36 to rotate the elongated central pinion or toothed shaft 32, which moves the gears 28 and 28' and thereby the bobbins 42 and 42'. The air-cylinder system is actuated to reciprocate the rods 46 and 46' which reciprocate the turntable assembly 10 mounted thereon and thence the rotating bobbins 42 and 42'. The operation of the air cylinders is controlled by well-known apparatus, illustrated diagrammatically at 77, which is connected to the air cylinders by pipes 73 and 79 (FIGURE 1). As pointed out above, the path of reciprocation is so arranged that the thread line 64 which is led on to the bobbin 42' by the operator will travel the distance covered by the yarn package 43 illustrated on the bobbin 42'.

After a predetermined time or when the yarn package has reached the proper size, the reciprocation of the rods 46 and 46' is halted and they are completely depressed from their normal reciprocating path to the position shown in FIGURE 2. It will be seen in this figure that the turntable is held by the rollers 71 in such a position that the pinion 20 engages the ring gear 19. The motor 22 is then actuated to rotate the pinion 20 for a predetermined time and thereby move the turntable assembly 180°, the ring gear 19 sliding along the rollers 71. With the turntable depressed to the position shown in FIGURE 2 and rotated 180°, the empty bobbin 42 shown on the left side in FIGURE 1 is now on the right side shown in FIGURE 2. The thread line 64 descending through the traveler 66 then passes across the central pinion 32 to the still rotating full bobbin 44'. At this time, reciprocation of the air cylinders is commenced whereby pins 52 and 52' are inserted into sockets 17 and 17' to lock the turntable assembly against rotation, and the turntable assembly lifted to reciprocating position once more. The thread line now commences winding on the bobbin 42 within the traveler ring 48 and the thread line passing from the empty bobbin to the full bobbin 42' is pulled taut by virtue of the fact that the full bobbin is still being driven. This stress on the thread line passing between the two bobbins causes the line to break, whereupon the yarn continues to be wound upon the newly started bobbin reciprocating within the traveler ring 48.

In order to remove the full bobbin, the solenoid 56' (FIGURE 1) is now energized by conventional means (not shown) and the bifurcated finger 60' moves towards the right whereupon the beveled edge of the finger slides beneath the lower portion of the spindle assembly 44' to lift this assembly out of engagement with the apex 30' of the shaft 24'. Thus disconnected, the full bobbin 42' ceases to rotate and can be easily removed by the operator and replaced by an empty bobbin. The solenoid 56' is then deenergized to withdrawn the bifurcated finger 60' and the newly inserted bobbin is placed in frictional engagement with the apex 30' so as to begin rotation therewith.

When the previously empty bobbin 42 becomes full, the above described operation is repeated so as to provide a substantially continuous transfer of yarn from full bobbin to empty bobbin.

In summary, there has been disclosed an apparatus for transferring yarn from a full bobbin to an empty bobbin in a drawtwist machine whereupon said full bobbin may be removed and replaced by an empty bobbin without requiring the cessation of the yarn feed.

Obviously, many modifications and variations of the

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present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A yarn winding apparatus, comprising a base, a traveler ring mounted on the base, a turntable movably mounted on the base, a bobbin holder rotatably mounted on the turntable, a driven gear carried by the turntable and connected to the bobbin holder, an elongated driving gear rotatably mounted on the base and meshed with the driven gear, means on the base for actuating the elongated gear to drive the bobbin holder, means on the base for rotating the turntable to align the bobbin holder coaxially with the traveler ring, and means on the base for reciprocating the turntable relative to the traveler ring.

2. A bobbin transfer device for twisting apparatus that comprises a stationary traveler ring, a turntable, a pair of bobbins on said turntable, means to rotate said turntable to align either of said bobbins in coaxially spaced relation with said ring, means vertically to reciprocate said turntable and bobbins whereby there is imparted to said aligned bobbin a relative traversing movement within said ring, and means to rotate said bobbins.

3. The device of claim 2 wherein said means to rotate said bobbins comprises single drive means, and including means to independently halt rotation of either bobbin.

4. A bobbin transfer device for twisting apparatus that comprises a stationary traveler ring, a turntable, a pair of bobbins mounted on said turntable at opposite sides thereof for axial rotation, means to rotate said turntable to align either of said bobbins in coaxially spaced relation with said ring, means vertically to reciprocate said turntable and bobbins whereby there is imparted to said aligned bobbin a relative traversing movement within said ring and means to rotate said bobbins.

5. The device of claim 4 wherein said bobbins are frictionally mounted on shafts for axial rotation therewith, and including means to disengage either of said bobbins from said shafts selectively to halt rotation of said bobbins.

6. The device of claim 4 wherein said means to rotate said turntable includes a ring gear attached to said turntable and independently actuated gear means adapted to engage said ring gear for movement thereof.

7. A bobbin transfer device for twisting apparatus that comprises a stationary traveler ring, a turntable, a pair of bobbins on said turntable, means to rotate said turntable to align either of said bobbins in coaxially spaced relation with said ring, means vertically to reciprocate said turntable and bobbins whereby there is imparted to said aligned bobbin a relative traversing movement of said bobbin within said ring, means to rotate said bobbins, means to feed yarn through said traveler ring onto said bobbin in traversing relationship with said ring, means to lower said bobbins beneath said ring when said aligned bobbin is fully wound to permit rotation of said turntable, alignment of an empty bobbin and removal of said fully wound bobbin.

8. A bobbin transfer device, comprising a base, a traveler ring mounted above the base, a turntable mounted for rotation on the base, a pair of shafts rotatably mounted on the turntable, a pair of bobbin holders mounted on the shafts, said bobbin holders being slidably mounted for movement into and out of frictional driving engagement with the shafts, a pair of driven gears attached to the shafts and carried by the turntable, an elongated gear meshed with the driven gears, means on the base for rotating the elongated gear to drive the bobbin holders, means on the base for moving the turntable to move the bobbin holders from a transfer position to an operative position, a ring gear attached to the turntable, means on the base for engaging the ring gear to rotate the turntable when said turntable is in said transfer position, means on the turntable moving means for

locking the turntable against rotation when said turntable is in the operative position, one of said bobbin holders being positioned in concentric relationship with the traveler ring when the turntable is in said operative position, and means for controlling the turntable moving means to reciprocate the turntable when said turntable is in the operative position.

9. A bobbin transfer device, comprising a base, a traveler ring mounted above the base, a vertical toothed shaft rotatably mounted on the base, means on the base for driving the toothed shaft, a turntable movably mounted on the base, a pair of shafts mounted on the turntable at opposite sides thereof and having conical portions, a pair of bobbin holders mounted on the shafts and adapted to engage the conical portions thereof in frictional engagement so that said bobbin holders are rotated by the shafts, a pair of driven gears carried by the turntable and meshed with the toothed shaft for actuating the bobbin holders, a plurality of fluid cylinders attached to the base, a plurality of vertical rods connected to the pistons of the fluid cylinders, an annular plate secured to the upper ends of the rods for engaging the

turntable to raise and lower said turntable, a ring gear attached to the turntable, means on the base for engaging the ring gear and rotating the turntable to align one of the bobbin holders coaxially with the traveler ring when said turntable is in a lowermost position, means on the annular plate for locking the turntable against rotation when said turntable is moved out of said lowermost position, means on the turntable for selectively elevating the bobbin holders out of engagement with the conical portions of the shafts to stop the rotation of said bobbin holders, and means for controlling the fluid cylinders to reciprocate the turntable.

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