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YARN PACKAGING DEVICE

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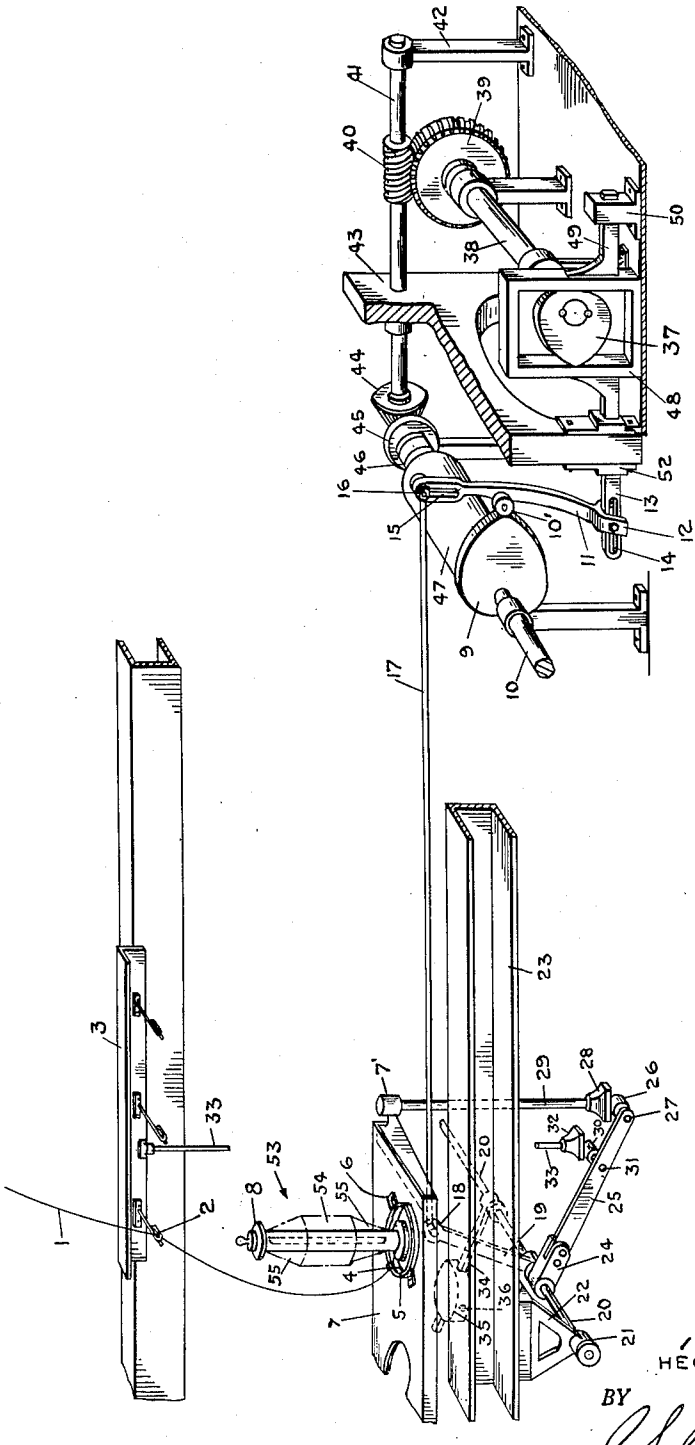

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YARN PACKAGING DEVICE

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1 Claim. (Cl. 242—43.7)

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This invention relates to the winding of yarns into packages and relates more particularly to an improved traversing mechanism adapted to be employed in connection with yarn twisting and winding apparatus whereby double-tapered yarn packages may be wound without effecting a reciprocating vertical motion of the revolving spindle on which the yarn package support rests.

Double-tapered yarn packages have heretofore been formed by superimposing two motions on the guide directing the yarn on to the bobbin, namely, an up and down traversing or chasing motion and a slow progressive feed or lift for building the package. The progressive feed or lift usually functions only once during the filling of the bobbin or yarn package support. Yarn packages wound in this manner cannot be dressed economically to remove any soiled yarn on the bottom layers of the package since the removal of the bottom layers necessitates complete backwinding to clean up the yarn. Certain mechanisms have been provided for superimposing a builder motion on the normal chaser or traverse motion wherein the spindle is moved. However, these mechanisms are of a considerable degree of complexity and present appreciable servicing and adjustment difficulties.

It is, therefore, an important object of this invention to provide novel means, of a simple yet efficient design, adapted to cooperate with the ring rail of a yarn winding device for producing a traverse stroke having a builder motion superimposed thereon so as to enable satisfactory yarn packages of a double-tapered cone shape to be wound.

Another object of this invention is the provision of means comprising a traverse mechanism for a yarn winding device which is capable of ready and easy adjustment so that bobbins of various dimensions may be accommodated on the winding device and yarn packages of the desired shape wound.

Other objects of this invention, together with certain details of construction and combinations of parts, will appear from the following detailed description and the accompanying drawing.

In the drawing, wherein a preferred embodiment of my invention is shown, the figure is a perspective view of a winding and twisting device embodying my invention, showing a yarn support, ring rail and the means provided for traversing the ring rail and superimposing a builder motion on the traverse stroke.

Referring now to the drawing, a yarn 1, coming from any suitable source of supply such as a yarn package, a metier or spinning cabinet (not shown), passes downwardly through a pigtail

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guide 2 set in an angle iron 3 which extends across the width of the winding machine and which is adapted to carry a number of pigtail guides, as shown. The yarn 1 is threaded through a traveler 4 mounted on a spinning ring 5 set in a ring holder 6, the latter being mounted on a vertically reciprocable ring rail 7. The ring rail 7 normally carries a plurality of said spinning rings suitably spaced thereon so that multiple winding operations may be carried on.

The yarn 1, after passing through traveler 4, is taken up on a rotating bobbin 8 mounted on a driven spindle of conventional construction (not shown) which is rotated at high speed in the usual manner, as by a belt engaging the whorl of the spindle. The rotation of bobbin 8 causes yarn 1 to be wound thereon and the yarn windings are suitably distributed to form a yarn package of the desired shape by a vertical reciprocating traverse or chaser motion imparted to ring rail 7.

The traverse or chaser motion of ring rail 7 is imparted thereto by the rotation of a heart-shaped cam 9 keyed to a shaft 10 which is driven at a uniform angular velocity by suitable drive means (not shown). Cam 9 acts on a cam follower 10' rotatably mounted on a rocker arm 11 which is pivotally and adjustably mounted at its bifurcated lower end 12 on an arm 13. The arrangement of parts is such that the fulcrum of rocker arm 11 may be shifted laterally to any desired position along slot 14 in arm 13. The rotation of heart-shaped cam 9 causes rocker arm 11 to operate. Rocker arm 11 is provided with a slot 15 at the upper end in which slot is set a pin 16 to which is attached one end of a traverse connecting strap 17. The opposite end of said connecting strap 17 is pivotally attached to a pin 18 in the upper part of a traverse arm 19. Traverse arm 19 is fixed to a rotatable shaft 20 journalled in a bearing 21 integral with a bracket 22 attached to a supporting channel iron 23, which constitutes part of the machine frame. The remainder of the machine frame has been omitted in the interest of clarity, only such portion being shown as is necessary. Also fixed to shaft 20 is a link 24 provided with a bifurcated end in which is mounted a lifter arm 25 the movement of which actuates traverse ring rail 7 and pigtail guide bar 3 in a manner hereinafter described. Lifter arm 25 is provided at one end thereof with a roller 26 rotatably mounted on a pin 27 set in lifter arm 25, roller 26 supporting foot 28 of ring rail lifter rod 29. The opposite end of lifter rod 29 is seated in a cylindrical bracket 7' fixed to ring rail 7.

The lifter arm 25 is also provided with a sec-

ond roller 30 rotatably mounted on a pin 31 fixed in said lifter arm 25. Roller 30 supports the foot 32 of a pigtail guide bar lifter rod 33 which is suitably attached to and supports pigtail guide bar 3. In addition to the several elements heretofore described, shaft 20 also supports rod 34 fixed thereto, on which rod is adjustably mounted a counterweight 35 which is held in adjusted position by a set screw 36. Counterweight 35 exerts a torque or turning moment on shaft 20 which tends to raise ring rail 7. The position of counterweight 35 on rod 34 and, consequently, the leverage exerted thereby may be varied by loosening set screw 36, sliding counterweight 35 along rod 34 to any desired position and then locking it in said position by tightening up set screw 36.

When the rotation of cam 9 forces rocker arm 11 to the right, traverse connecting strap 17 draws traverse arm 19 to the right against the torque or turning moment normally exerted by counterweight 35. This movement of rocker arm 11 rotates shaft 20 and turns lifter arm 25 in a clockwise direction which allows ring rail 7 and pigtail guide bar 3 to fall. The distance through which ring rail 7 and pigtail guide bar 3 move constitutes the downward traverse stroke of said ring rail. As cam 9 continues to rotate and the peak of cam 9 passes the cam follower 10', arm 11 is rocked to the left by the downward pull of gravity on counterweight 35 which applies a turning moment to shaft 20. The rotation of shaft 20 causes lifter arm 25 to rise and, since both ring rail lifter rod 29 and pigtail guide bar lifter rod 33 are raised by rollers 26 and 30, respectively, ring rail 7 and pigtail guide bar 3 also rise. This movement of said elements constitutes the upward traverse stroke. The continued rotation of cam 9 causes ring rail 7 to rise and fall with a uniform traverse stroke of a fixed distance which is determined by the periphery of cam 9. This traverse motion distributes the windings of yarn 1 on bobbin 8.

Without a suitable builder motion superimposed on the traverse motion of ring rail 9 described above, the yarn windings would form a yarn package of cylindrical shape. However, this would make for an undesirable package since the traversing of the heavy ring rails cannot be effected with enough speed to yield a yarn package having windings which are angled sufficiently to produce a coherent and compact package wherein the yarn windings resist sloughing off or turning at the ends. Thus, it is necessary that the path of the traverse stroke produced by the rotation of cam 9 be progressively advanced up and returned down on bobbin 8 by a suitable builder motion so that there may be formed a double-tapered yarn package wherein the windings are so distributed that the package has satisfactory physical characteristics.

The desired builder motion is produced by the rotation of a cam 37 which is mounted on and rotated by a cam shaft 38. Cam shaft 38 is driven through the action of a worm gear 39 and a worm 40 keyed to a rotatably mounted shaft 41 journaled at one end in a bracket 42 and in a supporting bracket 54. Keyed to the end of shaft 41 is a bevel gear 44 which meshes with a second bevel gear 45. Bevel gear 45 is rotated by the output shaft 46 of a gear reduction device 47, the input shaft of which is driven shaft 10 on which cam 9 is mounted. The gear ratio employed in gear reducer 47 is such that cam 37 is rotated at but a fraction of the speed at which cam 9 is rotated.

As cam 37 rotates slowly it causes frame 48 to move laterally. This lateral reciprocating movement of frame 48 causes extension 49 which may be integral with frame 48 to slide in a bearing 50 and arm 13, on the opposite side of frame 48, to slide back and forth slowly in a bearing 52 which is set in supporting bracket 43. The slow, sliding movement of arm 13 continuously shifts the position of the fulcrum of rocker arm 11. The slow displacement of the fulcrum of rocker arm 11 from the right to the left and back as cam 37 rotates, gradually advances the full and uniform traverse stroke upward along bobbin 8 and then downward along bobbin 8. By maintaining a suitable ratio between the peripheral speed of cam 9 and cam 37, the rate at which the builder motion advances and returns the uniform traverse stroke along bobbin 8 may be varied to form a yarn package of any desired double-tapered structure. With cam 9 rotating about twenty times for each rotation of cam 37, a yarn package of the shape indicated by reference numeral 53 will be formed. The central portion 54 of said yarn package will be cylindrical in shape since the yarn windings overlap constantly over this section, and the ends 55 will be tapered since the traverse stroke will cover this portion of bobbin 8 only a part of the time as the winding operation proceeds. Any adjustment in the placement of traverse stroke may be made by shifting the position of the bifurcated end 12 of rocker arm 11 along slot 14 in arm 13, a shift to the right raising the normal traverse stroke relative to bobbin 8 and a shift to the left lowering said traverse stroke. The movement of the position of the fulcrum in slot 14 does not, however, increase or decrease the length of the traverse stroke since that is determined by the profile of cam 9.

My novel apparatus enables a very desirable double-tapered yarn package to be built which unwinds easily when the yarn is coned or otherwise rewound and which may be readily shipped.

While the novel apparatus of my invention has been shown in use in connection with a ring twisting and winding device, it may also be employed, of course, in connection with any yarn winding device wherein the traverse of a reciprocating ring rail distributes the yarn windings on a yarn package.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

In a device for producing yarn packages wherein there are employed a rotatable spindle for carrying a yarn bobbin, a reciprocating ring rail for traversing yarn on to said bobbin, a rotatable shaft, a traverse arm fixed to the rotatable shaft, a rod carrying an adjustable counterweight fixed to said rotatable shaft, a lifter arm fixed to the rotatable shaft, a lifter rod connected to said lifter arm and to said ring rail for raising and lowering said ring rail, a rocker arm connected to said traverse arm by means of a traverse connecting strap, an arm for pivotally supporting said rocker arm, a slot in said supporting arm for initially adjusting the fulcrum point of said rocker arm with respect

to said supporting arm, a cam contacting said rocker arm for actuating said rocker arm to reciprocate said ring rail to produce a chaser motion with a traverse stroke of uniform length, means for rotating said traverse cam, a second cam, means connected to the second cam and to the means for rotating said traverse cam for rotating said second cam in timed relation to said traverse cam, a frame connected to said supporting arm within which said second cam is rotated, said frame being movable by said second cam, and bearings slidably supporting said frame and said supporting arm for movement back and forth in a straight line by said second cam to continuously shift the position of the fulcrum point of said rocker arm whereby a builder motion is superposed on the chaser motion by a progressive raising and lowering of the path of the uniform traverse stroke of said ring rail relative to the yarn bobbin.

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