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A. W. KEIGHT
YARN WINDING APPARATUS

2,630,976

Filed March 4, 1950

2 SHEETS—SHEET 1.

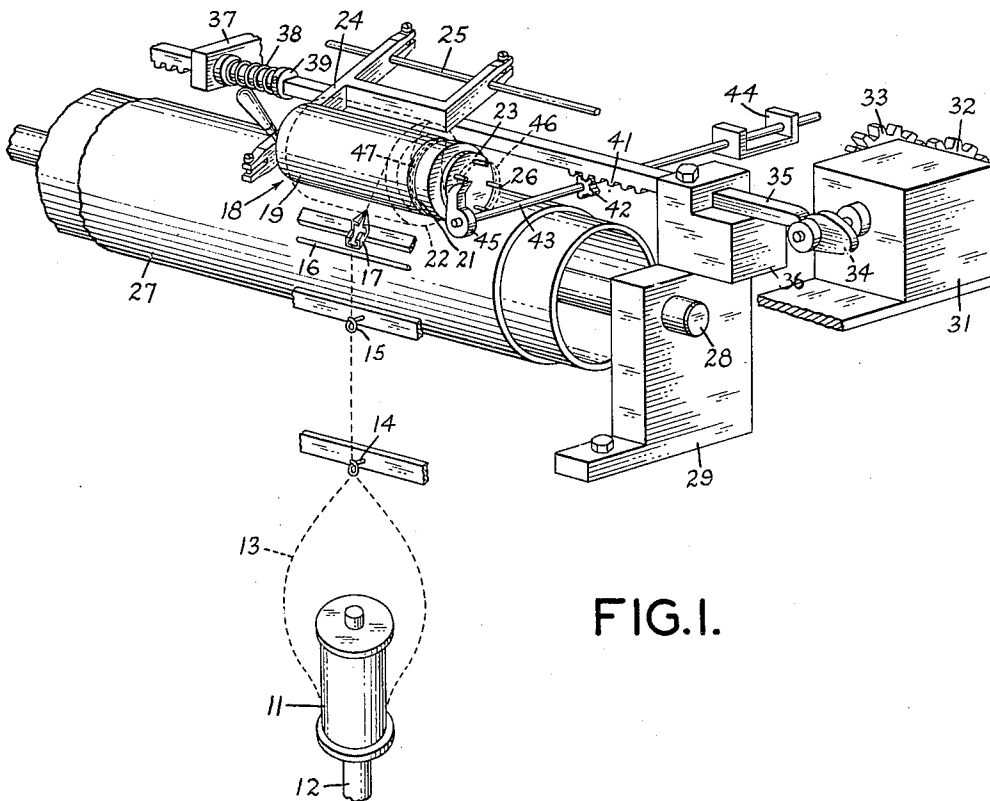


FIG. I.

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2 SHEETS--SHEET 2

FIG.2.

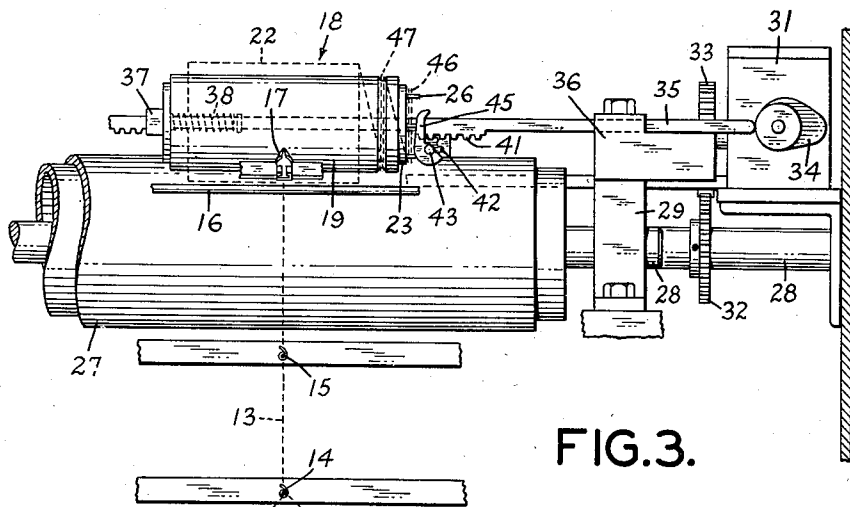
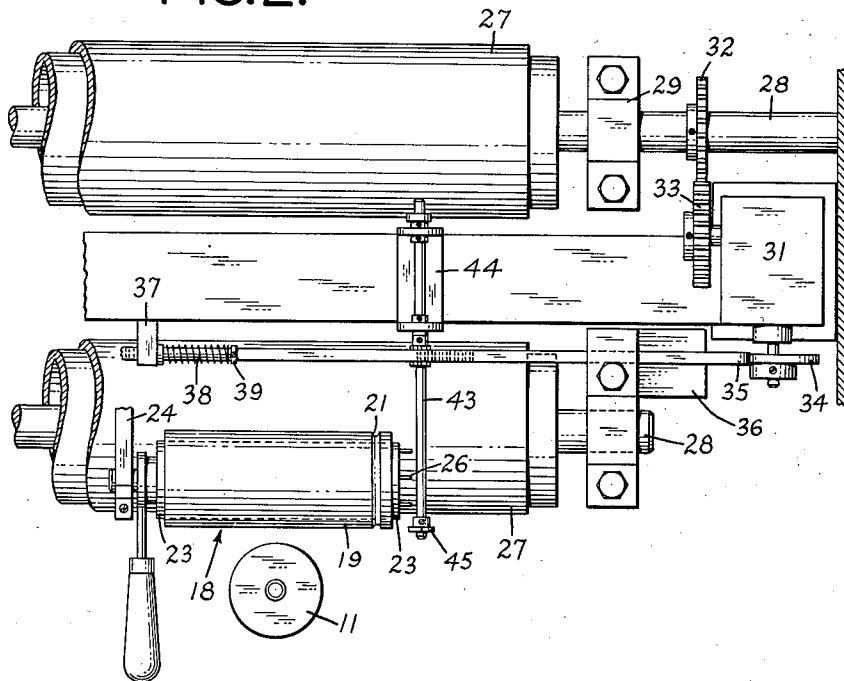
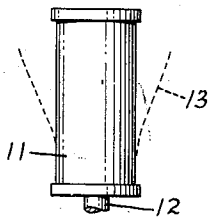


FIG.3.



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YARN WINDING APPARATUS

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8 Claims. (Cl. 242—18)

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This invention relates to yarn winding apparatus and relates more particularly to yarn winding apparatus for applying a transfer tail of twisted yarn to a yarn package.

Yarn packages are frequently produced by means of winding apparatus wherein the yarn is drawn from a supply package such as a bobbin, has a twist imparted thereto, and is taken up in the form of a package, such as a cheese, which may be provided with a transfer tail. Both the supply package and the take-up package may be rotated during the winding operation, the amount of twist introduced into the yarn depending upon the relative speed of said packages. To begin the winding of a take-up package, it has hitherto been the practice to stop the rotation of both the supply package and the mandrel carrying the take-up package, draw the yarn from the supply package and loop it around a support carried by the mandrel and start the rotation of the supply package and the mandrel substantially simultaneously. The first portion of the yarn that is taken up may be employed to form a transfer tail, following which the winding of the yarn package is carried out.

Heretofore, the end of yarn drawn from the supply package and looped around the support at the start of the winding operation and which formed the transfer tail has had no twist imparted thereto. Although normally this end of yarn is quite short its presence in the package is objectionable owing to the fact that it differs both in appearance and dyeing properties from the remainder of the yarn. As a result, when this end of yarn is woven, knitted or otherwise converted into a fabric it will show up as a fabric defect.

It is an important object of this invention to provide a yarn winding apparatus which will be free from the foregoing and other disadvantages of the apparatus previously employed for this purpose.

A further object of this invention is to provide a yarn winding apparatus which will produce a yarn package having a uniform twist in the ends of the yarn as well as in the yarn forming the body of the package.

Another object of this invention is to provide a yarn winding apparatus which will produce a yarn package having a transfer tail of twisted yarn.

Other objects of this invention, together with certain details of construction and combinations of parts, will be apparent from the following detailed description and claims.

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In accordance with my invention, I equip the mandrel of a winding machine with suitable means rotatable with the mandrel for taking up the yarn prior to the winding thereof on the yarn package. Preferably, this means for taking up the yarn comprises a plurality of pins fixed to said mandrel at a point spaced from the yarn package. At the commencement of the operation of winding yarn in the form of a package, a length of yarn is drawn from the supply package and looped about the pins. The mandrel and yarn supply package are then caused to rotate, the yarn being wound on the pins until the yarn being wound is having applied thereto a predetermined amount of twist. The yarn is then guided onto one end of the package and held at that point for a predetermined number of turns to be wound thereon whereby a transfer tail is formed, after which the yarn is guided onto the main body of the yarn package.

In order to guide the yarn onto the pins and onto the yarn package, the winding apparatus is provided with yarn guide means adapted to guide the yarn onto the pins and to be moved relative to the mandrel to guide the yarn from the pins to the desired positions on the yarn package to form first the transfer tail and then the yarn package itself.

A preferred embodiment of the present invention is shown in the accompanying drawings wherein:

Fig. 1 is a perspective view of the yarn winding apparatus with certain parts omitted in the interest of clarity,

Fig. 2 is a top elevational view of a portion of the yarn winding apparatus, and

Fig. 3 is a front elevational view of the portion of the yarn winding apparatus shown in Fig. 2.

Referring now to the drawings, the reference numeral 11 designates a bobbin mounted on a spindle 12 that is rotated by any suitable means equipped with a clutch and/or brake (not shown) in a manner well known in the art. Yarn 13 is drawn upwardly from the bobbin 11, passed through pigtails 14 and 15, across a bar 16 and is directed by a reciprocating guide 17 onto a yarn package, such as a cheese, indicated generally by reference numeral 18. The cheese 18 includes a tubular support 19 that is provided adjacent one end thereof with a groove 21, and carries a yarn winding 22 thereon.

A mandrel 23 engages the interior of the tubular support 19 and is mounted for free rotation on a bracket 24 that pivots about a rod 25. At its free end, the mandrel 23 is provided with a

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plurality of projecting pins 26 whose function will be fully set forth hereinafter. During operation, the cheese 18 rests against the surface of one of a pair of cork rolls 27 fastened to shafts 28 that are journaled in bearings 29 and are positively driven by any suitable means (not shown) in a manner well known in the art. In the interest of clarity, only the winding mechanism associated with one of the cork rolls 27 has been illustrated in the drawings. The frictional force between the yarn winding 22 and the cork roll 27 drives the cheese 18 at a constant peripheral speed thereby to draw the yarn 13 from the bobbin 11. By regulating the rotational speed at which the bobbin 11 is driven with respect to the speed at which the yarn 13 is drawn from the bobbin 11 any desired degree of twist may be imparted uniformly to the yarn 13.

Positioned adjacent the cork roll 27 is a gear reducer, indicated generally by reference numeral 31, which is driven from one of the shafts 28 through gears 32 and 33. The output of the gear reducer 31 drives a cam 34, which, on rotation, cause the reciprocation of a rod 35 slidably mounted in bearing blocks 36 and 37 and urged into contact with the cam 34 by means of a compression spring 38 positioned between the bearing block 37 and a collar 39 fastened to said rod. Secured to the undersurface of the rod 35 is a rack segment 41 which engages a pinion 42 fastened to a shaft 43 journaled in a U-shaped bracket 44 shown in Fig. 2. At its free end, the shaft 43 carries a finger 45 positioned adjacent the pins 26 and the end of the tubular support 19. As the rod 35 is reciprocated by the rotation of the cam 34, the finger 45 will be partially rotated in counter-clockwise direction past the pins 26 and past the end of the tubular support 19 and then in a clockwise direction back to its original position.

To begin the winding of a cheese 18, an empty tubular support 19 is positioned on the mandrel 23 and a yarn 13 is drawn from the bobbin 11 through the pigtails 14 and 15 and the end of the yarn 13 manually looped around the pins 26. The bobbin 11 is started and substantially simultaneously the bracket 24 is lowered so as to bring the tubular support 19 into contact with the surface of the rotating cork roll 27. The yarn 13 is then dropped over the finger 45 which guides the yarn 13 onto the pins 26 to form a winding 46. After all the untwisted yarn has been wound onto the pins 26, the rotation of the cam 34 causes a counterclockwise rotation of the finger 45 so as to guide the yarn onto the end of the tubular support 19 and place a transfer tail 47 of twisted yarn into the groove 21. The further counterclockwise rotation of the finger 45 permits the yarn 13 to slip off said finger and be picked up by the reciprocating guide 17. By proper design of the surface of the cam 34, it is possible to insure that all the untwisted yarn 13 will be wound on the pins 26 and that the proper number of turns will be placed in the transfer tail 47. When the yarn winding 22 is completed, the bobbin 11 is stopped and simultaneously the bracket 24 is raised to move the cheese 18 away from contact with the cork roll 27. The completed cheese 18 is then removed from the mandrel 23, the yarn on the pins 26 being discarded.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be

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made therein without departing from the spirit of my invention.

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

1. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating yarn guide, into package form on a support mounted on a rotatable mandrel, of a second yarn guide for guiding the yarn relative to said support and said mandrel, and means operatively connected to said yarn winding apparatus for moving said second yarn guide so as to cause the yarn to be led to predetermined positions, said means for moving said second yarn guide including a shaft for supporting the latter, a pinion fixed to said shaft and a reciprocating rack for moving said pinion and said shaft.

2. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating yarn guide, into package form on a support mounted on a rotatable mandrel, of means on the mandrel for receiving the yarn at the beginning of the winding operation, a second yarn guide for guiding the yarns to said yarn receiving means, and means operatively connected to said yarn winding apparatus for moving said second yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said yarn receiving means on said mandrel, said means for moving said second yarn guide including a shaft for supporting the latter, a pinion fixed to said shaft and a reciprocating rack for moving said pinion and said shaft.

3. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating yarn guide, into package form on a support mounted on a rotatable mandrel, of pins fixed to the end of the mandrel for receiving the yarn at the beginning of the winding operation, a second yarn guide for guiding the yarn onto said pins, and means operatively connected to said yarn winding apparatus for moving said second yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said means for moving said second yarn guide including a shaft for supporting the latter, a pinion fixed to said shaft and a reciprocating rack for moving said pinion and said shaft.

4. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating guide, into package form on a support mounted on a mandrel rotatable by frictional contact with a continuously rotating roll, of pins fixed to the end of said mandrel for receiving the yarn at the beginning of the winding operation, an oscillating yarn guide for guiding the yarn onto said pins, and means operatively connected to said continuously rotating roll for moving said oscillating yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said latter means including a shaft for supporting said oscillating yarn guide, a pinion fixed to said shaft and a reciprocating rack for moving said pinion and said shaft.

5. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating guide, into package form on a support mounted on a mandrel rotatable

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by frictional contact with a continuously rotating roll, of pins fixed to the end of said mandrel for receiving the yarn at the beginning of the winding operation, an oscillating yarn guide for guiding the yarn onto said pins, and means operatively connected to said continuously rotating roll for moving said oscillating yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said latter means including a shaft for supporting said oscillating yarn guide, a pinion fixed to said shaft, a reciprocating rack for angularly moving said pinion and said shaft, and a cam for causing said rack to reciprocate.

6. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating guide, into package form on a support mounted on a mandrel rotatable by frictional contact with a continuously rotating roll, of pins fixed to the end of said mandrel for receiving the yarn at the beginning of the winding operation, an oscillating yarn guide for guiding the yarn onto said pins, and means operatively connected to said continuously rotating roll for moving said oscillating yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said latter means including a shaft for supporting said oscillating yarn guide, a pinion fixed to said shaft, a reciprocating rack for angularly moving said pinion and said shaft, a cam for causing said rack to reciprocate, and means for rotating said cam at a predetermined speed.

7. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating guide, into package form on a support mounted on a mandrel rotatable by frictional contact with a continuously rotating roll, of pins fixed to the end of said mandrel for receiving the yarn at the beginning of the winding operation, an oscillating yarn guide for guiding the yarn onto said pins, and means operatively connected to said continuously rotating roll for moving said oscillating yarn guide

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so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said latter means including a shaft for supporting said oscillating yarn guide, a pinion fixed to said shaft, a reciprocating rack for angularly moving said pinion and said shaft, a cam for causing said rack to reciprocate, and means, including a speed reducer, for rotating said cam at a predetermined speed.

8. The combination with a yarn winding apparatus wherein yarn is wound, by means including a reciprocating guide, into package form on a support mounted on a mandrel rotatable by frictional contact with a continuously rotating roll, of pins fixed to the end of said mandrel for receiving the yarn at the beginning of the winding operation, an oscillating yarn guide for guiding the yarn onto said pins, and means operatively connected to said continuously rotating roll for moving said oscillating yarn guide so as to cause the yarn to be led to said support and to said reciprocating guide after a predetermined number of yarn windings have been placed on said pins, said latter means including a shaft for supporting said oscillating yarn guide, a pinion fixed to said shaft, a reciprocating rack for angularly moving said pinion and said shaft, a cam for causing said rack to reciprocate, and means, including a speed reducer operated from said continuously rotating roll, for rotating said cam at a predetermined speed.

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