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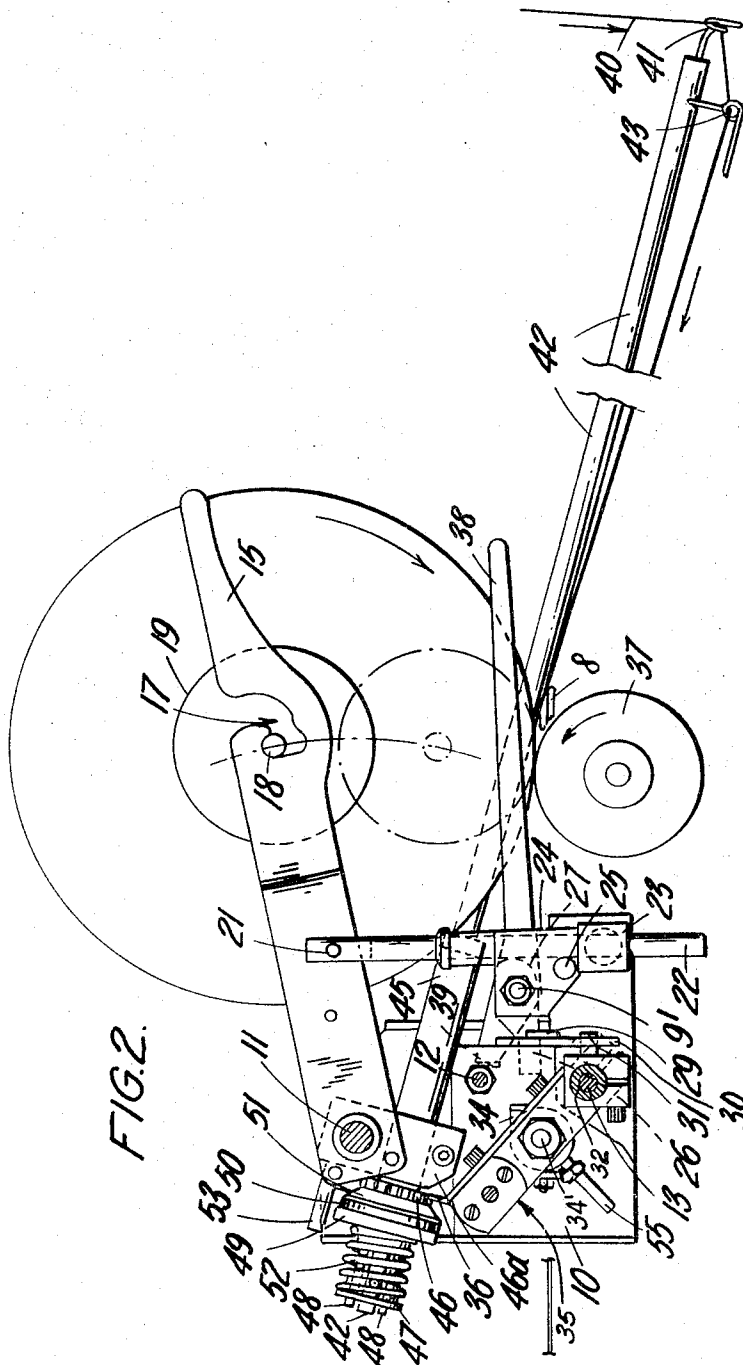
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FILAMENTARY MATERIAL ON TO A SUCCESSION OF BOBBINS

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3 Sheets-Sheet 2



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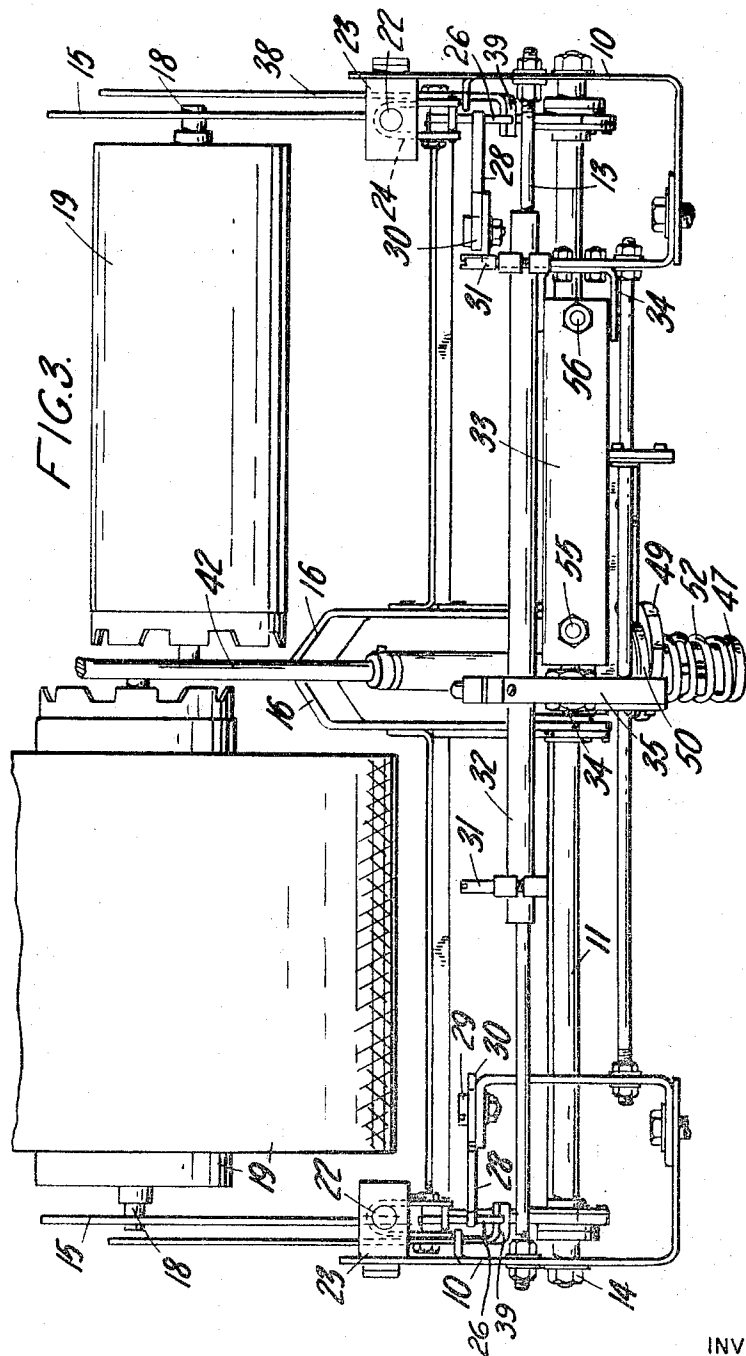
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APPARATUS FOR CONTINUOUSLY WINDING THREADS AND LIKE FILAMENTARY MAT- TERIAL ON TO A SUCCESSION OF BOBBINS

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14 Claims. (Cl. 242—18)

This invention relates to winding threads, wires and like filamentary material onto a succession of bobbins, which material is hereinafter referred to as yarn. The invention is particularly applicable to yarn formed of multi-filament synthetic material which has been crimped, for example, by false twisting.

According to one aspect of the present invention there is provided a winding apparatus for yarn comprising two spindles on which bobbins can be mounted, means for rotating said bobbins, yarn traversing mechanism which is arranged to lay the yarn backwards and forwards on either of the bobbins, conditioning means associated with the yarn traversing mechanism for moving the yarn from a position opposite a full bobbin to a position opposite an empty bobbin, and means associated with the empty bobbin for causing the yarn to cling or become anchored thereto when the yarn is moved from said position opposite the full bobbin to said position opposite the empty bobbin to enable the yarn to then be wound on the empty bobbin.

According to another aspect of the present invention there is provided a winding apparatus for yarn comprising two spindles on which bobbins are removably mounted, means for continuously rotating said bobbins, yarn traversing mechanism which may be conditioned to lay the yarn backwards and forwards on one or other of the bobbins, means for conditioning the yarn traversing mechanism whereby the yarn is moved from a position opposite a full bobbin to a position opposite an empty bobbin, and means associated with the empty bobbin for causing the yarn tooling or becoming anchored thereto with or without means for cutting the portion of the yarn extending between a full bobbin and the empty bobbin with which the yarn has become engaged.

The two spindles can be displaced apart longitudinally of one another. Preferably the axes of the spindles are parallel.

The said yarn traversing mechanism can comprise an elongated element extending substantially parallel with the longitudinally displaced spindles and carrying two spaced yarn guides and means for reciprocating said elongated element so that the yarn guides move respectively backwards and forwards along and opposite the two bobbins, each of which guides is of such a character that the yarn can be pulled out of it by displacing laterally the yarn travelling towards it and which lateral movement causes the yarn to be automatically picked up by the other guide; and conditioning means for imparting said lateral movement when one bobbin is full and which lateral movement causes the yarn when it leaves the guide to be pulled off the end of the bobbin towards the other bobbin where it is engaged by the means which cause it to cling to the bobbin, by which time or whereafter it is engaged by the other yarn guide.

The conditioning means for imparting said lateral movement to the yarn for disengaging it from one of the yarn guides can be either manually controlled, or automatically controlled by the growth of the yarn on the bobbin, or controlled by a timing mechanism.

The conditioning means for imparting said lateral movement to the yarn can comprise an eye or the like in permanent engagement with the yarn and means for displacing said eye so that it is disposed substantially opposite the center of the length of one or other of said bobbins. The arrangement can be such that considerable lateral movement is imparted to said eye when pulling the yarn out of one guide and causing it to be engaged by the other yarn guide, and such that during this lateral movement the eye is moved beyond the center of the empty bobbin and then back again to said center.

Each reciprocable yarn guide on said elongated element can be provided with a notch or groove which engages the yarn on its way to the bobbin, the path of movement of said eye being such that in addition to moving it laterally it also lifts the yarn out of said notch or groove and then into the path of movement of the other guide which is so shaped as automatically to engage its notch or groove with the yarn.

Said eye can be mounted on an arm extending transversely from a spindle which is mounted to oscillate about an axis transverse to the axes of rotation of the bobbins, and the arrangement is preferably such that the axis of this spindle is disposed substantially midway between the centers of the bobbins. The length of said arm and its extent of oscillation are so selected that the eye can be brought from the position opposite one bobbin to the position opposite the other bobbin, and means may be present for effecting said oscillation. This means for effecting said oscillation can comprise a pinion connected to said spindle and engageable by a rack, and a motor for reciprocating the rack.

The apparatus can be arranged to operate upon a number of yarns simultaneously and can have a number of means arranged to lead the yarns to the bobbins, each such means leading a yarn first to one of two bobbins and then to the other, each of which means comprising a said eye or the like through which the yarn is threaded, such apparatus having means for shifting each eye from a position opposite one bobbin of a pair of bobbins to a position opposite the other bobbin of the pair and means for connecting or controlling the various shifting means so that they operate simultaneously. Each eye can be mounted on an arm extending laterally from an oscillatable spindle, each of which spindles is oscillated by a motor, and there can be provided a single control for all the motors or a single motor can be arranged to actuate all the spindles.

A second yarn guide may be provided in permanent engagement with the yarn and through which the yarn passes on its way to the reciprocable yarn guide, which second yarn guide can be disposed symmetrically with respect to the two bobbins. The means for reciprocating the yarn guide may comprise two pulleys from which extend two stretches of flexible inextensible material disposed on opposite sides of the axes of rotation of the pulleys, and means for imparting oscillation to one of the pulleys and the other of which pulleys is arranged to rotate freely with respect to a shaft on which it is mounted.

Preferably the means for causing the yarn to cling or become anchored to one of the bobbins comprises a castellated ring arranged at that end of a bobbin which is disposed adjacent the end of the other bobbin. However, bristles, hooks or other projections may be incorporated for this purpose and may be similarly arranged.

Each bobbin can be mounted on a swinging structure and can be arranged by a driven friction roller so that as the yarn builds up on the bobbin this bobbin moves away from the axis of rotation of the friction roller whilst maintaining the contact between the bobbin (or more

correctly the package being formed on the bobbin) and the roller, and the conditioning means which conditions the yarn traversing mechanism can be arranged to move the swinging structure so as to bring a bobbin out of contact with the friction roller. A one way clutch can be provided which permits a swinging movement away from said friction roller due to the growth of the package of yarn on the bobbin, and hand control means can be adapted to free said clutch so that said swinging structure when supporting an empty bobbin can descend towards the friction roller. Said one way clutch and its controls can be so arranged that when released the swinging structure moves down a limited extent and is arrested by stop means, which stop means in their turn can eventually be released by the means which conditions to yarn traversing mechanism so that an empty bobbin can engage its driving roller.

Instead of the bobbin spindles being longitudinally disposed in relation to one another they may be disposed parallel with and opposite one another and spaced apart and said traversing mechanism for the yarn can be disposed between them, and means can be provided for deflecting the yarn from one bobbin to the other.

According to yet another aspect of the present invention there is provided a winding apparatus for yarn including a pair of bobbins, rotating means for rotating the bobbins, yarn traversing mechanism arranged to lay yarn backwards and forwards onto either bobbin, changeover means associated with the yarn traversing mechanism for causing said traversing mechanism to first feed the yarn onto one of the bobbins until it is full and then to feed the yarn onto the other bobbin, means for causing the yarn to cling to said empty bobbin as the yarn transfers from the full bobbin to the empty bobbin, supporting means for releasably supporting each bobbin, means for actuating said supporting means to move either bobbin out of driveable relationship with said rotating means, and co-ordinating means for co-ordinating the operation of said changeover means and said means for actuating said supporting means so that the empty bobbin can be held out of driveable relationship with said rotating means but is brought into said driveable relationship before the yarn transfers from the full bobbin to the empty bobbin and the full bobbin is brought out of driveable relationship with said rotating means when full.

The two bobbins can be spaced apart axially and said changeover mechanism can include an arm pivotal about an axis transverse to the axes of the bobbins, said arm having a yarn guide thereon through which the yarn is arranged to pass continuously in operation, said arm being pivotal between two positions so that said yarn guide is always disposed opposite the bobbin onto which the yarn is being wound and the transfer of the yarn from a full bobbin to an empty bobbin is effected by pivoting said arm from one position to the other.

Said changeover mechanism can include means for pivoting said arm and this means can be such that when actuated it pivots the arm through an angle greater than 180 degrees when passing from said one position to the other.

Said traversing mechanism can include two self-engaging yarn guides, one opposite each bobbin and arranged to reciprocate across that bobbin, and said arm can be arranged so that when it is pivoted during the transfer of the yarn from the full bobbin to the empty bobbin it lifts the yarn out of the self-engaging yarn guide opposite the full bobbin, causes the yarn to pass between the bobbins and engage said means for causing the yarn to cling to the empty bobbin, and then brings the yarn into the path of the self-engaging yarn guide opposite the empty bobbin.

Said arm can be mounted on a pivotal shaft which passes between the bobbins.

Each bobbin can comprise a cylindrical sleeve slidably mounted on a mandrel which has a cylindrical castellated ring at one end forming a continuation to said cylindrical sleeve, the castellated rings of two mandrels facing each other between the bobbins and forming said means for causing the yarn to cling to the empty bobbin.

By way of example, embodiments of the present invention will now be described with reference to the accompanying diagrammatic drawings in which:

FIGURE 1 is a front elevation of one form of winding mechanism showing a mounting for two bobbins and the mechanism for laying the yarn on one or other of the bobbins;

FIGURE 2 is a side elevation of the mechanism looking from the left of FIGURE 1 with some parts omitted to show more of the working parts; and

FIGURE 3 is an under plan view of the mechanism shown in FIGURE 1.

Referring to the embodiment shown in FIGURES 1 to 3, the main frame of the apparatus is built up from two brackets 10, which are secured together and spaced apart by an upper shaft 11, two intermediate tie rods one of which is shown at 12, and a lower shaft 13, threaded extremities of which shafts are engaged by nuts 14. Pivotaly mounted on the upper shaft 11 are two pairs of lever arms 15, 16, the two lever arms in each pair being cross braced by a structure (not shown). All the lever arms are slotted as indicated at 17 in FIGURE 2 to receive the ends of spindles 18 of bobbins 19. With this arrangement the spindles are arranged parallel to one another and displaced longitudinally with respect to each other. One end of each bobbin is provided with a castellated snare ring 20 and the bobbins are assembled on their supporting arms so that snare rings are arranged facing one another. The castellations of the snare rings preferably have such a configuration that as the snare rings rotate, the trailing edge of each castellation is sloped backwards, as shown in FIGURES 1 and 3.

The lever arms 15 are received in the forked extremities 21 of rods 22 which are slidable in bearings 23 fixed to the brackets 10. Reciprocally mounted on the rods 22 are U-shaped members 24 the limbs of which straddle the rods. Each rod 22 can slide up and down between the limbs of its associated U-shaped member 24. Each U-shaped member 24 has a collar 22a supported on its upper edge and through which each rod 22 can slide. Downward movement of each rod 22 is limited by engagement of the lever arm 15 with the corresponding collar 22a. Each rod is prevented from becoming detached from its U-shaped member by a pin 25 which engages holes in the limbs of the member to one side of the rod.

Pivotaly mounted at 9' between the limbs of each of the U-shaped members 24 is a lever arm 26 one end of which is formed with a cam face 27 one of which cam faces 27 is shown in FIGURE 2 and which cam faces are engageable with the rods 22.

When the left hand end of the lever arm 26 is in a lower position indicated by the dotted lines in FIGURE 2 the cam face 27 is free of the rod 22 and as the yarn builds up on one of the bobbins the pair of arms 15 and 16 of that bobbin swing upwardly carrying one of the rods with them which rod is free to slide in its bearing 23 and move through the associated U-shaped member 24 and collar 22a.

The lever arms 26 are arranged to be in the path of movement of arms 28 of bell crank levers pivotaly mounted at 29 on parts of the brackets 10. The other arms 30 of the bell crank levers are arranged in the path of movement of pins 31 mounted on a sleeve 32 slidable along the lower shaft 13.

The sleeve 32 is reciprocated by a double acting pneumatic motor, the cylinder 33 of which is attached by an angle piece 34 to a part of one of the brackets 10 and the motor piston rod 34' is secured to a cross member 35 which is slidable along the rods 12 and has fixed to it

sleeve 32 and a rack 36 the purpose of which is referred to later.

In FIGURES 1 and 2 the piston rod is shown in a retracted position which has brought the pin 31 on the right hand end of the sleeve 32 into engagement with the arm 30 of the right hand bell crank lever which has swung the bell crank lever 30, 28 anti-clockwise. In so doing the bell crank lever 30, 28 has caused lever arm 26 to move into its upper position (as shown in FIG. 2) inclining upwardly from its pivot at 9 causing the cam 27 to jam on the rod 22 and then carrying it and the U-shaped member upwardly. The upward movement of the rod 22 will have caused the right hand pair of lever arms 15 and 16 to swing upwardly lifting the then full bobbin 19 out of engagement with a driving roller indicated at 37 in FIGURE 2, but not shown in FIGURE 1.

The full bobbin is then replaced by an empty bobbin on the right hand arms 15 and 16, and FIGURE 1 shows such an empty bobbin.

The arms 15 and 16 and rod 22 may then be lowered under the action of gravity by releasing the jamming effect of the cam 27 on the rod. The nosepiece 39 is pushed down by an upward movement of lever 38. Inasmuch as lever 26, in its upper position, is in abutment with bell crank lever arm 28, lever arm 26 will actually pivot on the point of support to assume the lower position shown in FIG. 2, and cam face 27 will be rotated out of engagement with rod 22. There is a slight lifting of U-shaped member 24 during this operation. The rod 22, together with a pair of lever arms 15 and 14 will then fall until the lever arm 15 rests on the collar 22a. The lever 38 is then released, and as the U-shaped member 24 is still being held in its upper position by the associated bell crank lever 30, 28, the empty bobbin will be spaced away from its driving roller 37. When however, the pneumatic cylinder 33 is next energized the right hand pin 31 will be moved away from the arm 30 of the right hand bell crank lever allowing the U-shaped member 24 and collar 22a to descend together with the rod 22 and arms 15 and 16 to bring the empty bobbin into engagement with the driving roller. The left hand bell crank will have been swung clockwise resulting in the then full left hand bobbin being moved away from its driving roller. When the bobbin is rotating, yarn 40 is laid backwards and forwards along it by means of a reciprocating yarn guide 8 shown in FIGURE 1, and which is fixed to an inextensible metal tape 9 to which reciprocatory movement is imparted by means of a mechanism such as is described in British patent specification No. 885,473 in which the ends of the tape are wrapped around and secured to parts of pulleys which are oscillated by a suitable transmission, examples of which are shown and described in British patent specification No. 885,473. The yarn guide 8 is formed with tapered outer shoulders so as to be self catching with respect to the yarn.

The yarn 40 before passing to the yarn guide 8 passes through an eye 41 at the end of an oscillatory spindle 42 and then through another eye 43 at the end of an arm 44 secured to the oscillatory spindle 42. The spindle is mounted in a bearing tube 45 fixed in a block 46a which in its turn is fixed to shaft 11. Normally the spindle 42 and the arm 44 are stationary and in FIGURE 1 the eye 43 from which the yarn passes to the yarn guide 8 is disposed opposite approximately the center of the width of the left hand bobbin.

As best seen from FIGURE 2 the eye 43 is disposed at a lower level than the yarn guide 8.

When the left hand bobbin 19 is full the spindle 42 is oscillated to bring the arm 44 into the position shown in chain line in FIGURE 1 so that the eye 43 is then opposite the center of the right hand bobbin 19.

It will be noted however that the arm swings beyond the horizontal position thus moving the yarn beyond the center position and then back again to the center position. The arm could be made longer and its angular extent of

movement increased so as to accentuate this effect and so as to ensure that yarn is pulled out of the guide 8 opposite a full bobbin.

The required oscillatory movement is imparted to the spindle 42 by means of a pinion 46 which engages the aforesaid rack 36. The pinion is connected to the spindle 42 through a friction coupling comprising a head 47 fixed to the spindle and having fixed to it a number of pins 48 which are also secured to a stop disc 49. A friction ring 50 is disposed between the stop disc 49 and a part 51 fixed to the pinion 46. A compression spring 52 encircling the pins 48 is disposed between the head 47 and stop disc 49.

The stop disc 49 has an arcuate cut away portion on the periphery thereof across which extends a peg 53 fixed to the block 46a.

With this arrangement the ends of the arcuate cut away portion on the stop disc 49 limit the extent of oscillatory movement of the spindle 42 and also the positions of the eye 43 at the limits of the oscillatory movement of the spindle.

The friction coupling enables the spindle 42 to be oscillated by hand if required.

The double acting pneumatic motor 33 may be provided with a known form of reversing valve mechanism 54 to which opposite ends of the pneumatic cylinder are connected by pipes 55, 56 and with which reversing valve mechanism are associated supply and exhaust conduits 57 and 58.

The reversing valve mechanism is operated by the plunger 59 of a solenoid 60 which is connected to a source of electric supply 61 through a switch 62 which may either be actuated by a moving part 63 of a timing mechanism 64 such as a clock or synchronous electric motor or by movement of one or other of the bobbin carrier arms which move upwardly as the bobbin builds up, and which at a predetermined position operates the moving part of the switch 62. An over-riding hand control 65 may be provided for operating the switch. In the case where a number of pairs of bobbins are arranged along the length of a winding apparatus the one switch 62 may control the various solenoid actuated changeover valves for all the pneumatic motors whereby all the full bobbins are lifted simultaneously and all the eyes 43 shift the yarn from each full bobbin to a position opposite each empty bobbin.

Alternatively the reciprocable sleeves 32 associated with the various pairs of bobbins and the rack 36 may be actuated by a single pneumatic motor having changeover valve mechanism controlled by a single time controlled solenoid.

The sequence of operations is as follows:

When a bobbin builds up to a predetermined size the solenoid 60 is energized and the change-over valve mechanism 54 causes the piston rod 34 of the pneumatic motor to move in a required direction.

As the piston rod 34 commences to move it moves crosspiece 35 and thus the sleeve 32 and in so doing the bell crank lever associated with the empty bobbin is immediately released by its peg 31 so allowing the empty roller to drop into engagement with its driving roller 37. At the same time the piston rod 34 causes the rack 36 which is fixed to crosspiece 35 to move and rotate the pinion 46 to cause the arm 44 on the spindle to swing upwardly whereby the yarn is moved upwardly out of the yarn guide 8 and then from the full bobbin towards the empty bobbin.

The arrangement is such that the empty bobbin has already engaged and is being rotated by its drive roller 37 before the yarn reaches the empty bobbin.

After the yarn has been drawn across the lower surface of the full bobbin, the yarn moves upwards as it is drawn towards the empty bobbin. As the yarn moves upwards and across the space between the two bobbins it is caught up by one or more of the castellations of the

snare ring 20 of the empty bobbin and as this empty bobbin rotates it causes the yarn to be anchored on said castellation or castellations. Whilst the yarn is so anchored on the snare ring of the empty bobbin, the yarn starts to wind on this bobbin and the appropriate yarn guide 8 picks up the yarn and commences laying it backwards and forwards across this bobbin and a new package starts to build up. It is only necessary for the yarn to remain anchored to the snare ring 20 of the empty bobbin for the first few revolutions of this for the new package to start forming satisfactorily. During these first few revolutions the yarn stretching between the full and empty bobbins will probably also be caught up on the castellations of the snare ring 20 of the full bobbin and will be snapped between the full bobbin and the package just starting to build up on the empty bobbin. This snapping of the yarn can be caused by the difference in speed of the snare rings 20 on the two bobbins or by the stretch of yarn between the two snare rings becoming entangled around the ends of one of the spindles 18 or one of the stationary parts between the two bobbins. It is important that when the yarn is changing over from a full bobbin to an empty bobbin that it should be anchored on the snare ring of the empty bobbin for at least the first few turns of this so that a new package can start to build up on the empty bobbin.

By this time the peg 31 associated with the full bobbin will have engaged the arm 30 of the bell crank lever associated with the full bobbin and will have lifted the full bobbin out of contact with its driving roller 37, and if the thread has not already been broken, the reduction in speed of the full bobbin will then cause the yarn to be broken.

The full bobbin is then removed from between the supporting arms 15, 16 and an empty bobbin placed in position. This can be effected any time during the winding of the other bobbin. The operator can at any time actuate the lever 38 causing the empty bobbin to fall towards but clear of the driving roller 37 and as described earlier, when the timing mechanism next operates, the appropriate bell crank lever is released by the pneumatic motor and the empty bobbin engages its driving roller.

It will be appreciated that the foregoing illustrated embodiments can be modified in many ways within the scope of the present invention.

For example, the castellations on the snare rings 20 could be few in number and could also be replaced by one or more other types of anchoring projections such as hooks.

Also, if desired, cutting means, for example a knife, could be disposed between a pair of bobbins to positively sever the yarn between a full bobbin and an empty bobbin at the appropriate time.

A further modification is that the driving rollers 37 for adjacent bobbins can be formed by one roller.

In the embodiment shown in FIGURES 1 to 3 there can be a plurality of pairs of bobbins disposed side by side along the tape 9 and all these bobbins can be driven by a long single roller 37: further, there can be a second belt parallel to the belt 9 and a further set of bobbins duplicated along this second belt, similar to the general arrangement of the bobbins in FIGURE 4. With this arrangement the change-over mechanism for each pair of bobbins can be arranged to be actuated at the same instant.

The winding apparatus of the present invention is particularly useful for forming packages of synthetic multifilament yarn, for example nylon, which has just been crimped, for example by a false twisting process.

The present invention is also particularly useful with non-flanged bobbins, which can be cylindrical or frustoconical. In the illustrated embodiments the bobbins 19 can be formed by cylindrical sleeves, such as cardboard cylinders. Each sleeve is slidably fit on a shaft or man-

drel formed with the spindles 18 and a snare ring 20. With this arrangement, after a bobbin has been fully wound and removed from the winding apparatus, the cylindrical sleeve on which the wound package is formed can be slid off the mandrel, a new cylindrical sleeve can be slid on the mandrel, and the empty bobbin can then be placed on the winding apparatus.

We claim:

1. A winding apparatus for yarn including a pair of bobbins, rotating means for rotating the bobbins, yarn traversing means for laying yarn backwards and forwards onto either bobbin, change-over means associated with the yarn traversing means for first feeding the yarn onto one of the bobbins until it is full and then feeding the yarn onto the other bobbin, means for anchoring the yarn to said other bobbin as the yarn transfers from the full bobbin to said other bobbin, supporting means for releasably supporting each bobbin, means for actuating said supporting means for moving either bobbin out of driveable relationship with said rotating means, and co-ordinating means for sequentially operating both said change-over means and said means for actuating said supporting means, said co-ordinating means including means for holding said other bobbin out of driveable relationship with said rotating means and for bringing the same into said driveable relationship when the yarn is transferred from said one bobbin to said other bobbin and for bringing said one bobbin out of driveable relationship with said rotating means when said one bobbin is full.

2. A winding apparatus as claimed in claim 1 in which the two bobbins are spaced apart axially and said change-over mechanism includes an arm pivotable about an axis transverse to the axes of the bobbins, said arm having a yarn guide thereon through which the yarn is arranged to pass continuously, said arm being pivotal between two positions opposite said one and said other bobbins onto whichever the yarn is being wound, said arm and said guide comprising means for transferring the yarn from a full bobbin to an empty bobbin.

3. A winding apparatus as claimed in claim 2 in which said change-over mechanism includes means for pivoting said arm through an angle greater than 180 degrees when passing from one said position to the other.

4. A winding apparatus as claimed in claim 2 in which said arm is mounted on a pivotal shaft which passes substantially along planes between said bobbins.

5. A winding apparatus as claimed in claim 1 in which each bobbin comprises a cylindrical sleeve slidably mounted on a mandrel which has a cylindrical castellated ring at one end forming a continuation to said cylindrical sleeve, the castellated rings of the two mandrels facing each other between the bobbins and forming means for anchoring the yarn to the empty bobbin.

6. A winding apparatus for yarn including first and second axially spaced apart bobbins, rotating means for rotating said bobbins, yarn traversing guide means for laying the yarn backwards and forward onto the bobbins, change-over means for transferring feeding of the yarn from the first bobbin to the second bobbin, means for anchoring the yarn to the second bobbin as the feeding of the yarn is transferred from the first bobbin to the second bobbin, support means releasably supporting said first and second bobbins, actuating means for actuating the support means to move the first bobbin out of driveable relationship with the rotating means, and co-ordinating means for sequentially operating both the change-over means and the actuating means.

7. The winding apparatus of claim 6, in which the change-over means comprises an arm having a yarn guide thereon through which the yarn is arranged to pass continuously, which arm is pivotable about an axis transverse to the axis of the bobbins to move the yarn guide between a position opposite the first bobbin and a position opposite the second bobbin.

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8. The winding apparatus of claim 6, wherein the means for anchoring the yarn comprises a castellated ring at an end of said second bobbin nearest said first bobbin.

9. A winding apparatus for yarn including first and second axially spaced apart bobbins; mounting means for removably mounting said bobbins; means for rotating said bobbins; first and second yarn traversing means for laying the yarn backwards and forwards onto said first and second bobbins respectively; change-over means for transferring feeding of the yarn from the first to the second bobbin comprising an arm pivoted about an axis which is transverse to the axis of the bobbins; a yarn guide through which the yarn is arranged to pass continuously, said yarn guide being on said arm and spaced a predetermined distance from the pivotal axis thereof; means for moving said arm and said guide about said pivotal axis through an arcuate path with said guide passing between a position opposite said first bobbin to a position opposite said second bobbin; said arm and said yarn guide thereon, when moved about said pivotal axis, constituting the sole means for first lifting said yarn out of said first yarn traversing means and then placing the yarn in the path of said second traversing means.

10. The winding apparatus of claim 9, including means associated with said second bobbin for anchoring the yarn to the second bobbin when the feeding of the yarn is transferred to the second bobbin.

11. The winding apparatus of claim 10, wherein said means for anchoring said yarn comprises a castellated ring at an end of said second bobbin nearest said first bobbin.

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12. The winding apparatus of claim 9, wherein said means for moving said arm comprises a spindle mounted to oscillate about said pivotal axis, a pinion connected to said spindle and a rack mounted adjacent said spindle engageable with said pinion, and motor means for reciprocating the rack.

13. The winding apparatus of claim 9, wherein each bobbin is mounted on a pivoted mounting means and said means for rotating said bobbins comprises driven friction roller means engageable with said bobbins, said pivoted supporting means moving away from the axis of rotation of said friction roller means as the yarn builds up on a respective bobbin.

14. The winding apparatus of claim 13, wherein said pivoted mounting means are each supported by a respective one way clutch.

References Cited

UNITED STATES PATENTS

2,214,332	9/1940	Kline.	
2,296,339	9/1942	Daniels	242—19
2,524,623	10/1950	Colombu.	
2,600,841	6/1952	Bruestle	242—19
2,663,507	12/1953	Soussloff	242—18
2,779,545	1/1957	Hauck et al.	242—25

FOREIGN PATENTS

974,536	4/1961	Germany.
822,602	10/1959	Great Britain.

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