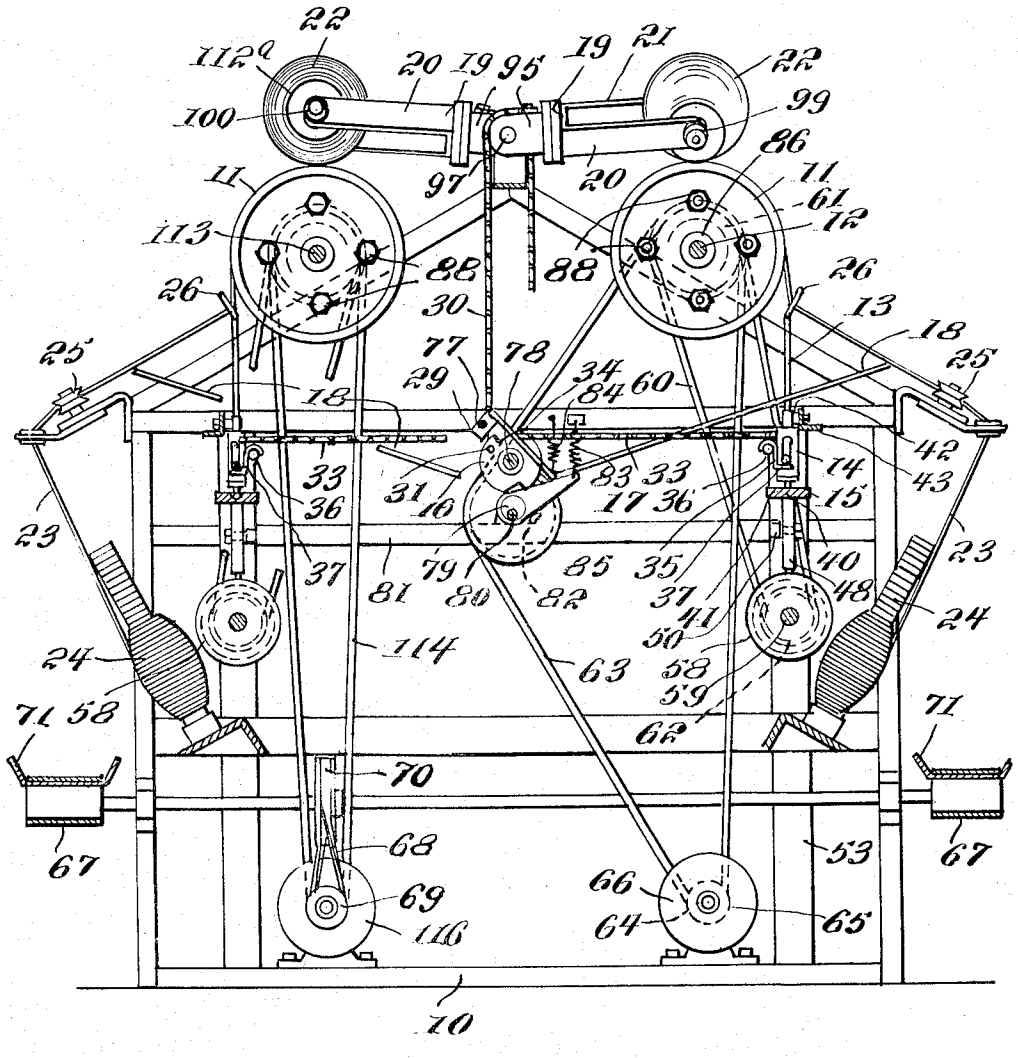
Dec. 29, 1953 T. L. WRIGHT 2,664,249

YARN CONE AND TUBE WINDER

Filed April 23, 1952 5 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

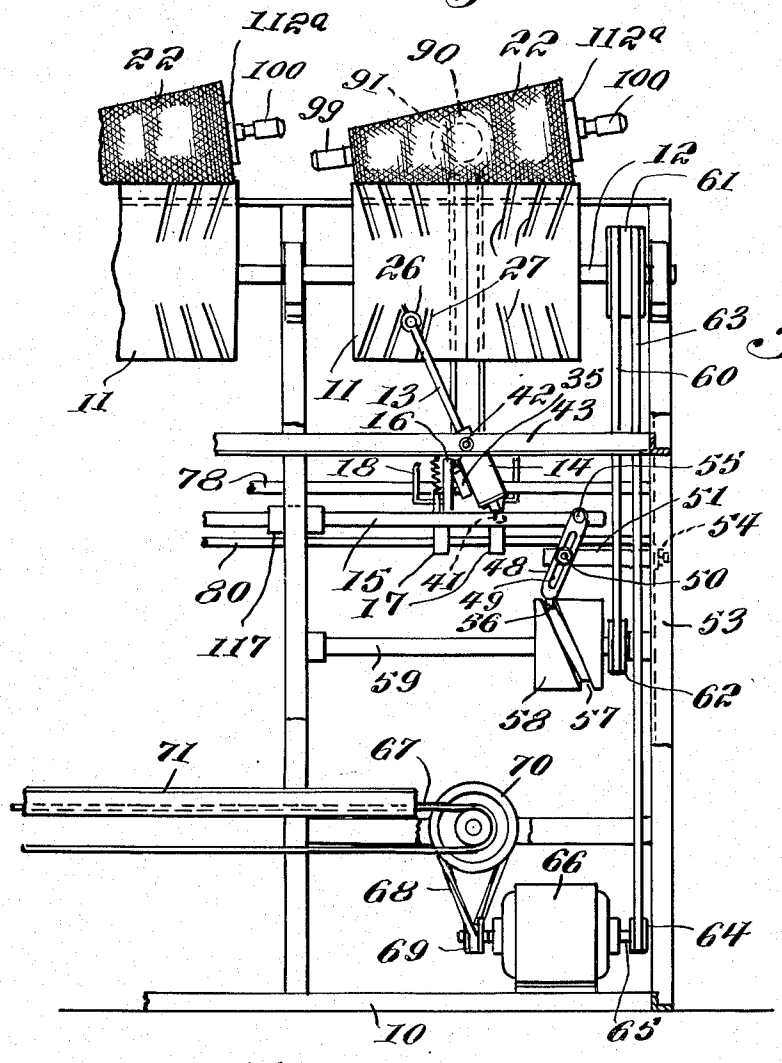


Fig. 3.

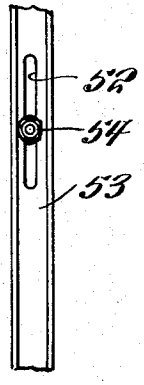
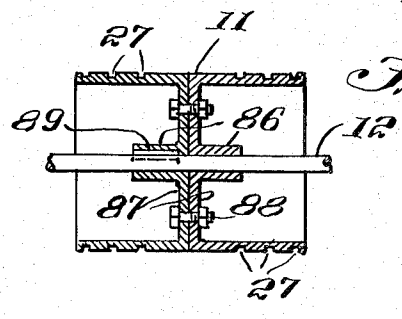


Fig. 4.



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Fig. 5.

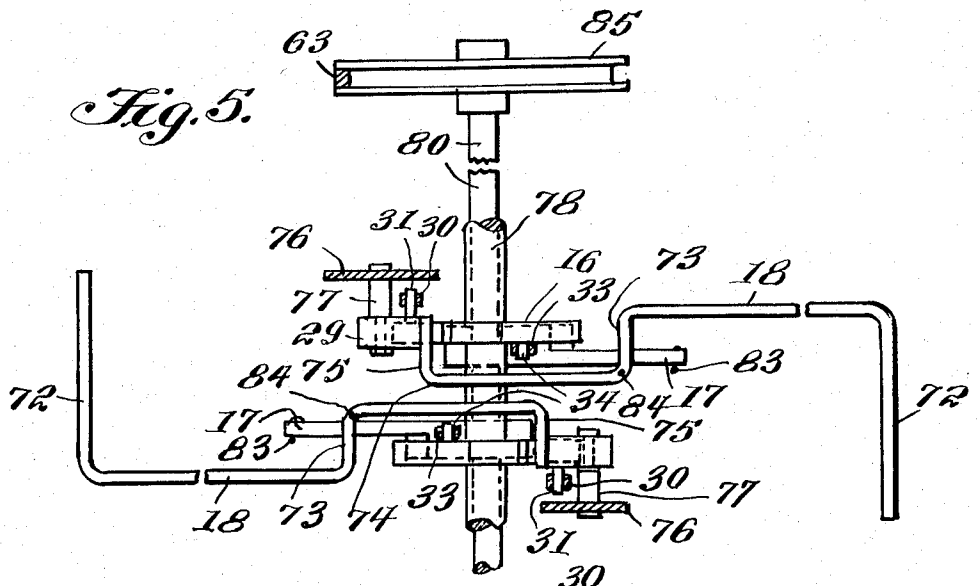
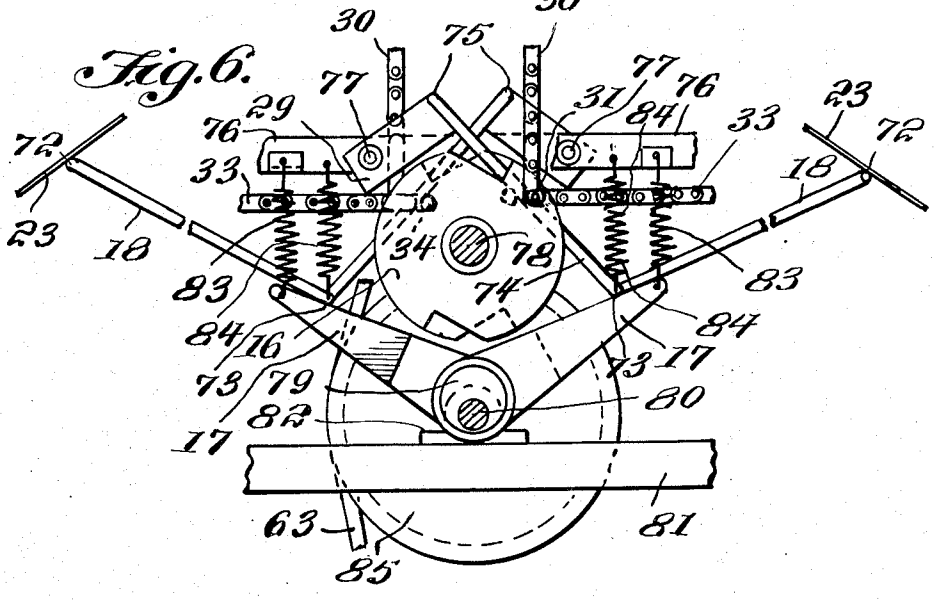


Fig. 6.

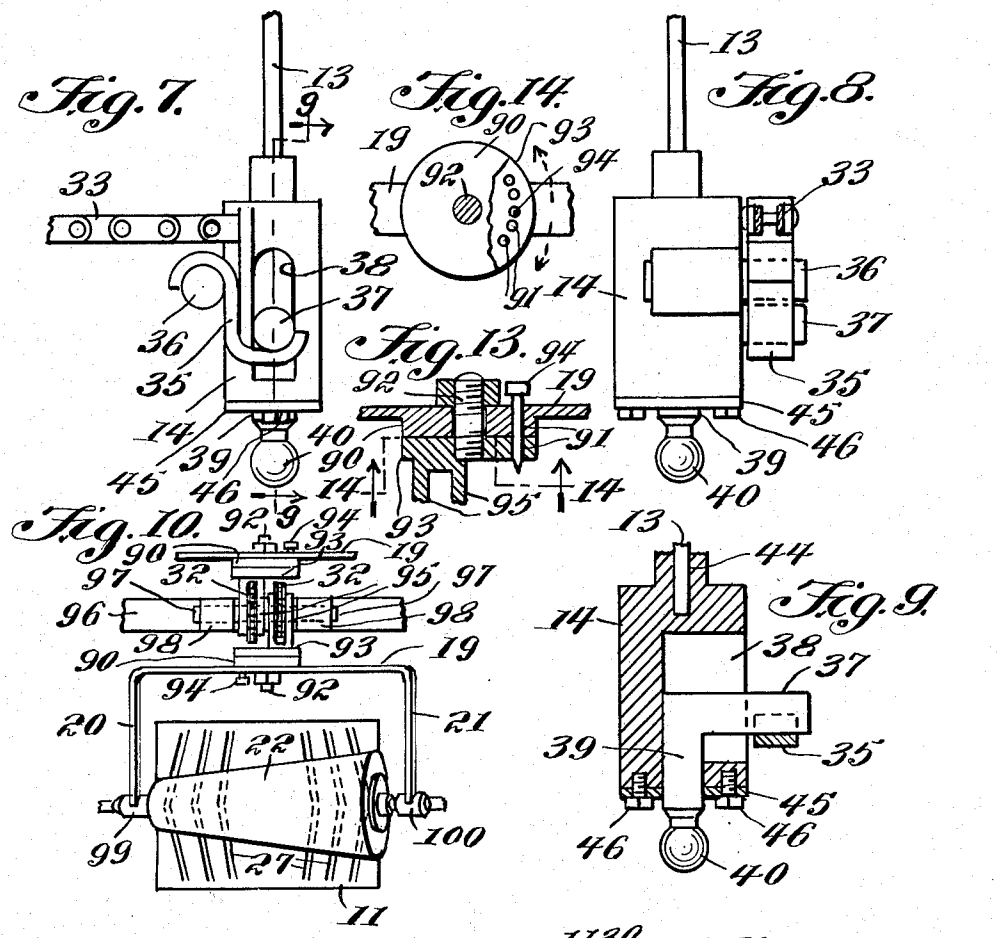


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YARN CONE AND TUBE WINDER

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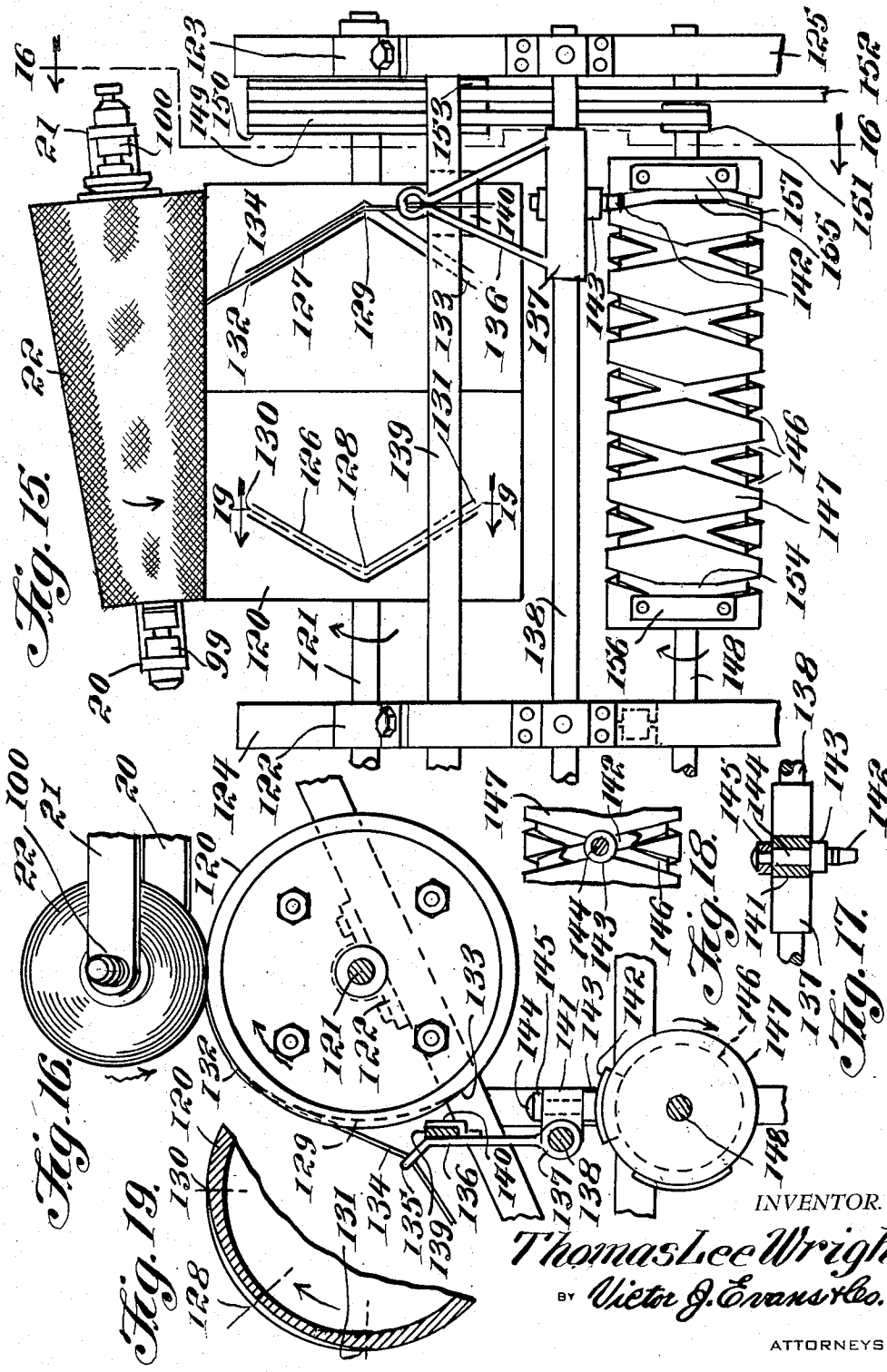


Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.

Fig. 19.

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YARN CONE AND TUBE WINDER

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Application April 23, 1952, Serial No. 283,831

6 Claims. (Cl. 242—43)

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This invention relates to winding machines for winding yarn with what is commonly referred to as the open wind or Foster wind on cores of cones, tubes and the like and where the cone or tube produced by the machine is known as a package, and in particular a yarn winder that winds yarn evenly with the yarn tight at the ends and also throughout the intermediate portions of the cones or tubes.

The combination of the continuously traveling yarn guide on the traverse with large cylinders, and with the tubes and cones driven by surface contact with the cylinders makes it possible to wind, at high speeds, the same number of yards of yarn per minute continuously and eliminate building up or ribboning.

In winding yarn with conventional winders the speed of winding is limited to a safe operating speed of the traverse and yarn guide, operated by the traverse; as in reversing the direction of travel of the guide it is necessary for the guide to stop and start back in the opposite direction.

The quantity of yarn wound by machines of this type is, therefore, controlled by the operation of the traverse. The yarn is fed from the yarn guide to tubes and cones over a cylinder, and with the surface of the cylinder contacting the peripheral surface of a cone or tube, the surface speed of the cone or tube corresponds with that of the cylinder.

Increasing the diameter of the yarn feeding cylinder, therefore, makes it possible to speed up yarn winders for this use whereby the quantity of yarn wound on a winder is increased from that of conventional winders.

In addition to speeding up the quantity of yarn wound per day the large feeding cylinder in combination with the yarn guide and traverse wherein the yarn guide is actuated by the traverse makes it possible to obtain an even tight wind with all spongy portions, particularly at the ends, eliminated and with the breaking of the yarn reduced to a minimum.

The purpose of this invention is to improve yarn winding machines and provide a machine which winds the yarn with a smooth easy pull on the yarn whereby maximum tension may be used and wherein cones or tubes formed on the machine are firm throughout the intermediate parts and also at the ends thereof.

With the conventional method of winding yarn to form cones and tubes, the yarn winds tight or firm at the center or through the intermediate part of the cone or tube, however, owing to the reverse action at the ends the ends are soft or

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spongy and this makes it difficult to feed the yarn evenly from the spools, cones, or tubes on unwinding.

With this thought in mind this invention contemplates a winder including the combination of grooved cylinders and a traverse, in which the traverse is provided with a traveling thread guide which carries the yarn and lets the yarn fall into grooves at each of the ends of the cylinders in each revolution of the cylinders whereby the length and size of the package is substantially unlimited.

The object of this machine is, therefore, to provide means for maintaining constant and maximum tension on yarn being wound on cones and tubes whereby the cones and tubes are tight and firm throughout the length thereof.

Another important object of the invention is to increase the diameter of the yarn feeding cylinders of winding machines whereby the surface speed of the cylinder is increased while the yarn guide actuated by the double thread or level wind of the traverse operates at a comparatively low speed.

Another object of the invention is to provide a yarn winding machine in which means is provided for stopping the operation of the machine as the yarn breaks.

Another object of the invention is to provide an improved yarn winding machine wherein finished cones or tubes are automatically elevated when completed.

A further object of the invention is to provide an improved machine for winding cones, tubes, and the like with the cones, tubes and the like firm throughout the length thereof, in which the machine is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a frame having a traverse cylinder shaft journaled therein, a plurality of cone and tube carrying spindles journaled in arms and positioned whereby cones and tubes formed thereon are aligned with and contact the surfaces of the traverse cylinders and means for rotating the parts and elevating the spindles when a strand of yarn breaks and also as the cones or tubes are filled.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings, wherein:

Figure 1 is an end elevational view illustrating a double unit wherein cone and tube spindles are positioned to coact with traverse cylinders journaled on a frame.

Figure 2 is a front elevational view showing

one end of the machine and illustrating the operating and adjusting elements of the traverse arms thereof.

Figure 3 is a detail showing a vertical frame member with a slot therein whereby the stroke of the reciprocating elements actuating the traverse arms is adjustable.

Figure 4 is a detail showing a longitudinal section through one of the grooved cylinders corresponding to the traverse cylinders of the conventional machines.

Figure 5 is a plan view on an enlarged scale of the ratchet assembly whereby a unit of the machine is cut out when the yarn breaks or when a cone or tube is filled.

Figure 6 is an end elevational view of the assembly shown in Fig. 5 also showing the parts on an enlarged scale.

Figure 7 is a detail showing the base of the traverse arms and showing a chain extended from the base by which the traverse arm is released from the reciprocating bar of the machine.

Figure 8 is a rear elevational view of the traverse arm base shown in Fig. 7.

Figure 9 is a vertical section through the traverse arm base taken on line 9—9 of Fig. 7.

Figure 10 is a detail illustrating the mounting of a cone above a grooved cylinder and illustrating means for adjusting the angle of the cone carrier arm.

Figure 11 is a detail showing a bearing on the end of one of the cone carrying arms with parts broken away and shown in section.

Figure 12 is a similar view showing the spring actuated clamp on one of the cone carrying arms for retaining a cone in operative position above the grooved cylinder.

Figure 13 is a detail showing a cross section through the tube or cone holding yoke mounting showing a pin for retaining the yoke in adjusted positions.

Figure 14 is a detail taken on line 14—14 of Fig. 13 illustrating a series of openings for receiving the pin shown in Fig. 13 for holding the yoke in adjusted positions.

Figure 15 is a front elevational view, similar to that shown in Fig. 2, illustrating a modification wherein the thread is fed to the cylinder with a thread guide actuated by a traverse having a double thread.

Figure 16 is a cross section taken on line 16—16 of Fig. 15 showing the traverse mounting.

Figure 17 is a detail illustrating a follower with which the thread guide is actuated by the traverse.

Figure 18 is a detail illustrating the follower shown in Fig. 17 on the traverse.

Figure 19 is a detail showing a section through part of the cylinder with which the thread is fed to cones and tubes and showing the thread return groove that is provided at each end of the cylinder.

Referring now to the drawings wherein like reference characters denote corresponding parts the improved cone and tube winder of this invention includes a frame, generally indicated by the numeral 10, a traverse or grooved cylinder 11 mounted on a shaft 12, a traverse arm 13 having a base 14 and reciprocated by a bar 15, a ratchet 16 which is actuated by a pawl 17, the movement of which is controlled by a yarn engaging lever 18, and a yoke 19 in the end of arms 20 and 21 of which cones or tubes, as indicated by the numeral 22 are held for winding.

Yarn, as indicated by the numeral 23 is fed

from a bobbin 24 through a tension 25 from which the yarn passes through an eye 26 on the end of the traverse arm 13 to grooves 27 of the cylinder 11 and from the cylinder the yarn is fed back and forth across the surface of a core 28 which is freely held in the yoke 19.

Should the yarn break, the lever 18 moves upwardly allowing the pawl 17 to engage the ratchet 16, causing the ratchet to rotate counterclockwise to a point where an end 29 of the lever 18 engages the teeth of the ratchet 16, locking the ratchet.

With the ratchet 16 turning counterclockwise a chain 30, attached to the ratchet at the point 31 and trained over a sprocket 32 on the yoke 19, turns the sprocket whereby a cone or tube in the arms of the yoke is moved upwardly away from the surface of the cylinder so that rotation of the cone or tube ceases.

In the same movement a chain 33, attached to the ratchet 16 at the point 34 at one end and to a lever 35, at the other, actuates the lever 35 about a pivot 36, as illustrated in Figs. 7, 8 and 9 so that a pin 37, extended through a slot 38 in the base 14 of the traverse arm 13 moves the pin 37 with the bar 39 from which the pin extends upwardly whereby a ball 40 on the lower end of the bar 39 is moved upwardly out of a socket 41 in the bar 15 so that movement of the traverse arm ceases. The traverse arm 13 is pivotally mounted by a pin 42 in a bar 43.

The traverse arm 13 is frictionally held in a socket 44 of the base 14 and the lower end of the base is provided with a plate 45 that is secured to the base with screws 46.

Upon rethreading the winder the lever 18 is drawn downwardly and retained in this position with the yarn which extends through the eye 26 and over the surface of the cylinder 11 to the core 28.

The chain 30 is also connected to the yoke 19 in such a manner that as a cone or tube builds up in the yoke the upward movement of the outer ends of the arms 20 and 21 also actuates the ratchet 16, and this movement of the ratchet also withdraws the ball 40 from the socket 41 thereby stopping the movement of the traverse arm 13.

The reciprocating movement of the traverse arm 13 is obtained by a lever 48 having a slot 49 therein and, as illustrated in Fig. 2, the lever 48 is pivotally mounted on a pin 50 on the end of a support 51. The support 51 is mounted in a slot 52 in a vertical channel shaped member 53 of the frame with a bolt 54 whereby the stroke is adjustable to correspond with the length of a cone or tube being formed. The upper end of the lever 48 is pivotally connected to the bar 15 with a pin 55 and a ball 56 on the lower end extends into a spiral groove 57 in the surface of a cylinder 58 and it will be noted that by moving the support 51 vertically the length of travel of the upper end of the lever 48 is adjusted.

The cylinder 58 is mounted on a shaft 59 and the shaft is rotated by a belt or chain 60 which is trained over pulleys 61 and 62. The pulley 61 is mounted on the shaft 12 and a belt 63, which is also trained over the pulley 61 extends from a motor pulley 64 on a shaft 65 of a motor 66.

A motor 116 drives a belt conveyor 67 with a belt 68 and pulleys 69 and 70 and, as illustrated in Fig. 2, the belt extends through a trough 71 whereby cones, tubes, cores, and other parts may be conveyed to and from the machine.

As illustrated in Figs. 5 and 6 the traverse levers 18 are formed with extended ends 72 that are positioned to be engaged by the yarn 23, as shown in Fig. 1, and the opposite ends of the levers are provided with offset sections 73 that engage the pawls 17 which operate the ratchet 16. From the offset sections 73 of the levers 18 the levers are provided with sections 74 that extend from bases 75 through which the levers are pivotally mounted on a tranverse member 76 of the frame of the machine by pins 77. The pins 77 are positioned in flat sections or bases 29 from which the sections 75 extend.

The ratchets 16 are mounted on a shaft 78 and the pawls 17 are mounted by eccentrics 79 on a shaft 80 which is journaled on transverse members 81 of the frame by bearings 82.

The pawls 17 are resiliently held upwardly by springs 83 and similar springs 84 urge the levers 18 upwardly against the yarn.

The shaft 80 is also provided with a pulley or sprocket 85 over which the chain or belt 63 is trained whereby the shaft 80 is rotated by the motor 66.

The traverse or grooved cylinders 11 are formed, as illustrated in Fig. 4 with complementary sections and the sections are provided with hubs 86 on transversely disposed webs 87 and bolts 88 extend through the webs for securing the sections together. One of the hubs is provided with a key 89 by which the cylinders are keyed to the shaft 12.

As illustrated in Fig. 2 the cylinders are provided with pairs of grooves 27 and the grooves are positioned to correspond with the cones or tubes of different lengths, the pitch of the grooves being such that a groove extended from a point or vertex at the meeting point of sections of the groove leads yarn into a groove extended from a corresponding point at the opposite end of the cylinder. By this means the yarn is then fed continuously back and forth across a cone or tube as may be desired.

The yokes 19 in which the tubes or cones are held are provided with hubs 90 which are provided with radially disposed openings 91, as shown in dotted lines in Fig. 2, and the hubs are mounted on studs 92 which extend from plates 93 that are provided with registering openings whereby the arms of the yoke may be set at different angles to correspond with the angle of a cone to be formed. The yokes are retained in adjusted positions by pins 94 that extend through the openings in the hubs and plates. The plates 93 are provided with extended arms 95 between which the sprockets 32 are positioned and the arms are pivotally mounted on a bar 96 of the frame by shafts 97 which are journaled in bearings 98.

The extended ends of the arms 20 and 21 of the yoke 19 are provided with cylindrical hubs 99 and 100, respectively and, as illustrated in Fig. 12, a frustro-conical shaped head 101 extended from the hub 100 may be manually withdrawn by a disc 102 extended from the opposite end of the hub when it is desired to remove and replace a cone or tube.

A similar head 103 is journaled on the end of the hub 99 with a ball bearing 104 that is mounted in the head and positioned on a stud 105 extended from the end of the cylindrical hub. The head 101 is also journaled on a shaft 106 through a ball bearing 107 that is mounted on a stud 108 extended from the shaft. The opposite end of the shaft is provided with a section 109 of reduced diameter and the disc 102 is positioned on the end of the reduced section or stem 109. A spring 110 is positioned around the shaft and with one end of the spring seated against a stationary head 111 in the end of the hub and the other against a pin 112 extended through the shaft 106, the shaft is resiliently urged longitudinally with the head 101 extended into and in frictional contact with a collar 112a having a set screw 113e therein, in the large end of a cone. By this means cores of tubes or cones are removably mounted in the yoke 19 and cones or tubes formed on the cores may be removed as they are completed and replaced with conical or frustro-conical shaped core members.

In the machine illustrated in Fig. 1, the parts are assembled to provide a unit on each side of the center and, as illustrated in Fig. 2, a plurality of units may be used on each side of the center. With the parts duplicated the reference numerals are applied to the unit on one side of the center only and it will be appreciated that the same reference numerals may be applied to corresponding parts on the opposite side of the center.

However, the belt or chain 63 extended from the motor to the cylinder carrying shaft 12 may extend over the sprocket 85 on the shaft 80 or the cylinder carrying shaft 113 on one side of the machine may be driven by a chain or belt 114 from a pulley or sprocket on a motor 116.

The reciprocating bar 15 extends continuously through the unit of the machine and balls 40 of the traverse arms are freely positioned in sockets, similar to the sockets 41 in the bar. The bar may be slidably mounted in bearings 117 in the frame.

One of the shafts 12 is positioned on each side of the machine and yokes, similar to the yokes 19 are positioned upon the common centrally positioned bar 96 whereby the yokes are free to swing vertically.

The yarn guiding grooves, as illustrated in Fig. 10, are oppositely positioned and are in the form of a V with the vertex or point of the V spaced from the ends of the cylinder and with the arms or sections at the sides positioned on equal angles from a plane extended through the longitudinal axis of the cylinder. The arms or sections of the grooves at the sides tapered out at points positioned between the vertices and the termination of quadrants in which the sections of the grooves are positioned.

As an illustration the grooves of a cylinder 10 inches in diameter taper out at points positioned 4 inches from the vertex and also, as an illustration, the grooves are $\frac{3}{16}$ of an inch wide by $\frac{3}{16}$ of an inch deep at the vertex.

Furthermore, with the ten inch cylinder, as illustrated in the drawings, thirty-six inches of yarn is fed to the cone or tube with each revolution of the cylinder whereas in a conventional driving cylinder of three or three and one-half inches in diameter about ten inches of yarn is fed to a cone or tube with each revolution, and should machines of this type be speeded up to wind thirty-six inches of yarn with the same comparatively small feeding cylinders, the traverse or yarn guide would travel so fast that it would be difficult to prevent breakage.

In using the large cylinder the amount of yarn supplied to the tubes and cones is increased without increasing the speed of the traverse or drive roll of the machine.

It will be understood, however, that these dimensions are only for the purpose of illustration

and the grooves may be formed of a suitable size in cross section and also of a suitable length.

In the design illustrated in Figs. 15 and 16 a cylinder 120, similar to the cylinder 11 is mounted on a shaft 121 that is journaled in bearings 122 and 123 in frame members 124 and 125, respectively and, as shown in Fig. 15, the cylinder 120 is provided with grooves 126 and 127 that extend from points or vertexes 128 and 129, respectively at the points where the grooves are of greatest depth, to points 130 and 131, of the groove 126, and 132 and 133 of the groove 127, where the grooves taper out into the surface of the cylinder.

The yarn, as indicated by the numeral 134 is fed to the groove and cylinder through an eye 135 at the vertex of a triangle of a yarn guide 136 having converging arms that extend from a hub 137 which is slidably mounted on a bar 138. The bar 138 is mounted in the frame members 124 and 125 and this bar and also a bar 139 provide guiding means for retaining the yarn guide 136 in an upright position. The member 136 is provided with a clip 140 that extends around the bar 139, and the hub 137 is provided with a lug 141 in which a follower 142 is carried. The follower 142 is provided with a boss 143 and a stud 144 which extends from the boss is positioned in an opening in the lug 141, in which it is held by a nut 145.

The follower 142 is positioned to travel in a traverse groove 146 of a cylinder 147 which is mounted on a shaft 148. The shaft 148 is journaled in the frame members 124 and 125 and the shaft may be driven from the shaft 121 by a belt 149 which is trained over pulleys 150 and 151. The shaft 121 is driven by a belt 152 on a pulley 153, similar to the belt 63 and pulley 61, of the type illustrated in Fig. 2.

In the design as illustrated in Figs. 2 and 10 the pairs of grooves at the ends of the cylinder are positioned for winding a 10 inch cone or tube, the next pair of grooves for winding an 8 inch cone or tube, and the grooves at the center for winding a 6 inch cone or tube. It will be understood, therefore, that the grooves may be positioned at different distances on the cylinder whereby cones or tubes of different lengths may be formed.

With the cylinder and traverse combination as illustrated in Figs. 15 and 16 the cylinder is provided with one V-shaped groove at each end and the grooves are oppositely positioned so that the yarn is carried to the end of the cone or tube and started back with the grooves.

It will also be noted that the grooves of the traverse cylinder 147 are positioned to start the yarn guide in the reverse direction with a comparatively easy movement, the meeting ends of the grooves being provided with straight sections 154 and 155 and the cylinder being provided with blocks 156 and 157 that are positioned to be engaged by the follower.

With the grooves formed in this manner the pitch of a groove at one end is such that in making one revolution the groove leads into a corresponding groove at the opposite end of the cylinder 11. Furthermore, with the grooves formed in this manner the grooves lead the yarn to the end of the cone or tube and bring it back thereby forming tapered ends and at the same time, in holding the yarn in tension the ends of cones or tubes formed on the machine are tight or firm.

It will be understood that modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A cone and tube winder, comprising a frame, a cylinder positioned in the frame, means journaling the cylinder in the frame, a core journaled above the cylinder, with the core surface in frictional driving engagement with the surface of the cylinder whereby the core is rotated by the cylinder, any diameter of the core being not more than one-third of the diameter of the cylinder, spaced upper and lower parallel bars mounted in said frame and spaced from the cylinder, a yarn guide having an elongated hub providing a base, said base being positioned to to slide longitudinally on said lower parallel bar, a cylinder having a double groove providing a level wind positioned below said lower parallel bar, means journaling the level wind in the frame with the axis thereof parallel to said lower parallel bar, a lug projecting from the hub of the yarn guide and positioned with the end thereof extended into the groove of the level wind, and means for rotating said cylinder and level wind for winding yarn on said core.

2. A cone and tube winder, comprising a frame, a cylinder positioned in the frame, means journaling the cylinder in the frame, a core journaled above the cylinder, with the core surface in frictional driving engagement with the surface of the cylinder whereby the core is rotated by the cylinder, any diameter of the core being not more than one-third of the diameter of the cylinder, spaced upper and lower parallel bars mounted in said frame and spaced from the cylinder, a yarn guide having an elongated hub providing a base, said yarn guide having a yarn feeding eye at the vertex of a triangle formed by converging arms extended upwardly from the ends of said hub, said base being positioned to slide longitudinally on said lower parallel bar, with the eye thereof positioned to slide along said upper parallel bar, a cylinder having a double groove providing a level wind positioned below said lower parallel bar, means journaling the level wind in the frame with the axis thereof parallel to said lower parallel bar, a projecting lug on the hub of the yarn guide positioned with the end thereof extended into the groove of the level wind, and means for rotating said cylinder and level wind for winding yarn on said core.

3. A cone and tube winder, comprising a frame, a cylinder journaled in the frame, a core, a yoke pivotally mounted in said frame and positioned to swing vertically therein, core gripping elements journaled in arms of said yoke for journaling the core with the surface thereof in frictional driving engagement with the surface of the cylinder whereby upon rotation of the cylinder the core is rotated, any diameter of said core being less than one-third of the diameter of the cylinder, spaced upper and lower parallel bars mounted in said frame and spaced from the cylinder, an elongated hub slidably mounted on said lower bar, an A-frame having an eye in the upper end carried by said hub providing a yarn guide, a cylinder having double threads therein providing a level wind journaled in said frame, a projection extended from said yarn guide into the threads of the level wind for reciprocating said yarn guide, and means for rotating said level wind and cylinder having the V-shaped grooves therein.

4. In a cone and tube winder, the combination which comprises a frame, a yarn feeding cylinder journaled in the frame, a core, means for journaling the core in the frame, said core journaling means positioned whereby the surface of the core is in frictional driving engagement with the surface of the yarn feeding cylinder, the ratio of the diameter of the yarn feeding cylinder to the core being at least five to one, a traverse cylinder having a reversely threaded screw cam slot in the surface thereof positioned in a plane below the yarn feeding cylinder for feeding yarn over the cylinder to the core, said traverse cylinder being mounted with the axis thereof parallel to the axis of the yarn feeding cylinder, and a yarn guide actuated by said traverse cylinder to travel with a reciprocating action longitudinally of said yarn feeding cylinder.

5. In a cone and tube winder, the combination which comprises a frame, a yarn feeding cylinder journaled in the frame, a core, means for journaling the core in the frame, said core journaling means positioned whereby the surface of the core is in frictional driving engagement with the surface of the yarn feeding cylinder, the ratio of the diameter of the yarn feeding cylinder to the core being at least five to one, a traverse cylinder having a reversely threaded screw cam slot in the surface also journaled in the frame and positioned with the axis thereof parallel to the axis of the yarn feeding cylinder and also in a plane below that of the yarn feeding cylinder, a rod mounted in the frame parallel to the traverse cylinder and positioned in a plane above said traverse cylinder, and a V-shaped yarn guide with an elongated hub slidably mounted on said rod, actuated by said traverse cylinder, and positioned to feed yarn to said yarn feeding cylinder.

6. In a winder, the combination which comprises a frame, a yarn feeding cylinder having yarn engaging means spaced from the ends thereof journaled in the frame, a core, the ratio of the diameter of the yarn feeding cylinder to the core being at least five to one, means for journaling the core in the frame, said core journaling means positioning the core whereby the surface thereof is in frictional driving engagement with the surface of the yarn feeding cylinder, a yarn guide mounted to travel longitudinally of the cylinder for feeding yarn over the cylinder to the core, a traverse cylinder having a reversely threaded screw cam slot therein positioned in a plane below that of the yarn feeding cylinder and mounted with the axis thereof parallel to said yarn feeding cylinder, and means operatively connecting said traverse cylinder to said yarn guide.

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