

Sept. 9, 1952

D. R. EASTWOOD
YARN WINDING MACHINE

2,609,997

Filed March 7, 1946

8 Sheets-Sheet 1

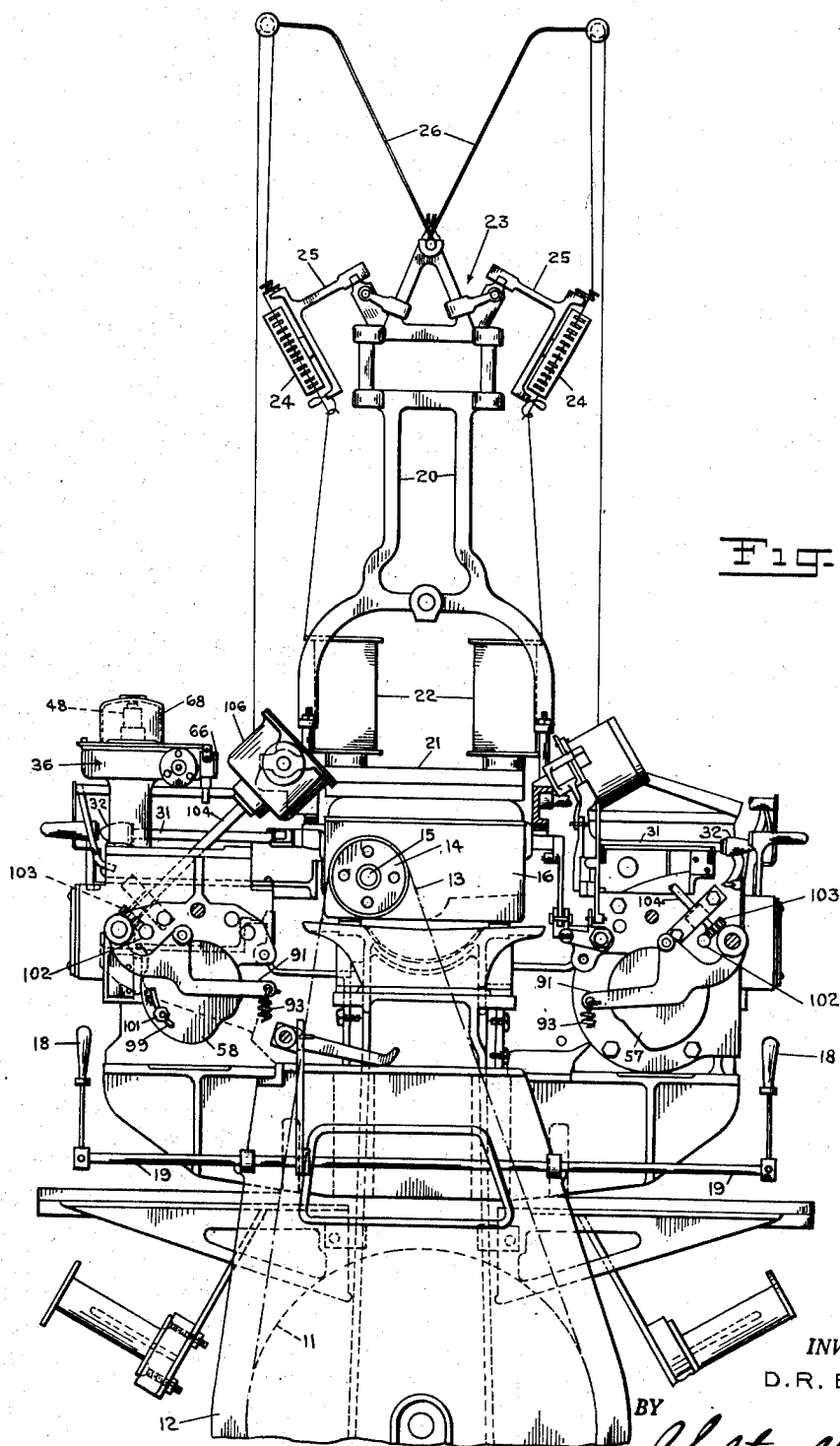


Fig. 1

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8 Sheets-Sheet 2

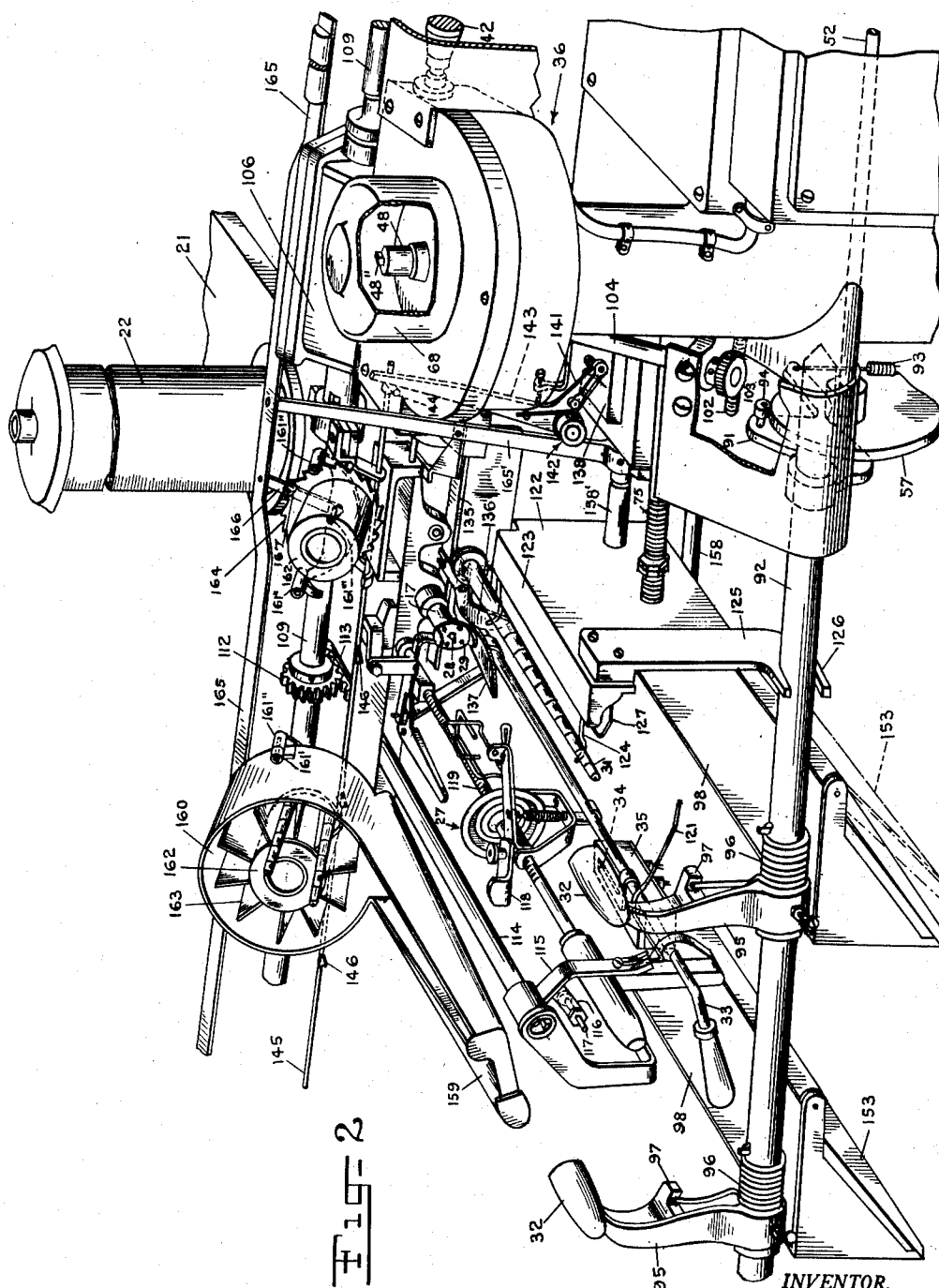


FIG. 2

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8 Sheets-Sheet 3

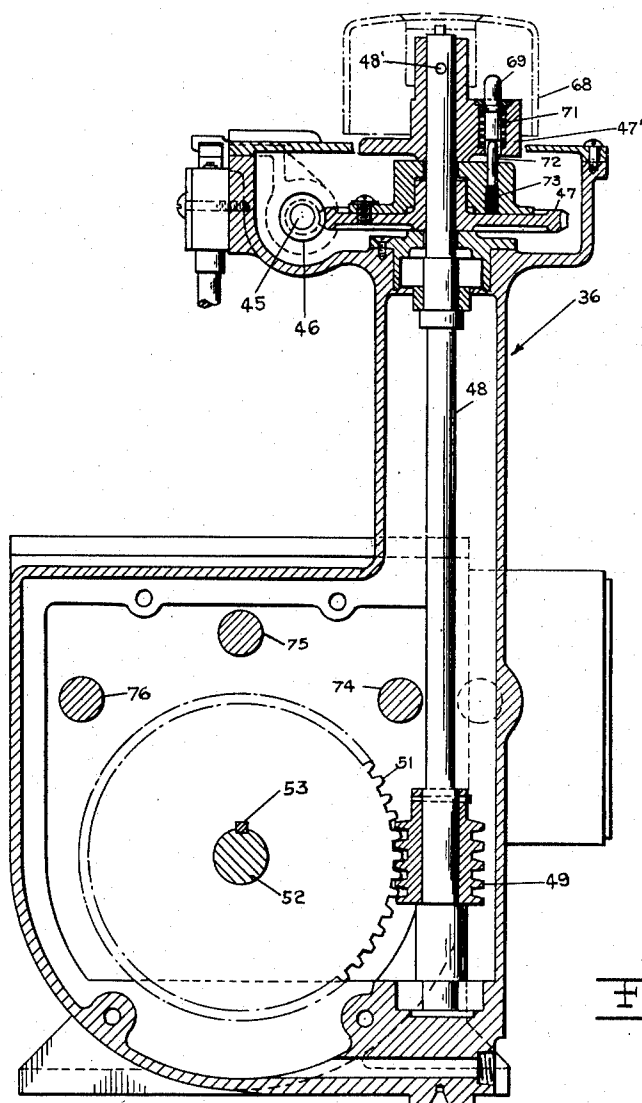


Fig. 3

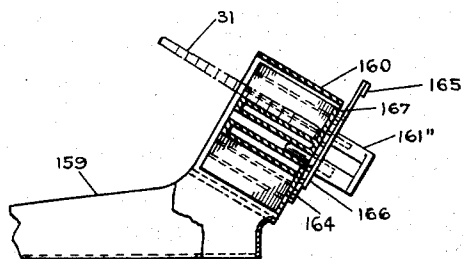


Fig. 14

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8 Sheets-Sheet 4

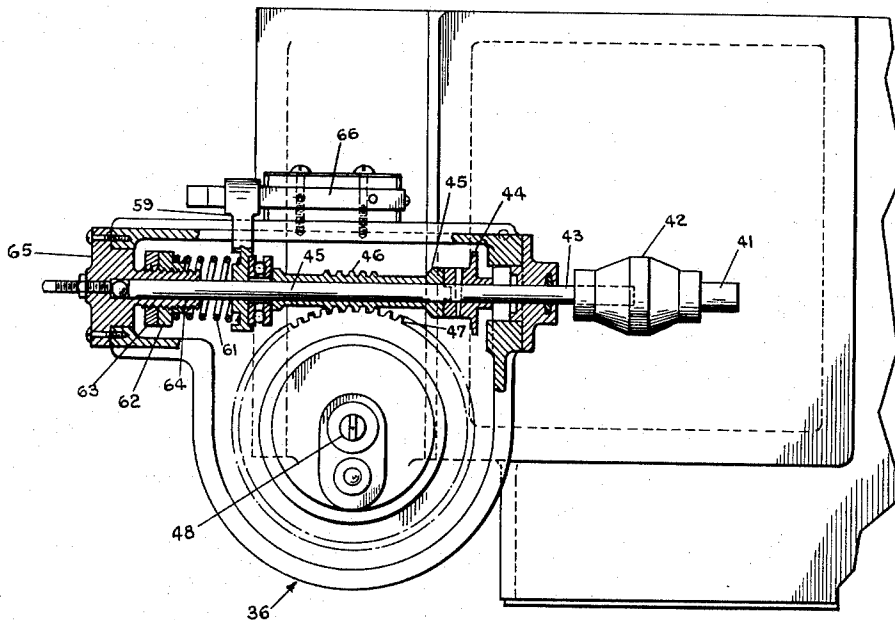


Fig. 4

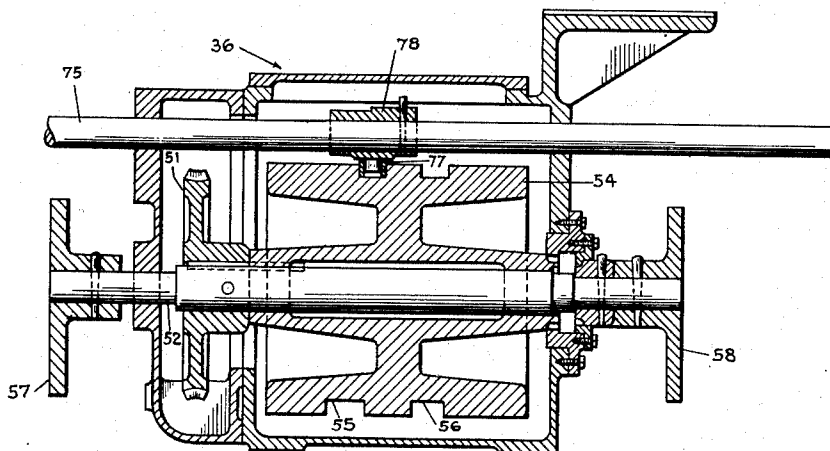


Fig. 5

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8 Sheets-Sheet 5

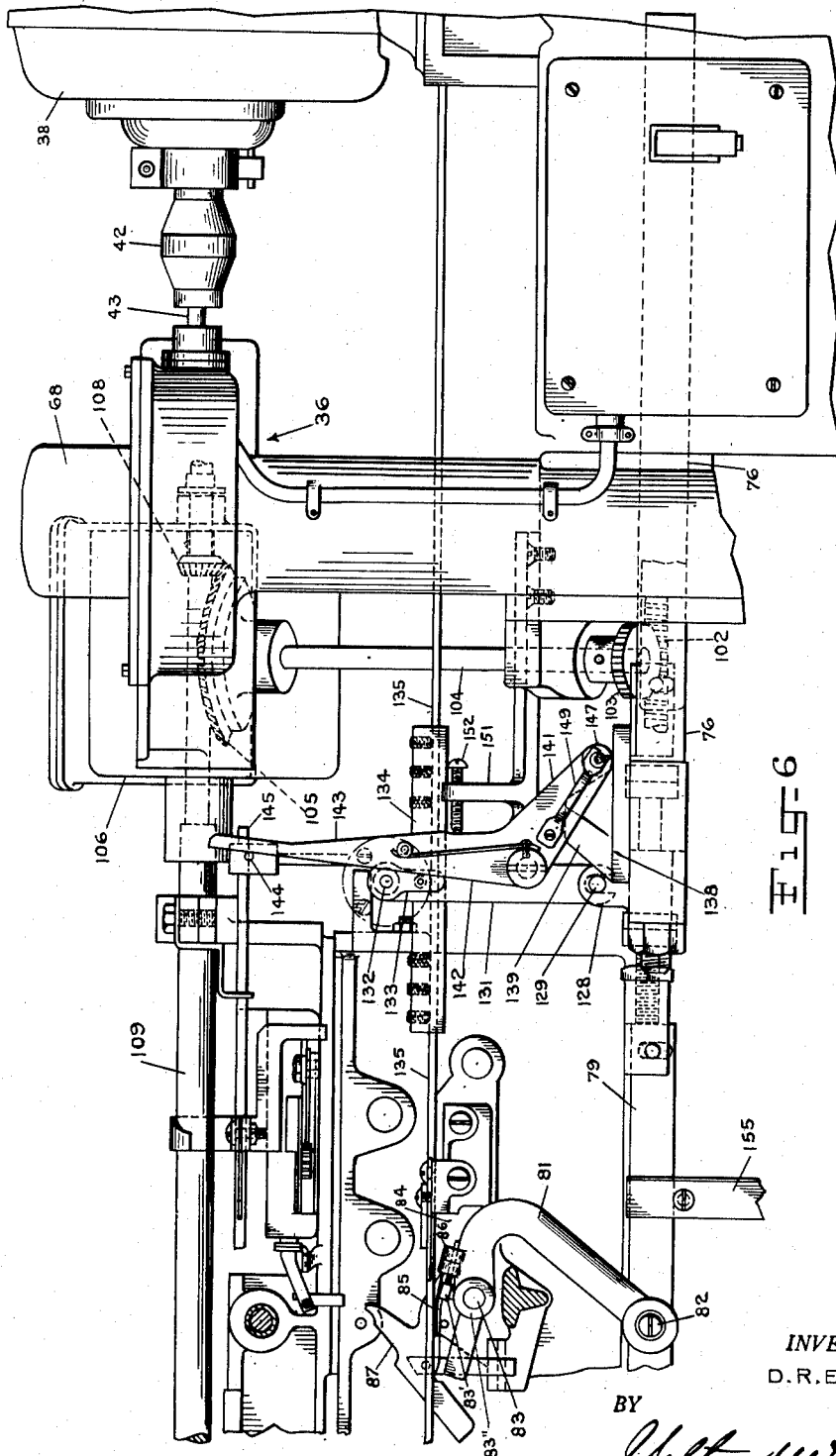


Fig. 6

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D. R. EASTWOOD
YARN WINDING MACHINE

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8 Sheets-Sheet 6

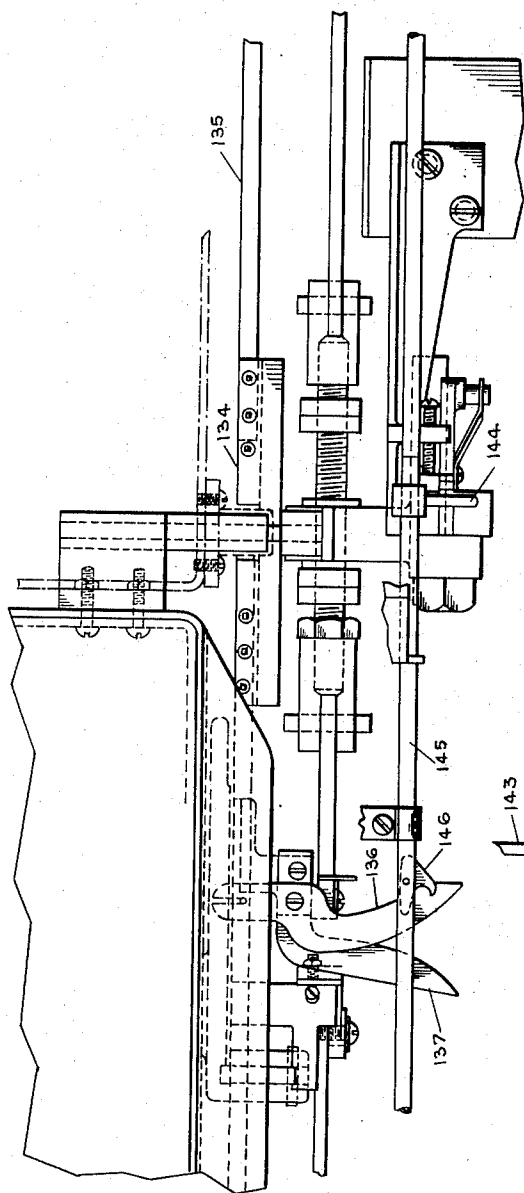


Fig. 8

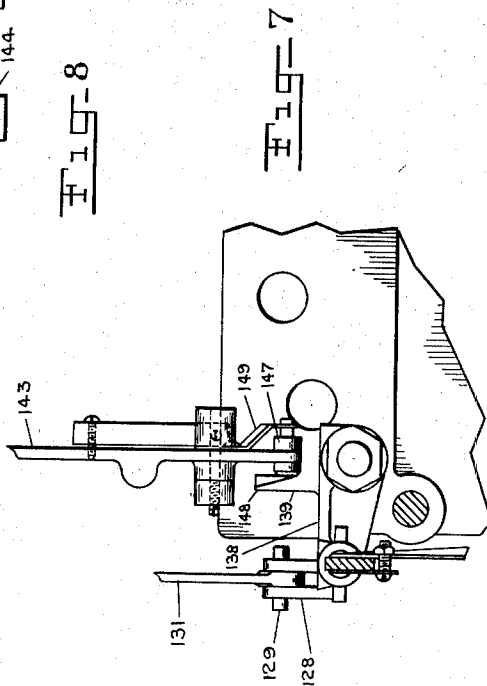


Fig. 7

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YARN WINDING MACHINE

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8 Sheets-Sheet 7

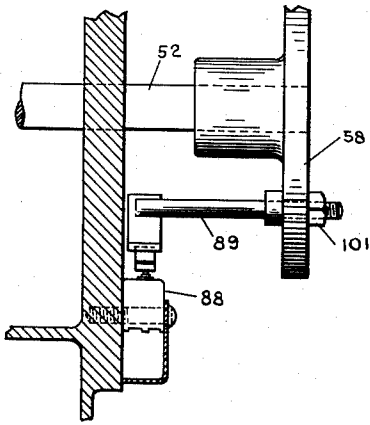


Fig. 10

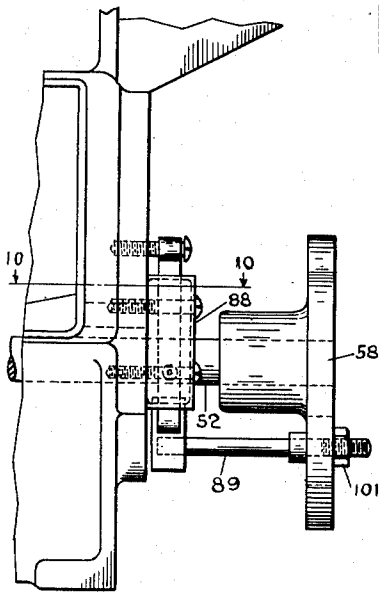


Fig. 9

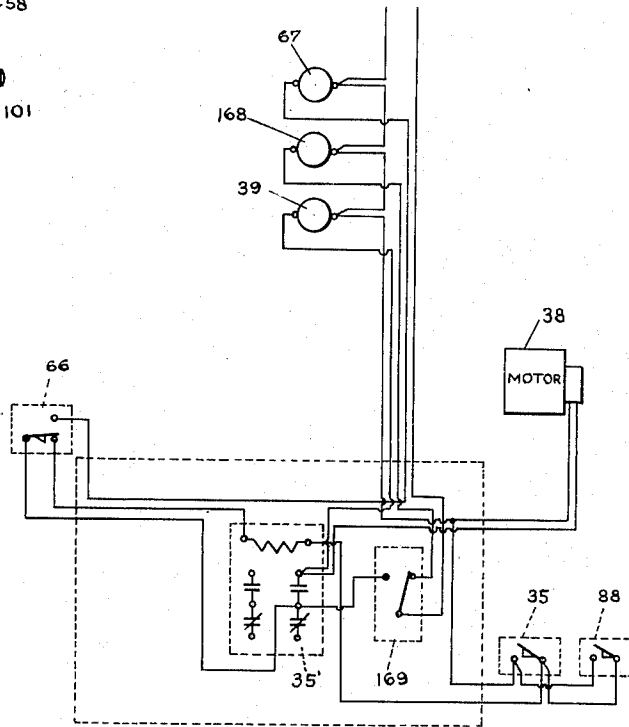


Fig. 11

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D. R. EASTWOOD
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8 Sheets-Sheet 8

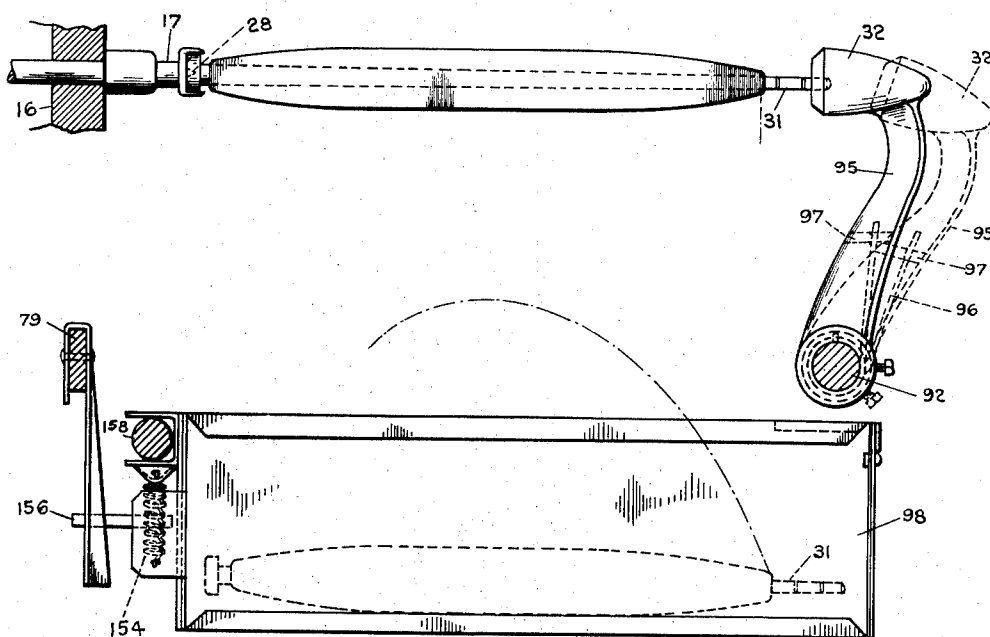


Fig. 12

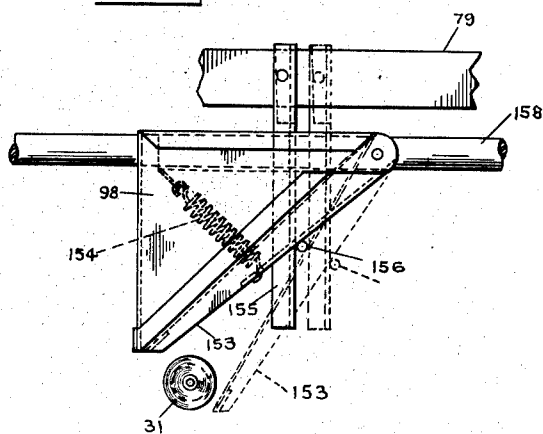
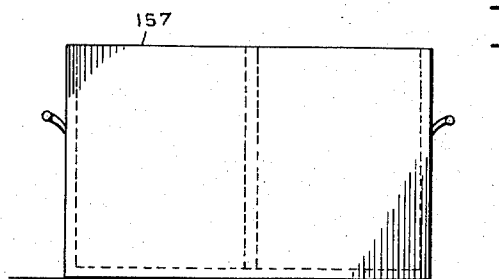


Fig. 13



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UNITED STATES PATENT OFFICE

2,609,997

YARN WINDING MACHINE

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America, a corporation of Delaware

Application March 7, 1946, Serial No. 652,549

9 Claims. (Cl. 242—32)

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This invention relates to yarn winding machines, and relates more particularly to yarn winding machines wherein pirns, cops, quills, spools or like packages of yarn (hereinafter referred to in the interest of brevity as "pirns") are automatically removed from the machine upon completion of the winding and replaced by fresh package supports on which the winding of new packages continues.

An object of this invention is to provide improved means for releasing and removing wound pirns from the winding mechanism and for placing an empty pirn tube in position to have yarn wound thereon.

Another object of this invention is to provide automatic means for trapping the portion of the yarn extending from the supply to the wound pirn, for initiating the winding of the yarn on the fresh pirn tube, and for severing the yarn from the wound pirn.

A further object of this invention is the provision of means, under the control of a master spindle which is adjusted so that its pirn tube fills at substantially the same time as the other pirn tubes, for simultaneously replacing a plurality of wound pirns by fresh pirn tubes.

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

In one aspect, this invention comprises the modification of a well-known pirn winding machine manufactured by the Universal Winding Machine Company of Boston, Massachusetts, and designated by this company "No. 90 Winding Machine," to make the pirn changing, i. e. the doffing and donning of pirns, completely automatic without, however, preventing the starting and stopping of any individual spindle manually. Such machines are usually provided with twenty spindles, two sets or banks of ten spindles each being positioned back-to-back on a suitable bench and framework. For the greater operating efficiency of this invention, two pirn winding machines are joined in endwise relationship and the two banks of ten spindles on the same side of the machines are operatively connected so that twenty pirns are simultaneously wound, doffed and replaced by fresh pirn tubes. The twenty spindles on the other side of the machines are operatively connected also and operate under separate control. Each winding machine retains its original driving means, gear boxes and gainer case, clutch-driven spindles, yarn traversing and guiding means, and spindle starting and stopping means.

This invention comprises, broadly, means, in association with each spindle of the above winding machine arrangement, for releasing and removing the wound pirn from the winding spindle,

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after the stoppage of the winding, so that it may fall into a suitable receiver, a carriage adapted to deliver a fresh pirn tube to a position in line with the end of the spindle where it may be removed from the carriage by a novel means for supporting the pirn tube during winding. In this latter operation the yarn, still connected to the wound pirn and which had been brought to a position adjacent to the spindle base, is trapped between the flange of the fresh pirn tube and the spindle base. A severing member then cuts the yarn at a point near the spindle and the wound pirn is then released from the receiver and falls into a suitable storage receptacle.

The fresh pirn tubes may be supplied to the carriage from a magazine capable of holding a plurality of tubes, the carriage conveniently co-operating with the magazine in a manner such that a fresh pirn tube is released from the magazine and supplied to the carriage for transference to the spindle replenishing position on completion of the winding of a pirn.

A feature of this invention resides in means for moving the length of yarn extending from the traverse guide to the wound pirn and carrying it to a position where it may effect engagement with the fresh pirn tube and the bunching mechanism of the winding machine. Thus, the yarn moving member is mounted on the mechanism for pushing the traverse mechanism to its starting position, the yarn at that point is trapped not only between the flange of the fresh pirn tube and spindle base but also by a hook on the bunch builder bar, and furthermore is centered between the blades of a cutting device.

All of the spindles on the same side of the winding machines may be served simultaneously by the automatic pirn changing mechanism of this invention, the various movements of the pirns being effected in synchronism in association with each spindle and operated by a master spindle which controls the other spindles in the operating unit by starting the doffing mechanism when it has been filled to predetermined size. Thus, a control switch operated by the master spindle unit, upon the stoppage of the rotation of the spindle, closes a motor circuit, the motor then operating the elements which synchronously effect the doffing and donning operations and the restarting of the winding operation. Means may be provided to render the control switch inoperative, but this will not prevent the individual spindles from operating and stopping when their respective pirns have been completely filled. In other words, with the control switch rendered inoperative the winding machine operates as if the machine was not modified in accordance with this invention.

In the event of jamming of the pirn changing mechanisms, protection is provided in the form of

an overload device that automatically shuts down the operating mechanism and may light a lamp to warn the operative. Means are provided for manually removing the cause of jamming or overloading.

The invention will now be described in greater detail with reference to the accompanying drawings wherein for the sake of simplicity there is shown little more than one pirn winding unit, specifically the control winding unit governing the pirn changing movements of the twenty winding units in horizontal alignment on the same side of two adjacent pirn winding machines.

In the drawings:

Fig. 1 is an end view of a pirn winding machine modified in accordance with this invention,

Fig. 2 is a perspective view on an enlarged scale of a portion of the winding machine with parts broken away and omitted to show details in greater clarity,

Fig. 3 is a cross-sectional view of the drum cam operating mechanism,

Fig. 4 is a cross-sectional view of overload arrangement,

Fig. 5 is a cross-sectional view of the drum cam arrangement,

Fig. 6 is a front elevational view of a portion of the winding machine, with certain parts omitted, showing certain details of the pirn changing mechanism on an enlarged scale.

Fig. 7 is a detail view of the bunching rod operating cam and lever,

Fig. 8 is a top plan view, on an enlarged scale, of a portion of the pirn changing mechanism, showing scissors operating and bunching details,

Fig. 9 is a detail view of means for operating motor stop switch,

Fig. 10 is a sectional view taken on line 10—10 in Fig. 9,

Fig. 11 is a wiring diagram of the pirn changing mechanism,

Fig. 12 is a detail view of the pirn releasing mechanism and hopper,

Fig. 13 is a side elevational view of the hopper, showing the storage receptacle for receiving wound pirns, and

Fig. 14 is a cross-sectional detail view of the magazine.

Like reference numerals indicate like parts throughout the several views of the drawings.

Referring now to the drawings and particularly to Fig. 1 thereof, the reference numeral 10 indicates a drive shaft driven by a suitable means, as by a motor or overhead drive, on which is fixed a pulley 11, the pulley being covered by a guard 12. Pulley 11 is connected by a belt 13 to an active pulley 14 which drives the input shaft 15 of the gainer case 16 which comprises a gear and clutch arrangement for rotating the spindles 17 of the pirn winding machine. Handles 18 are provided to operate rod 19 for shifting the belt 13 from the active pulley 14 to the idler pulley, not shown but located beside it on shaft 15, to halt the rotating of the spindles 17 or from the idler pulley to the active pulley 14 to start the rotation of the spindles. The framework of the winding machine, generally indicated by reference numeral 20, carries a platform 21 for supporting supply bobbins 22 and superstructure 23 for supporting gate tension devices 24, through brackets 25, and compensators 26. All of the foregoing elements, with the exception of the specific spindle structure as

will appear below, are standard equipment on pirn winding machines of the type being modified. It is to be understood, however, that pirn winding machines of a type other than the one herein employed may be modified in accordance with this invention.

The traversing mechanism, generally indicated by reference numeral 27, is also of the well-known type and includes substantially all of the elements normally associated therewith. Accordingly, the several elements of the traversing mechanism will not be described except where they are modified or perform a particular function in accordance with this invention.

As is shown in Fig. 2 of the drawings, the spindle 17 employed in accordance with this invention differs from the spindle normally employed in that it has been reduced in length to approximately $\frac{3}{8}$ " and has a tip 28 projecting about $\frac{1}{4}$ " through a rubber washer 29. The rubber washer serves as a friction drive for the pirn tube 31, pressure being applied to the tip of the pirn tube by a ball-bearing guide 32, hereinafter more fully described.

During the winding of the pirn the traversing device guides the winding of the yarn onto the pirn in the usual manner, moving its field of traverse gradually from the base of the pirn tube to the tip thereof to complete the winding of the pirn. The rotation of the spindle is then halted, also in the usual manner as by a finger on the traversing mechanism tripping the sizing lever which normally holds the starting lever 33 in operative position, i. e. the position held during the winding operation. Thereupon the ejecting, replenishing and restarting mechanism of this invention function as follows:

The rotation of the starting lever 33 to inoperative position causes a switch finger 34 fixed thereto to operate control switch 35. The latter elements are mounted on the spindle designated as the master spindle which in the drawings is at the left of the cam unit and operating mechanism, both generally indicated by reference numeral 36, mounted between, and at one side of, two pirn winding machines and arranged to control the pirn changing operations of twenty spindles, i. e. ten spindles on each machine. The master spindle controls the other nineteen spindles, when it has been filled with yarn to the predetermined size. A similar master spindle controls a similar number of spindles on the opposite side of the winding machines.

The control switch 35 upon being actuated by switch finger 34 energizes relay 35' which starts doffing motor 38 and at the same time turns on a white pilot light 39 to indicate to the operator that the pirn winding machine has begun the doffing operation. Referring to Figures 3, 4, 5 and 6 it will be seen that the shaft 41 of motor 38 is connected through a rubber coupling 42 to a shaft 43 on which is fixed for rotation therewith, the driving half of a jaw clutch 44. A worm wheel 46, one end of which forms the other half of jaw clutch 45, is assembled on shaft 43 and normally rotates with it. The worm wheel 46 meshes with and rotates a gear 47 mounted on shaft 48 and is coupled to vertical shaft clutch body 47' by means of pin 72. Clutch body 47' is fixed to shaft 43 by means of pin 48' and thus causes the rotation of vertical shaft 48. A worm wheel 49 is mounted near the lower end of vertical shaft 48 and is adapted to mesh with and rotate a gear 51 fixed to a shaft 52 by means of a key 53. Shaft 52 has suitably mounted there-

on a drum cam 54 having grooves 55 and 56, as well as plate cams 57 and 58.

Means are provided to prevent damage to the operating mechanism in the event of jamming which might be caused by a crooked pirn or some other abnormal condition. Thus, the thrust of worm wheel 46 is taken by a trip collar 59 held in position by a compression spring 61 and carried on the shaft 43. The spring 61 is in turn held in position by nut 62 and locknut 63 adjustably mounted on a threaded projection 64 integral with end bearing 65. In case of an overload, tending to prevent the rotation of gear 47, worm wheel 46 will move to the left on shaft 43 disengaging clutch 44 and compressing spring 61, effecting movement of trip collar 59 which opens limit switch 66, shutting down the motor, extinguishing white light 39 and lighting red pilot 67 (see Figure 11). In order to remove the cause of the overload, a cover 68 is removed and a suitable crank is placed over the upper end 48' of shaft 48, the crank being so constructed that it locks in position on projecting pin 48' and depresses pin 69 against the action of compression spring 71. Pin 69 depresses pin 72 against the action of expansible spring 73 thus disconnecting the driving mechanism (see Fig. 3). The crank is then operated to move the drum cam 54 in one direction or the other to release the jam. After the cause of the overload is removed, the limit switch 66 must be reset manually, after which the pirn winding machine and pirn changing means operate to complete the cycle which was interrupted by the jamming.

While the pirn tubes 31 are being filled, the drum cam 54 is at rest. When pirn tube on the master spindle is filled to its predetermined size, the sizing lever, as stated above, is tripped in the usual manner and causes switch finger 34 on starting lever 33 to operate control switch 35 to energize relay 35', starting the doffing motor 38 and to turn on the white pilot light 39. The doffing motor, through the various elements described above, rotates the drum cam 54. As the drum rotates, it moves rods 74, 75 and 76 towards the left by means of cam follower roller 77 journaled on a fixed collar 78 carried by all three rods, the cam follower rollers operating in cam grooves 55 and 56. (See Figures 3 and 5.) The first rotational movement of drum cam causes rod 76 and bar 79 attached thereto to move to the left. This movement causes a curved latching arm 81 pivotally mounted at 82 on bar 79 and at 83 on a bracket 84 fixed to the framework of the winding machine, to rotate in a clockwise direction, whereby a wire 85 carried in a boss 86 integral with latching arm 81 lifts the stopping lever 87 of the spindle. The mechanism is preferably adjusted so that the spindles are stopped when the drum cam has moved about 20 degrees.

The rotation of shaft 52 of the drum cam 54 also rotates plate cams 57 and 58. When the pirn tubes are filling, the plate cams, as well as the drum cam, are at rest and in this position plate cam 58 holds open a normally closed motor switch 88 which is connected in parallel with the normally closed switch 35 on the master spindle unit. When the shaft 52 has rotated about 20 degrees, or substantially at the point where the rotation of the spindles is stopped, a finger 89 carried by the plate cam 58 permits switch 88 to close to maintain the motor circuit. Also at this point, each plate cam lifts a lever 91 fixed at one end to a rocker shaft 92, the other end being free and having attached thereto a spring 93

which acts to maintain a roller cam follower 94, carried by lever 91, in contact with the periphery of the plate cam. The lifting of the lever 91 rocks shaft 92 and the pirn guides 32 carried by guide arms 95, which guide arms are mounted on rocker shaft 92. Springs 96 carried by rocker shaft cooperates with a boss 97 on the guide arm for maintaining the guide in contact with the pirn tip. This arrangement also permits individual pirn guides 32 to be pulled away from the pirn tip, allowing the pirn to drop free thereof, as when it is desired to re-thread an individual unit while the balance of the machine is operating. When the shaft 52 has rotated about 45 degrees, the lever 91 has moved the guides 32, through rocker shaft 92 and guides arms 95, far enough away from the pirn tip to permit the filler pirn to drop into a hopper 98 located directly below the same. The hopper 98 will be more fully described below.

The finger 89 employed for holding open normally closed switch 88 is adjustably carried in a slot 99 in the face of the plate cam 58 and is held in adjusted position by locknuts 101.

As the drum cam 54 continues to rotate, rod 74 is caused to move to the left by the drum cam. Rod 74 carries at one end a rack 102 which engages and rotates a pinion gear 103, see Figure 2. The pinion gear 103 is carried at the lower end of an inclined shaft 104, the upper end of which has attached thereto a bevel gear 105 in a housing 106. The bevel gear 105 meshes with and is adapted to rotate bevel gear 108, also enclosed in housing 106. Rotation of bevel gear 108 operates traverse pinion shaft 109 which extends to the left for servicing one group of ten spindles of one winding machine and which also extends to the right for servicing the ten spindles on the other winding machine. At suitably spaced points, the traverse pinion shaft has fixed thereto pinion gears 112 each adapted to engage a rack 113 mounted in a split tube 114. An arm 115 attached to rack 113 carries a bracket 116 in which is mounted an adjustable finger 117 which engages lever 118 fixed to the traverse mechanism 27, thus disengaging said traverse mechanism from the half-threaded rod 119 and carrying the traverse mechanism to its starting position. A wire 121 attached to arm 115 engages the uncut thread between the traverse yarn guide and the wound pirn and carries it to a point directly in front of the washer 29 on the spindle. The drum cam 54 has now rotated about 140 degrees.

In the meantime, rod 75 has started to move to the left (Figure 2) by drum cam 54 when the drum cam had rotated about 95 degrees. Rod 75 has attached thereto a carriage 122 having a platform 123 and two bent wire fingers 124 fixed to said platform. A bracket 125 is attached to the carriage, the bracket being bifurcated at its lower end 126 so that it may straddle and be supported by rocker shaft 92. The bent wire fingers 124 hold the empty pirn tube 31 which the carriage is carrying to the position where it may be picked off the same by the spindle 17 and guide 32. This point is reached when the drum 54 has rotated about 185 degrees. A wire 127 which is fixed to carriage 122 not only functions to guide the uncut yarn past the carriage but also to hold the uncut yarn at the spindle when arm 115 returns to its starting position. Arm 115 starts back when the drum cam 54 has rotated about 150 degrees at which point rod 74 has been moved to the right by drum cam

54 reversing the previous direction of rotation of pinion gear 103. The arm 115 returns to its starting position when the drum cam 54 has rotated about 240 degrees, and remains at this position during the remainder of the cycle.

With the empty pirn tube in position to be picked up by the spindle and guide, plate cams 57 and 58 (and also the drum cam) have rotated about 168 degrees, permitting levers 31 to lower, thus rotating rocker shafts 92, by means of the pull of springs 93, and rocking guide arms 95 to their original position. This causes guide 32 to push the pirn tube against the spindle head, trapping the yarn between the flange of the pirn tube and the rubber washer 29 on the spindle head.

When the drum cam 54 has rotated about 160 degrees, rod 76 starts to move to the right and performs a plurality of functions. Thus, rod 76 moves to the right bar 79 attached thereto. This bar 79 carries a boss 123 having a pin 129 on which is pivoted a lever 131 having a bifurcated end. The upper end of the lever is pivoted at 132 and is provided with a finger 133 mounted in a connecting member 134 fixed to a bar 135. Movement of bar 135 to the right operates the pivot blade 136 of a scissor so that it cooperates with stationary blade 137 thereof to cut the yarn therebetween, see Figure 8, the cutting being effected some time before the drum cam rotates through 260 degrees.

Another function performed by rod 76 is to set automatically the bunching mechanism, which bunching mechanism is standard equipment on the Universal winding machine. Referring to Figures 2, 6, 7 and 8, the bar 79, attached to rod 76, has mounted thereon a platform 138 carrying a cam 139. As the rod 76 is moved to the right moving with it bar 79, the cam 139 causes the arm 141 of bell crank lever, generally indicated by reference numeral 142, to be raised thus moving arm 143 of the bell crank lever in a counterclockwise direction. Arm 143 engages a projection 144 on a bar 145 moving the same to the left. Hooks 146 on bar 145 engage the yarn, carrying it out of the yarn guide on the traversing means to permit bunching. The bar 145 after it is moved toward the left is held there for a time determined by the setting of the timing mechanism of the standard bunch builder. The roller 147 at the free end of the arm 141 in the meantime has travelled to the end of the high point 148 of cam 139, has fallen off to permit arms 141 and 143 to return to their original positions in front of the cam 139. The roller 147 is pivotally carried on a spring clip 149 fixed to arm 141. Means are provided to limit the clockwise movement of arm 143, comprising a bracket 151 suitably mounted on the framework and carrying an adjustable screw 152.

A third function performed by the movement to the right of rod 76 and bar 79 is to start the spindles. Thus, movement of the rod and bar causes the free end of latching arm 81 to move in a counter-clockwise direction, engaging projection 83' on sleeve 83'' mounted on pin 83, to cause the clutches in the gear box to start the rotation of the spindles. This starting of the spindles is effected at about the same time as the bunch builder is put in operation, i. e. before the drum cam 54 has been rotated through 260 degrees.

The bar 79 also functions to open the hopper 93, which is substantially triangular in vertical

cross-section and has a door 153 normally held closed by a spring 154. To this end the bar 79 carries a series of arms 155 depending therefrom. Arm 155 is adapted to engage a pin 156 attached to door 153, opening the same to permit the filled pirn to fall into a suitable storage receptacle 157 located below the hopper. The hopper 93 may be supported in position in any suitable manner as on a rod 158.

The carriage 122 which brought up the empty pirn tube remains in its forward position while the drum cam rotates from the 185 degree point of rotation to about the 228 degree point by virtue of lost motion in the mechanism, permitting the pirn tube 31 to be lifted from the bent wire fingers 124 by the spindle and guide. It is then returned to its starting position by the drum cam causing rod 75 to move backwards, or to the right, where it is directly under a chute 159 of a magazine 160 arranged to hold ten pirn tubes.

The magazine housing 160 is carried on bracket 161 by ears 161' (only one of which is shown) suitably attached to the housing and having pins for insertion in holes provided in bracket 161. A rotor 162, having fins 163 dividing the magazine into a series of compartments each adapted to receive a pirn tube, and a ratchet wheel 164, is mounted on pin 161''' in bracket 161. A lever 166 is also pivoted on pin 161''' with its upper end pivoted on bar 165. As rod 158', connected to carriage 122, moves to the left, carrying the empty pirn tube to the threading position in front of spindle 17, bar 165 is moved to the right, by lever 166, movable by rod 158', causing lever 166, by means of pawl 167 attached thereto, to move ratchet wheel 164, thus indexing the rotor 162 one point. This permits one empty pirn tube to drop into chute 159, thence to platform 123 of the carriage. As the carriage 122 returns to its starting position, the pirn tube is rolled off onto the wire fingers 124 in readiness for the next cycle.

The latching, bunching and scissors rod 76 returns to its starting point when the drum cam 54 has rotated through 350 degrees, opening the scissor blade 136 and moving latching arm 81 to its neutral position in preparation for the next cycle.

As described above, the bunching bar 145 is held in the bunching position by the standard automatic bunch building mechanism. After the bunch builder has tripped, following a predetermined number of strokes of the traverse mechanism 27 of the spindle unit, the bar 145 is permitted to return to its normal position, allowing the yarn to enter the yarn guide on the traverse mechanism, the winding then proceeding in the same manner as on the standard winding machine.

As the master spindle starts, the motor starting switch 35 opens but, as stated above, the circuit is maintained by switch 38 operated by plate cam 58 through finger 89 carried thereby. At the completion of the cycle, finger 89 opens switch 38, stopping the motor 38. A third pilot light 163, green, is provided to indicate when main control switch 169 is open.

With the exception of the master spindle, any spindle may be stopped and restarted, at any time during the winding operation, in the same manner as with pirn winders wherein the pirn changing is manually effected. If it is desired to stop the master spindle, main control switch 169 must first be opened, as otherwise the wind-

ing machine would start to doff as soon as the spindle was tripped. Where a pirn is filled before the pirn on the master spindle, the spindle is tripped as usual in manually operated pirn winders, but the doffing thereof is delayed until the master spindle is tripped.

It is also possible in the pirn winding machine of this invention to start the winding of pirns at any time during the winding operation and usual manual means, such as a handle attached to either end of bar 145, are provided to reset the bunch builder. However, such pirns will not be completely filled when doffing occurs, due to the late start.

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:

1. A machine for winding yarn tubes comprising, in combination with a spindle for rotating a pirn tube and means for guiding the pirn tube into engagement with said spindle, a traversing mechanism movable lengthwise of the pirn tube until the winding of the yarn thereon is completed, and means for automatically stopping the rotation of said spindle when the winding of the yarn on the pirn tube is completed, means for automatically replacing a wound pirn by an empty pirn tube upon which the winding of a new pirn continues, said latter means including a rocker shaft for supporting said pirn tube guiding means, a lever connected to said rocker shaft, means for actuating said lever to move said rocker shaft to effect a withdrawal of said pirn tube guiding means permitting the wound tube to fall away from said traversing mechanism, tube guiding means and spindle, means for moving said traversing mechanism moving means to move to said spindle the length of yarn extending from the supply to the wound pirn, a carriage and a drum cam operatively connected to said carriage for reciprocating the same to move a fresh pirn tube in line with said pirn tube guiding means and said spindle, a magazine for supplying a fresh pirn tube to said carriage at the starting position thereof, said magazine including a rotor having fins for dividing said magazine into compartments each adapted to hold a single fresh pirn, means for turning said rotor for discharging a fresh pirn from one of said compartments on to said carriage, and means for restarting the winding operation.

2. A machine for winding yarn tubes comprising, in combination with a spindle for rotating a pirn tube and means for guiding the pirn tube into engagement with said spindle, a traversing mechanism movable lengthwise of the pirn tube until the winding of the yarn thereon is completed, and means for automatically stopping the rotation of said spindle when the winding of the yarn on the pirn tube is completed, means for automatically replacing a wound pirn by an empty pirn tube upon which the winding of a new pirn continues, said latter means including a rocker shaft for supporting said pirn tube guiding means, a lever connected to said rocker shaft, means for actuating said lever to move said rocker shaft to effect a withdrawal of said pirn tube guiding means permitting the wound tube to fall away from said traversing mechanism, tube guiding means and spindle, a hopper for receiving said wound tube, means for moving

said traversing mechanism moving means to move said spindle the length of yarn extending from the supply to the wound pirn, a carriage and a drum cam operatively connected to said carriage for reciprocating the same to move a fresh pirn tube in line with said pirn tube guiding means and said spindle, a magazine for supplying a fresh pirn tube to said carriage at the starting position thereof, said magazine including a rotor having fins for dividing said magazine into compartments each adapted to hold a single fresh pirn, means for turning said rotor for discharging a fresh pirn from one of said compartments on to said carriage, and means for restarting the winding operation.

3. A machine for winding yarn on pirn tubes comprising, in combination with a spindle for rotating a pirn tube and means for guiding the pirn tube into engagement with said spindle, a traversing mechanism movable lengthwise of the pirn tube until the winding of the yarn thereon is completed, means for automatically stopping the rotation of said spindle when the winding of the yarn on the pirn is completed, means for automatically replacing a wound pirn by an empty pirn upon which the winding of a new pirn continues, said latter means including a horizontally reciprocable carriage, means operatively connected to said carriage for reciprocating the same to move a fresh pirn tube in line with said pirn tube guiding means and said spindle, a magazine for supplying a fresh pirn tube to said carriage at the starting position thereof, said magazine including a rotor having fins for dividing said magazine into compartments each adapted to hold a single fresh pirn, means for turning said rotor for discharging a fresh pirn from one of said compartments on to said carriage, and means for restarting the winding operation.

4. A machine for winding yarn on pirn tubes comprising, in combination with a plurality of spindles for rotating pirn tubes, means for driving said spindles and means for guiding the pirn tubes into engagement with said spindles, traversing mechanisms movable lengthwise of each of the pirn tubes until the winding of the yarn thereon is completed, means including a starting handle operatively connected to spindle drive means for independently stopping the rotation of each of said spindles when the winding of the yarn on the pirn tube in engagement with said spindle is completed, means for automatically stopping the rotation of all of said spindles only when the winding of the yarn on a predetermined one of said pirn tubes is completed, means for automatically replacing the wound pirns by empty pirn tubes upon which the winding of new pirns continues, and means for restarting the winding operation.

5. A machine for winding yarn on pirn tubes comprising, in combination with a plurality of spindles for rotating pirn tubes, means for driving said spindles and means for guiding the pirn tubes into engagement with said spindles, traversing mechanisms movable lengthwise of each of the pirn tubes until the winding of the yarn thereon is completed, means including a starting handle operatively connected to spindle drive means for independently stopping the rotation of each of said spindles when the winding of the yarn on the pirn tube in engagement with said spindle is completed, means for automatically stopping the rotation of all of said spindles only when the winding of the yarn on a predeter-

mined one of said pirn tubes is completed, means for automatically replacing the wound pirns by empty pirn tubes upon which the winding of new pirns continues, said latter means including a rocker shaft for supporting all of said pirn tube guiding means, a lever connected to said rocker shaft to move said rocker shaft to effect a movement of said pirn tube guiding means so as to permit wound pirn tubes to fall away from said traversing mechanism, pirn tube guiding means and spindle, means including a drum-cam actuated horizontally reciprocating carriage for moving fresh pirn tubes in line with said pirn tube guiding means and said spindles, and means for actuating said lever to move said rocker shaft to effect a movement of said pirn tube guiding means to bring said pirn tubes into engagement with said spindles, and means for restarting the winding operation.

6. A machine for winding yarn on pirn tubes comprising, in combination with a spindle for rotating a pirn tube, means for driving said spindle and means for guiding the pirn tube into engagement with said spindle, a traversing mechanism movable lengthwise of the pirn tube until the winding of the yarn thereon is completed, means including a starting handle operatively connected to the spindle drive means for manually stopping the rotation of said spindle at any stage during the winding of the yarn on the pirn tube on said spindle, means for automatically stopping the rotation of said spindle when the winding of the yarn on the pirn tube is completed, means for automatically replacing the wound pirn by an empty pirn tube upon which the winding of a new pirn continues, means for moving said traversing mechanism to the starting position thereof, means on said traversing mechanism moving means including a wire finger carried by an arm to which a yarn guide is attached to move to said spindle the yarn extending from the supply to the wound pirn before the empty pirn tube is brought into engagement with said spindle whereby the yarn is clamped to the spindle by the pirn tube, and means for restarting the winding operation.

7. A machine for winding yarn on pirn tubes comprising, in combination with a plurality of spindles for rotating pirn tubes, means for driving said spindle and means for guiding the pirn tubes into engagement with said spindles, traversing mechanism movable lengthwise of each of the pirn tubes until the winding of the yarn thereon is completed, means including a starting handle operatively connected to the spindle drive means for independently stopping the rotation of each of said spindles at any stage during the winding of the yarn on the pirn tube on said spindle, means for automatically stopping the rotation of all of said spindles only when the winding of the yarn on a predetermined one of said pirn tubes is completed, means for automatically replacing the wound pirns by empty pirn tubes upon which the winding of new pirns continues, means for moving all said traversing mechanisms to the starting position thereof, means on said traversing mechanism moving means including a wire finger carried by an arm to which a yarn guide is attached to move to said spindles the yarn extending from the supply to the wound pirns before the empty pirn tubes are brought into engagement with said spindles whereby the yarn is clamped between the pirn tubes and the spindles, and means for restarting the winding operation.

8. A machine for winding yarn on pirn tubes comprising, in combination with a spindle for rotating a pirn tube, means for driving said spindle and means for guiding the pirn tube into engagement with said spindle, a traversing mechanism movable lengthwise of the pirn tube until the winding of the yarn thereon is completed, means including a starting handle operatively connected to the spindle drive means for manually stopping the rotation of said spindle at any stage during the winding of the yarn on the pirn tube on said spindle, means for automatically stopping the rotation of said spindle when the winding of the yarn on the pirn tube is completed, means for automatically replacing the wound pirn by an empty pirn tube upon which the winding of a new pirn continues, a hopper positioned below said spindle for receiving the wound pirn, means for discharging the wound pirn from said hopper, means for moving said traversing mechanism to the starting position thereof, means on said traversing mechanism moving means including a wire finger carried by an arm to which a yarn guide is attached to move to said spindle the yarn extending from the supply to the wound pirn before the empty pirn tube is brought into engagement with said spindle whereby the yarn is clamped to the spindle by the pirn tube, and means for restarting the winding operation.

9. In a machine for winding yarn on pirn tubes including a plurality of spindles for rotating pirn tubes, drive means for said spindles, means for guiding the pirn tubes into engagement with said spindles, traversing mechanisms movable lengthwise of each of the pirn tubes until the winding of the yarn thereon is completed, means for independently stopping the rotation of each of said spindles when the winding of the yarn on the pirn tube in engagement with said spindle is completed, means for stopping the rotation of all of said spindles, means for automatically replacing the wound pirns by empty pirn tubes upon which the winding of new pirns continues, and means for restarting the winding operation, the improvement which comprises the provision of automatic means for stopping the rotation of all of said spindles only when the winding of the yarn on a predetermined one of said pirn tubes is completed, said means comprising an electrical switch in the path of the movable traverse mechanism of the predetermined pirn tube, the electrical switch being operatively connected to the spindle drive means and adapted to be engaged by said movable traverse mechanism when the winding on said pirn is completed, whereby the spindle drive means rotating all of said spindles is halted.

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