

March 19, 1957

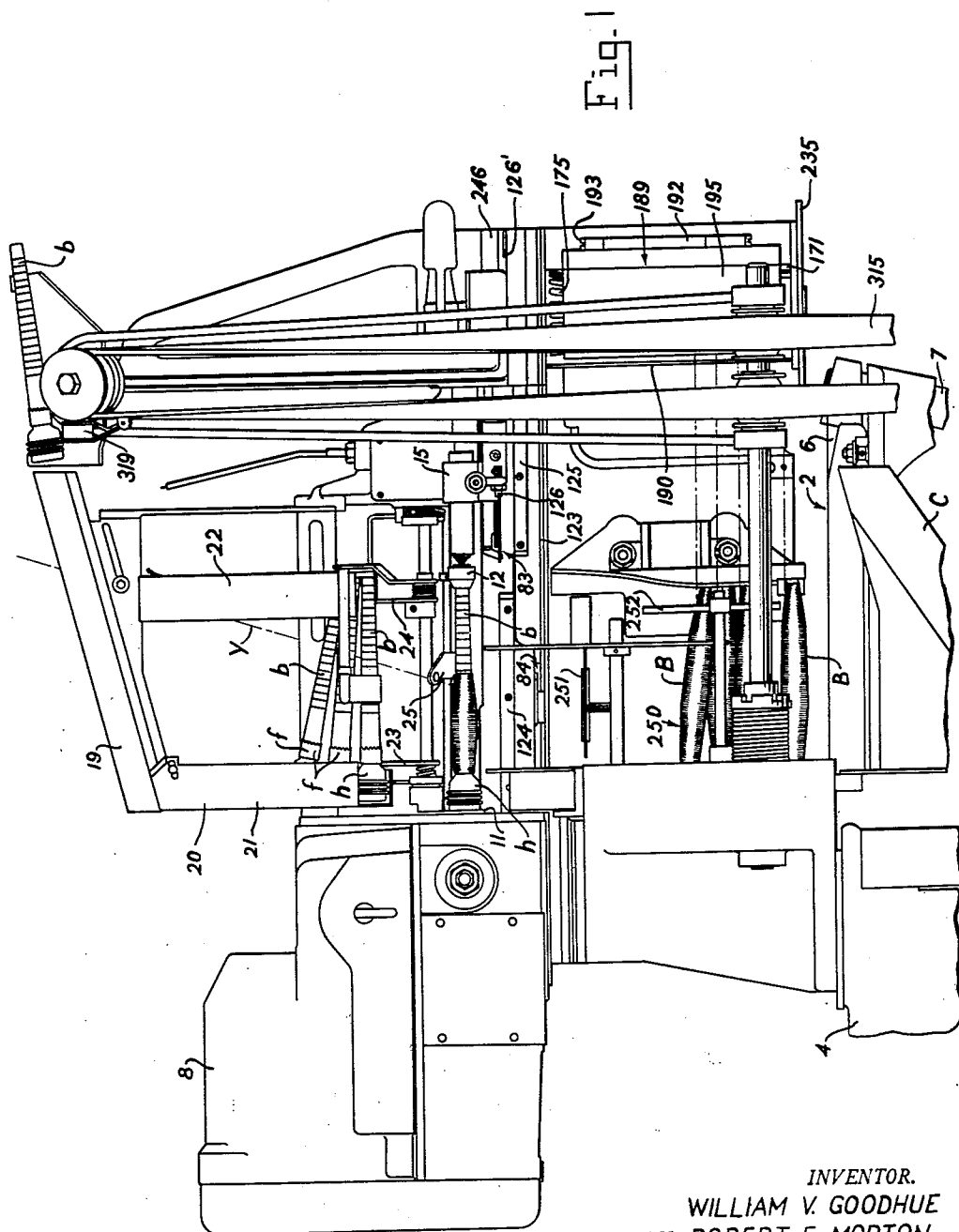
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2,785,704

TEXTILE MACHINE

Original Filed May 3, 1950

8 Sheets-Sheet 1



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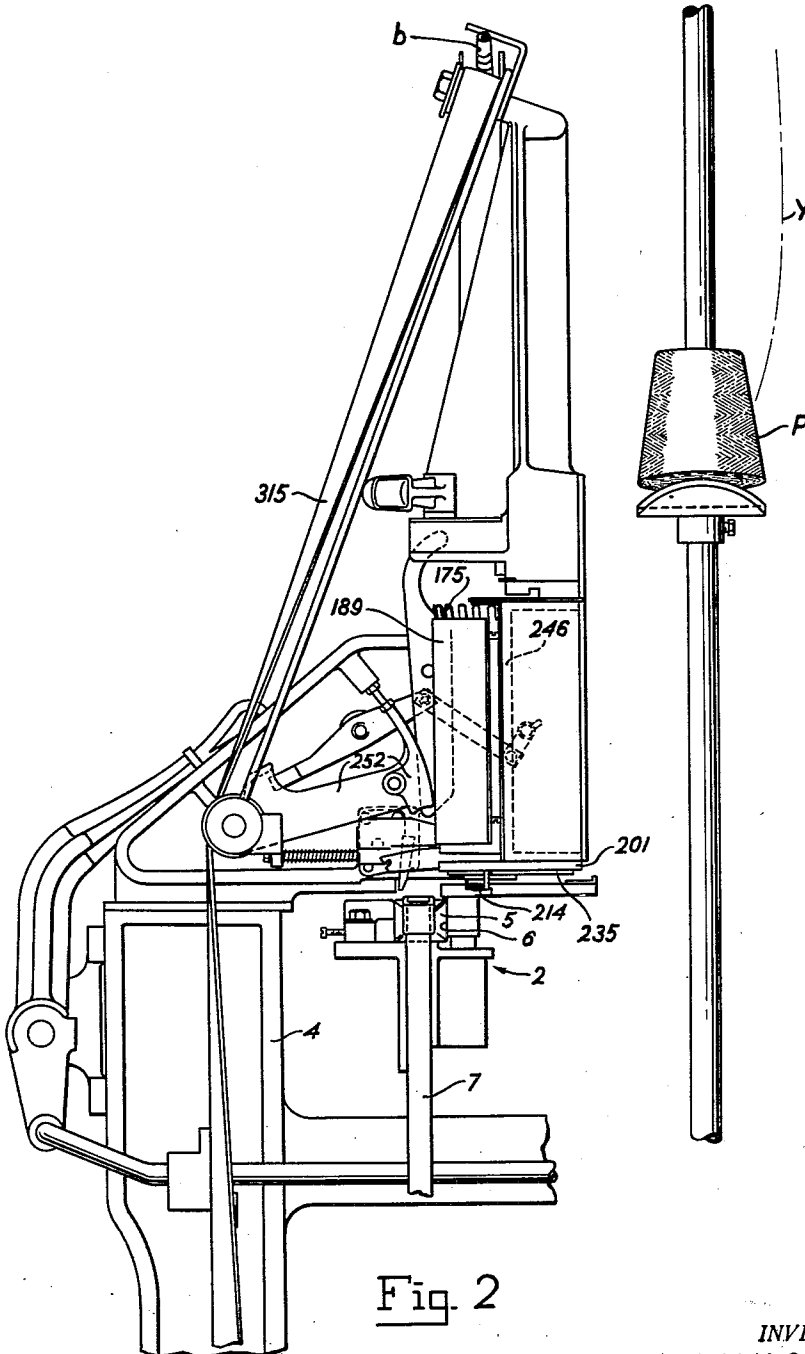


Fig. 2

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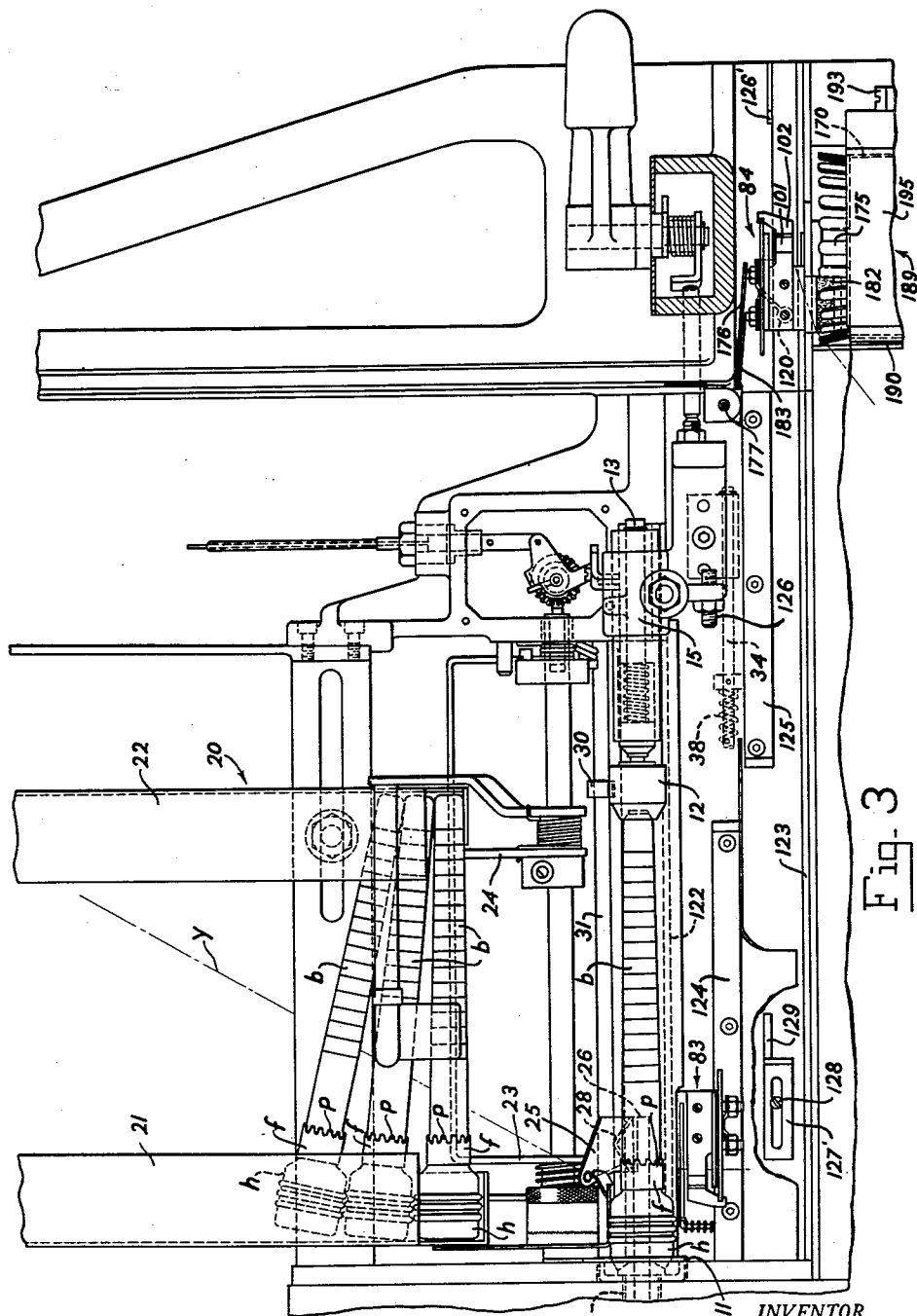


Fig. 3

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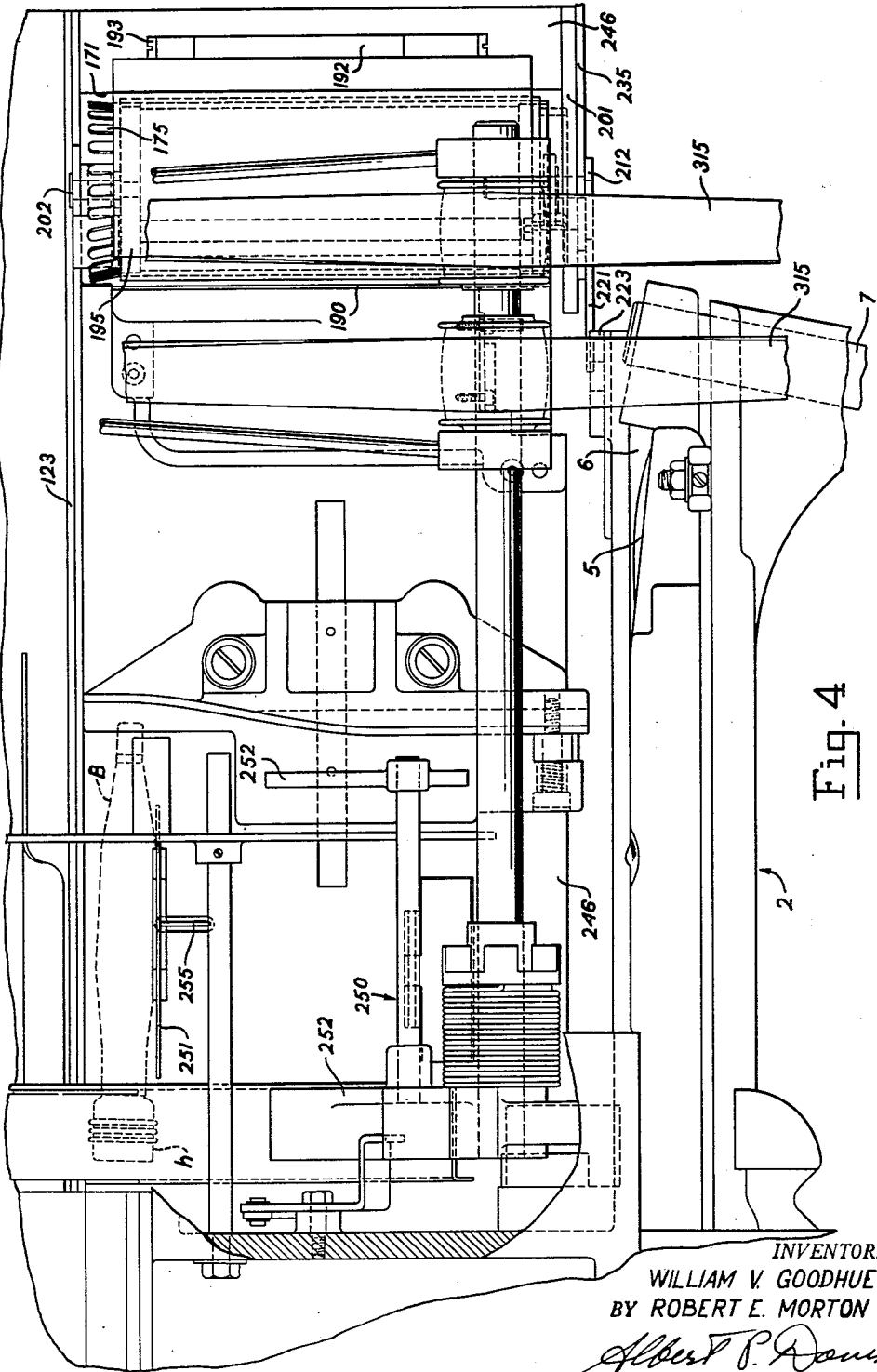


Fig. 4

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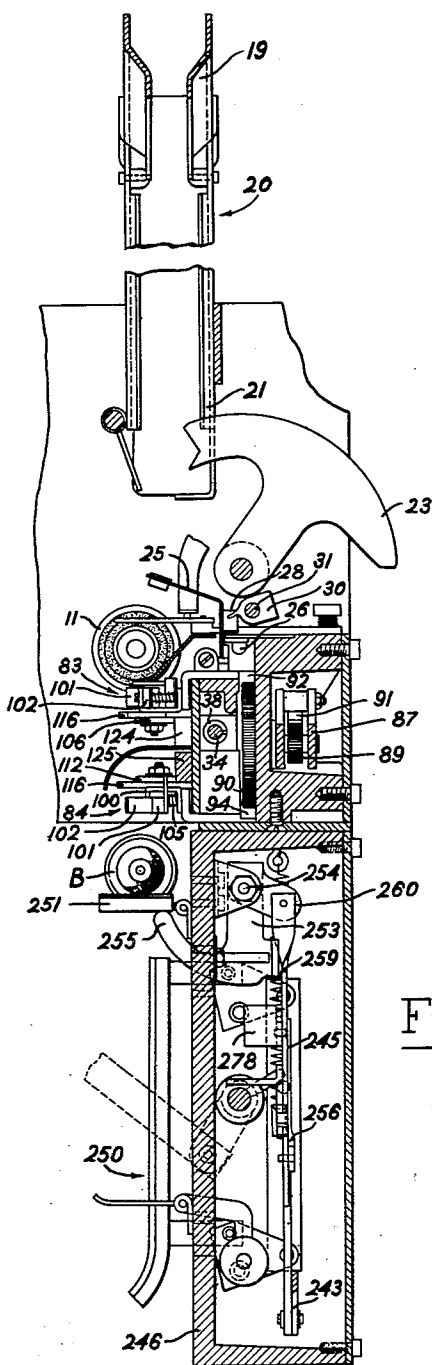


Fig. 5

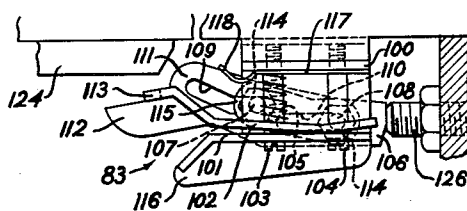


Fig. 10

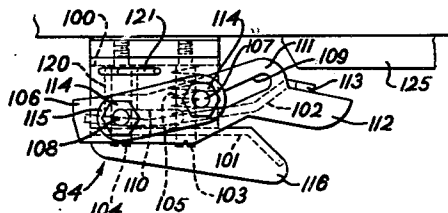


Fig. 11

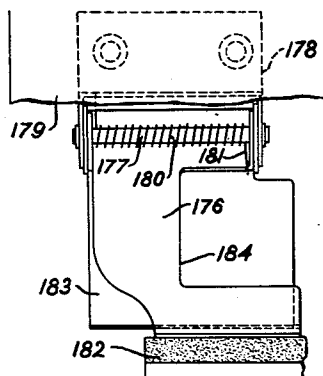


Fig. 14

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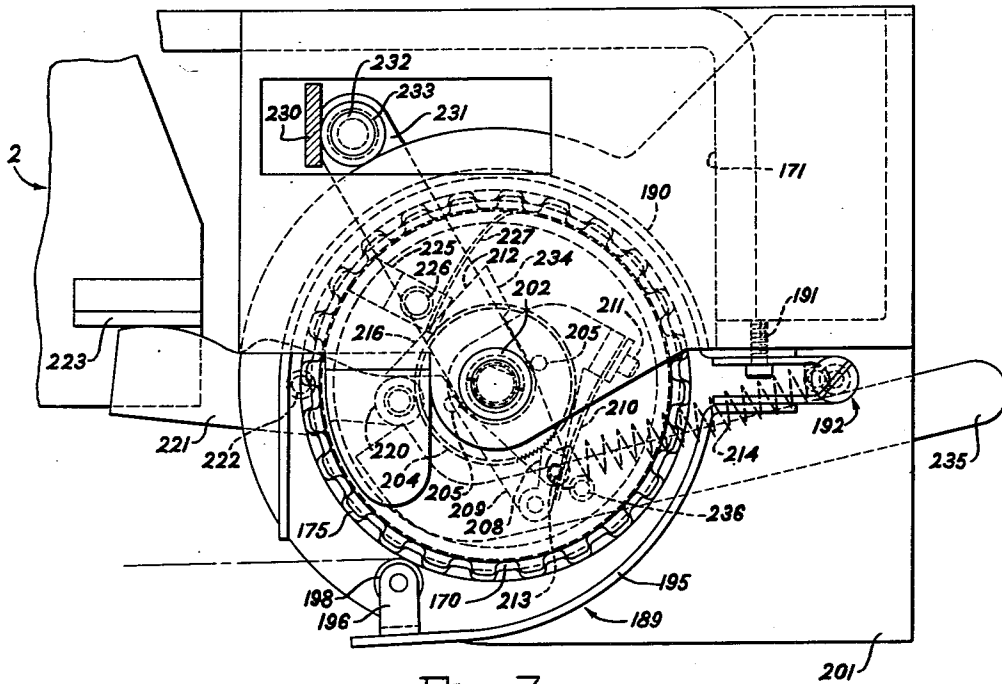


Fig. 7

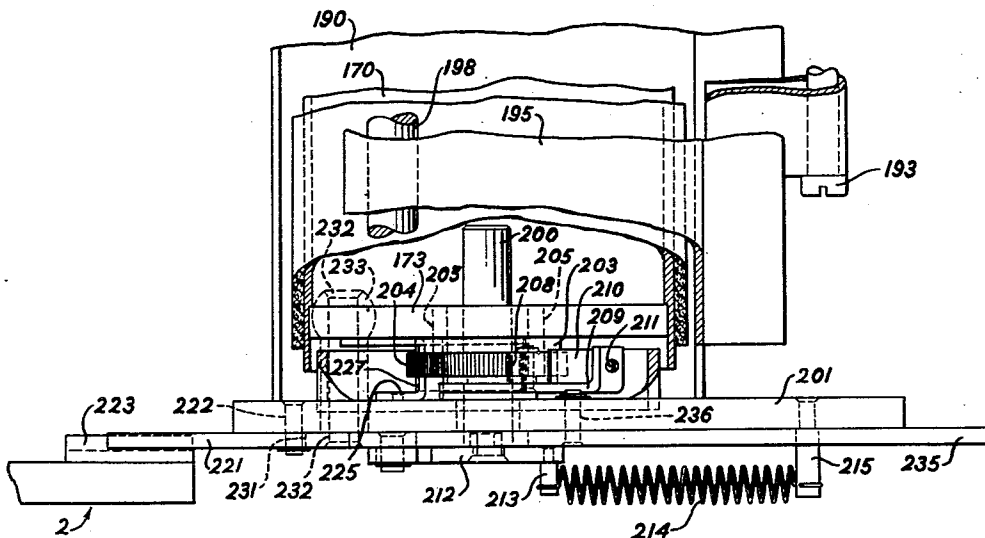


Fig. 8

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Original Filed May 3, 1950

8 Sheets-Sheet 8

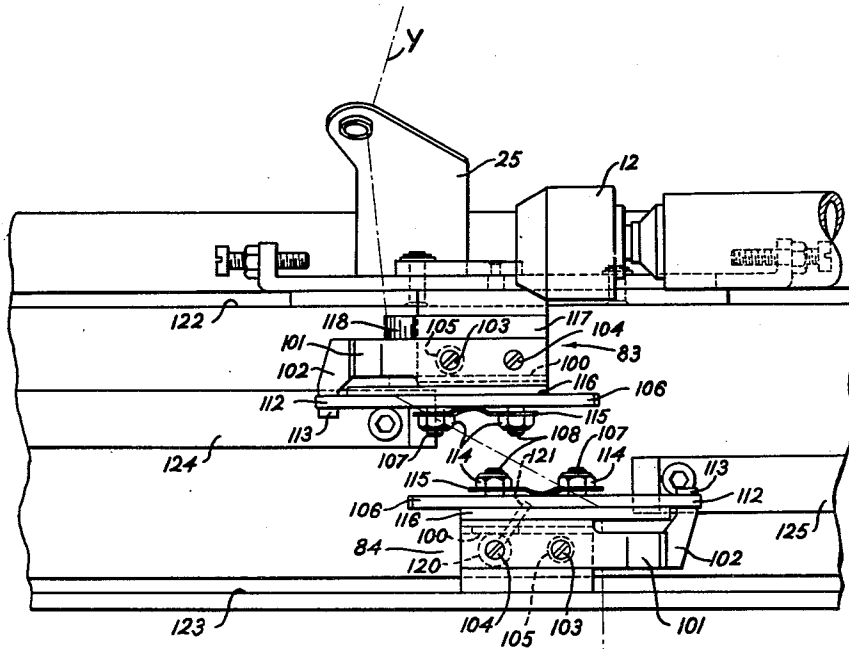


Fig. 9

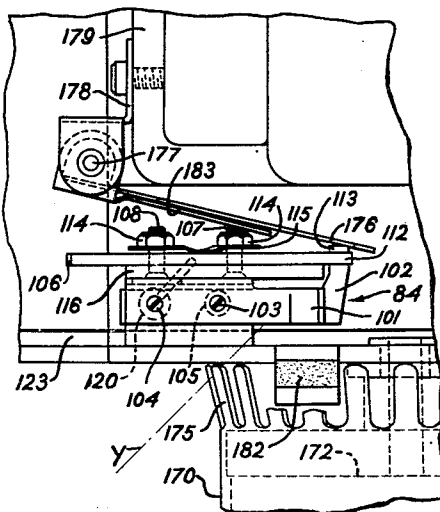


Fig. 12

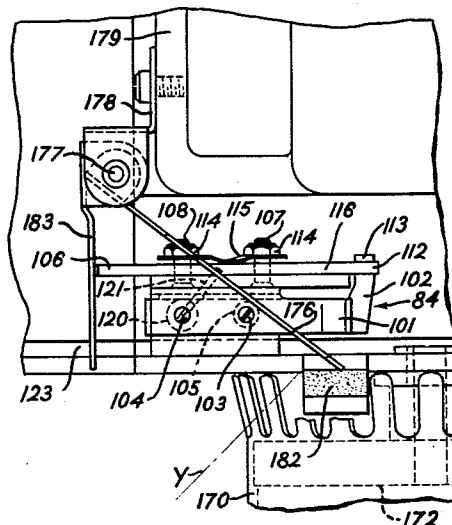


Fig. 13

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2,785,704

TEXTILE MACHINE

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Original application May 3, 1950, Serial No. 159,814, now Patent No. 2,638,936, dated May 19, 1953. Divided and this application April 23, 1953, Serial No. 350,608

23 Claims. (Cl. 139—224)

The present invention relates to a mechanism for use with a winding machine for automatically winding filling bobbins in a loom and continuously supplying them for transfer to the shuttle or shuttles of the loom, and more particularly relates to means for transporting, receiving and holding the end of yarn from wound bobbins together with means for holding the wound bobbins and in part controlling the operation of the bobbin supplying means.

The present invention is a division of our copending application Serial No. 159,814, filed May 3, 1950, for "Method and Means for Automatically Winding Filling Bobbins in a Loom and Supplying Them to the Shuttle Thereof," now Patent No. 2,638,936, issued May 19, 1953. In that application there is disclosed and claimed the combination of an automatic loom, winding means for winding filling bobbins and supplying them to the loom, means for receiving spent bobbins from the loom and stripping the residue of yarn therefrom, and means for transporting the stripped bobbins from the stripping means back to the winding means. In such a combination it is desirable that means be provided to cooperate with the winding mechanism to receive the wound bobbins ejected therefrom, to receive and hold the ends of yarn extending from the wound bobbin, to transport said ends of yarn to the receiving and holding means, and to interrupt the operation of the winder when a full supply of bobbins has been placed in the bobbin receiving means and to restart its operation when that supply has been depleted a predetermined amount.

It is, therefore, one object of the present invention to provide means cooperating with a winding machine and a loom for receiving and holding the end of yarn extending from a bobbin wound and ejected by said winding machine.

Another object of the present invention is to provide means to receive a wound bobbin and hold said bobbin in a predetermined position together with means for receiving and holding the end of yarn extending from said bobbin.

Another object of the present invention is to provide means for receiving a wound bobbin together with means for drawing out a length of yarn or "transfer tail" from the bobbin and holding it under tension.

Another object of the present invention is to provide a magazine for a loom cooperating with an automatic winding machine and adapted to receive bobbins wound by said winding machine as they are ejected therefrom and to present them to the filling changing mechanism of the loom.

Another object of the present invention is to provide for use with an automatic loom having a winding machine for winding filling bobbins incorporated therewith, a magazine for receiving bobbins wound by said winding machine and presenting them to the loom filling changing mechanism together with means for drawing out a length of yarn or "transfer tail" from the bobbins placed in said magazine and holding said length of yarn under tension.

Another object of the present invention is to provide

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a magazine for an automatic loom having means incorporated therein to control means for feeding bobbins thereto.

Another object of the present invention is to provide a magazine for a loom cooperating with an automatic winding machine and adapted to receive bobbins wound by said winding machine as they are ejected therefrom and having means incorporated therein to control the operation of said winding machine.

Another object of the present invention is to provide means for taking the ends of yarn from wound bobbins supplied to an automatic loom and holding said ends under predetermined tension.

Another object of the present invention is to provide means for drawing out a length of yarn or "transfer tail" from wound bobbins supplied to an automatic loom and including means to hold said length of yarn.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings wherein:

Figure 1 is an enlarged front view including a portion of the end of the loom illustrating the winding means with its donning-and-doffing mechanism, the conveyor-means for transporting empty bobbins to the magazine therefor and depositing them thereinto, the loom magazine for holding reserve bobbins and the yarn and holding and tensioning means;

Fig. 2 is an end view showing a portion of the loom, the connections between the weaving mechanism and the bobbin-winding and furnishing means, and the yarn and holding and tensioning means;

Fig. 3 is a still further enlarged view illustrating the winding means, the upper traveling clip or retriever as having returned the yarn-guide to initial winding position with the yarn attached to an empty bobbin and the lower clip as moved into position to engage the trailing yarn from the doffed bobbin with the teeth of the comb at the top of the tensioning drum;

Fig. 4 is an enlarged front view of the magazine for reserve bobbins and the rotary drum for holding the transfer-tails of yarn extending from the bobbins held therein;

Fig. 5 is a part-sectional end view showing the magazine for empty bobbins, the bobbin-donning means, the mechanism for operating the yarn clips, and a portion of the mechanism whereby the supply of wound bobbins controls in part the operation of the winder;

Fig. 6 is an enlarged rear elevational view showing the clip-operating means, the rotary drum for holding the bobbin transfer-tails, its rotating means and also the reserve-bobbin magazine control-mechanism for arresting the operation of the winding means when said magazine becomes temporarily filled with bobbins;

Fig. 7 is an enlarged top plan view of the tensioning drum showing the ratchet-means for rotating it in dotted lines;

Fig. 8 is an enlarged elevational view of the lower portion of the drum showing the means for rotating it and other details;

Fig. 9 is a greatly enlarged elevational view of the two cooperating yarn-clips;

Fig. 10 is a plan view of the upper yarn-clip or retriever;

Fig. 11 is a plan view of the lower clip;

Fig. 12 is a view showing the upper portion of the

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tensioning drum, the clip for carrying the end of the yarn thereto, the yarn-trap for retaining the end of the yarn above the drum to insure its proper engagement therewith, and illustrating the clip as passing under the gripping means of the yarn-trap;

Fig. 13 is a similar view showing the gripping means of the yarn-trap released by the clip to retain the end of the yarn as the clip is returned from the end of its travel;

Fig. 14 is an end view of the yarn-trap showing the spring for actuating the gripping element.

In our above-mentioned Patent No. 2,638,936 we disclose a winding machine in combination with a loom and bobbin stripping means, wherein the winder furnishes wound bobbins to the loom, the loom discharges spent bobbins to the stripper, and the stripper furnishes stripped bobbins to the winder. The present invention provides, in such an organization, means to receive and hold the wound bobbins prior to their being placed in the loom shuttle, means to hold the end of yarn extending from wound bobbins, means to draw out or transport said end of yarn to said holding means, and means to stop the operation of the winder when a full supply of wound bobbins is available to the loom and to restart the winder operation when there is less than a full supply of bobbins.

GENERAL ORGANIZATION

Referring to the present drawings, Fig. 1 illustrates a portion of an automatic loom at the filling-changing end, automatically-operated bobbin-winding means, including bobbin donning-and-doffing mechanism, the magazine for receiving wound bobbins, and the mechanism for receiving and holding under tension the transfer-tails from the wound bobbins. The loom may be of conventional type as regards its general organization with its automatic filling-changing mechanism modified as required for co-operation with the bobbin-winding means; and the automatic winding means may be of a type such as shown in United States Letters Patent Nos. 2,257,651 and 2,302,715. The loom may comprise the usual reciprocating lay 2; shuttle 5 received in the box 6 at the end of the lay, the picker-stick 7 for driving the shuttle from this end of the loom, and the various other instrumentalities generally employed in automatic looms.

Bobbin-winding means

Inasmuch as the winding machine and its associated mechanisms are fully described in our above-mentioned Patent No. 2,638,936 only so much of them as is necessary to a complete understanding of the present invention will be described herein. The winding mechanism is incorporated in the frame 4 of the loom and located above the filling-changing mechanism with its driving means enclosed in a housing or casing 8 and driven by an electric motor enclosed in the casing. The winding spindle 10 projects from one end of the casing 8 and carries a recessed driving-member or spindle-cup 11 for receiving the head *h* of the bobbin *b* as shown in Fig. 3. The tip end of the bobbin *b* is likewise supported in the recess of a rotatable center 12 at the end of a stub-spindle or slidable plunger 13 held in an outboard bearing 15, similar to the tail-stock of a lathe. The outboard bearing 15 is shiftable to retract the outer spindle-center 12 and release a wound bobbin for doffing it from the winding spindle 10; the instrumentalities for effecting the doffing operation being described more in detail in the above-mentioned Patent No. 2,638,936.

Empty bobbin magazine

Mounted above the winding means is a magazine 20 for containing empty bobbins *b*, which may be of wood or other material in conventional shape with an enlarged head *h* at one end and a barrel tapering towards its opposite tip end. Preferably, bobbins *b* are of a type such as shown in United States Patent No. 2,614,771

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having a serrated ferrule *f* surrounding its barrel adjacent its head *h*.

The empty bobbins *b* are preferably conveyed to magazine 20 by means of a magnet 319 carried by conveyor belt 315. Magazine 20 and conveyor belt 315 which form no part of the present invention are explained in detail in our above-mentioned Patent No. 2,638,936. The bobbins are deposited in the trough 19 to cause them to slide therealong for positioning their heads to drop down in the chute 21 with their tip ends guided in the chute 22. Beneath the magazine 20 are pivoted arms or levers 23 and 24 carrying gripping means for grasping a bobbin from the magazine and carrying it down into position for engagement with the driving-center 11 on the winding spindle 10 and the outer spindle-center 12 as required for donning the bobbin to wind the yarn thereon.

Yarn-traversing means

The filling-yarn *y* is distributed on the bobbins *b* by means of a yarn-guide 25 which is traversed longitudinally thereof with a relatively short stroke by means of a reciprocating traverse-bar 26. The guide is fed progressively outward along the barrel of the bobbin *b* by advancing the traverse-bar 26 through the operation of suitable means enclosed in the casing 8. In this way the layers of yarn are deposited on the wooden bobbin in conical or tapered chases which build up to form the bobbin with a cylindrical body and tapering tip-end in the manner usually accomplished in filling-winding machines.

As the guide reaches a position adjacent the end of the bobbin *b*, an inclined cam-shaped projection 28 thereon, shown by full lines in Fig. 6 and dotted lines in Fig. 3, engages beneath a trip-element 30 fast on a control rod 31 rotatably held in bearings in the framework of the winding mechanism. This causes the control rod 31 to be rocked to release latching or detent-means for energizing the means for operating the donning and doffing mechanism of the winding means in a manner substantially the same as described in the two patents referred to above.

Bobbin-doffing means

The outboard bearing or tail-stock 15 is fastened to a rod or bar 34 reaching back into the casing 8 with its ends connected to a lever operated by a cam for sliding the rod to move the outboard-bearing 15 and spindle-center 12 toward the left to engage the spindle-center 12 with the bobbin, and to the right to disengage the bobbin when it is desired to doff the bobbin. Pressure from spindle-center 12 when it is in engagement with the tip end of the bobbin *b* holds its head *h* drivingly engaged with the spindle-center 11 when the bearing 15 is moved back toward casing 8. A spring 38 on the rod 34, see Figs. 3 and 6, is compressed and loaded when the outboard bearing 15 is moved toward the casing 8 to don an empty bobbin, means being provided for latching the rod against the force of the spring to retain the bearing in operative relationship. The latching means is released at the completion of winding each bobbin to cause the spring 38 to slide the rod 34 and move the bearing 15 to the right to doff the wound bobbin.

The operation of the means described above moves the outboard bearing 15 to retract the spindle-center 12 and release the bobbin to doff it from winding position and allow it to drop down into the magazine for wound bobbins in the manner as later explained.

Yarn-retriever and transfer-tail clip

In starting to wind on a newly-donned bobbin the yarn is fastened thereto by sliding it under the prongs or fingers *p* on the ferrule *f* surrounding the barrel of the bobbin. The yarn trailing from the doffed bobbin is severed and its end carried outward to a tensioning drum for holding it extended from the bobbin when the latter is trans-

ferred to the reserve magazine of the loom. The means for performing these several functions consists in a pair of slidable clips 83 and 84 arranged to travel first in one direction and then in the opposite direction in different parallel courses below the winding bobbin. The clips 83 and 84 are shown in detail in Figs. 10 and 11 and the means for sliding them in horizontal paths is illustrated in Fig. 6. A sort of rolling trolley is employed for this purpose, a reciprocable bar 85 moved by a lever in the casing 8 being connected to a carriage 87, on which are journaled two pairs of spur-gears. One pair of gears is constituted by a pinion 89 connected to a larger gear 90 arranged with the teeth of the pinion engaging the teeth on a fixed rack 91. The larger gear 90 of the pair has its teeth in mesh with a rack-bar 92 which is connected to the upper yarn-clip 83 for sliding it. The other pair of gears comprises a pinion 95 arranged with its teeth in mesh with those of a fixed rack 91 and connected to a larger gear 97 meshing with a rack-bar 94 which is fastened to the lower clip 83 for sliding it. Through this arrangement the motion transmitted to the rod 85 is multiplied to slide the two rack-bars 92 and 94 with an augmented length of traverse so as to travel the clips in opposite directions at accelerated rates of speed in the manner and for the purpose as more particularly pointed out hereinafter.

Referring to Figs. 10 and 11, the two clips 83 and 84 are of substantially the same construction and arrangement but reversed in position with the reentrant openings between their jaws facing in opposite directions. As shown in Fig. 10, the upper clip 83, called the retriever, consists in a rectangular mounting 100 of U-shape having a fixed jaw 101 formed by one of its depending side walls which is flared outwardly at its end. A movable jaw 102 of similar shape is loosely mounted on horizontal studs 103 and 104 projecting through the sides of the mounting 100 to adapt this jaw to rock toward the fixed jaw 101. A helical spring 105 coiled around the stud 103 acts to force the movable jaw 102 toward the fixed jaw 101 to clamp the yarn therebetween as it is entered between the flaring ends of the jaws. A cam-member 106 is slidably held on the under side of the mounting 100 by means of studs 107 and 108 projecting through slots 109 and 110 in said member. The slot 109 at the forward end of the cam-member 106 is of angular shape to cause this end of the member to be swung laterally as it is slid forward on the mounting 100. The cam-member 106 has a finger 112 projecting forwardly from its slotted portion and adapted to engage with a lug 113 depending from the outer end of the movable jaw 102 to cam said jaw away from the fixed jaw 101. Nuts 114 on the ends of the studs 107 and 108 are set up against the ends of a spring 115 which is formed with a central bowed portion bearing against the under face of the cam-member 106 to hold it in place and apply a slight friction to its sliding motion. The cam-member 106 slides against a plate 116 fastened to the under side of the mounting 100, the forward end of this plate being beveled on one side to coact with the edge of the forward finger 112 of the cam-member 106 during cooperation of the flaring ends of the jaws 101 and 102. The edges of the beveled end of the plate 116 and the finger 112 on the cam-member 106 are sharpened, as regards the construction of the clip 84, for cooperation in the manner of knives or shears to cut the length of yarn held between the jaws 101 and 102 as later explained. On the other hand, in the arrangement of the clip 83 the cam-member 106 overlies the upper face of the plate 116 with a clearance therebetween so that these parts do not act as shears. The clip 83 carries a blade-like element 117 fastened to the inner face of the depending side of the mounting 100 and formed at its forward end with an arcuate extension 118 employed for a purpose later explained.

As before noted, the clip 84 is of substantially the same construction and arrangement as that of the clip 83

and corresponding parts are referred to in the drawings by the same reference characters. As shown in Figs. 11 and 12, the clip 84 is provided with means for opening its jaws 101 and 102 without sliding the cam-member 106. For this purpose a cylindrical cam 120 is mounted to rotate on the stud 104. The end of the cam 120 is formed helically so that as it is turned on the stud 104 it will set against the rearward end of the movable jaw 102 to rock the latter; this end of the jaw being formed at an angle to its main portion to provide for the rocking action. A pin 121 projects radially from the cam 120 for rotating it to open the jaws 101 and 102 of the clip 84 at the end of its travel whereby to release the yarn therefrom after it is clamped above the rotary tensioning drum described later. The pin 121 strikes against a fixed abutment 126, see Fig. 3, which acts to rotate the cam 120 to open the jaws of the clip 84 at the end of its travel.

Referring to Figs. 3, 5 and 9, the two clips 83 and 84 are operated during the doffing of the wound bobbin and the donning of an empty bobbin in the manner as next explained. The clips slide in grooves 122 and 123 in the base of the framework of the winding mechanism, being moved toward and away from each other by the travel of the rolling carriage 87 under the operation of reciprocable bar 85. As the clips 83 and 84 meet and pass each other they continue their motion to engage the yarn trailing from the doffed bobbin and cause it to enter between their jaws. The yarn is entered between the flaring ends of the jaws 101 and 102 which are then closed together to clamp and hold the yarn. The closing of the jaws of the two clips is effected by sliding the cam-members 106 to cause them to release the movable jaw 102 on each clip and permit the spring 105 to force it against the fixed jaw 101. This sliding motion of the cam-members 106 is caused by their engagement with the beveled ends of a pair of rails 124 and 125 extending horizontally along the base of the framework, see Figs. 3, 10 and 11. As shown in Figs. 10 and 11, the cam-members 106 have rounded side portions 111 adjacent their forward ends which engage against the beveled ends of the rails 124 and 125 to slide the members rearwardly on the clips 83 and 84. As the cam-members 106 are slid in this manner they are rocked laterally to release the movable jaws 102 of the clips for clamping action by the springs 105. As the clips 83 and 84 continue their travel in opposite directions toward their stations the rounded side portions 111 of the cam-members 106 ride along the rails 124 and 125 with the movable jaws 102 released thereby and acting to clamp the yarn *y* against the fixed jaws 101.

Referring to Fig. 9, as the clips pass each other the cam-member 106 on the lower clip 84 is slid by its contact with the end of the rail 125 to not only cause the closing of the jaws, but also to move the shearing edge of the cam-member across that of the blade 116 to sever the length of yarn *y* leading between the clips. In this way the yarn trailing from the doffed bobbin is severed from the end in the yarn-guide 25 so that it may be carried to the tensioning drum in the manner as later explained.

The retriever-clip 83 which has clamped the end of the yarn *y* leading down from the yarn-guide 25 continues its travel to the left, as viewed in Fig. 9, and besides retrieving this end for attaching it to a newly donned bobbin *b*, it acts to return the yarn-guide 25 to initial winding position adjacent the head of the bobbin in the manner explained in the above-mentioned Patent No. 2,638,936.

Transfer-tail tensioning drum

Referring to Figs. 6, 7, 8, 12 and 13, the tensioning drum 170 which holds the end of the trailing yarn from the doffed bobbin is rotatably mounted in a recess or compartment 171 of the framework below the winding mechanism. The drum 170 is in the form of a sheet-metal cylinder supported by circular disks 172 and 173

at top and bottom of its interior. Projecting from the top of the cylinder 170 are a series of spaced teeth 175 inclined outwardly in the form of a comb which acts to catch the yarn carried to the drum by the clip 84, see Figs. 12 and 13.

Yarn-detention gripper

In order to prevent the end of the yarn *y* from pulling out or becoming detached from the teeth 175, means are provided for gripping it at a point within the confines of the comb as shown in Figs. 12, 13 and 14. This detention means consists of a flap-like gripper 176 having ears at its upper end pivoted on a pin 177 held in a bearing member 178 fastened to the framework at 179. A helical spring 180 coiled around the pin 177 has one end held fast and its opposite end 181 engaged against the gripper, see Fig. 14, to normally rock it downwardly. The lower edge of the gripper 176 is adapted to engage against a resilient pad 182, constructed of sponge-rubber or the like, across the top of which the yarn is drawn as it is carried toward the right by the clip 84, see Fig. 3. The yarn *y* is drawn under the lower edge of the gripper 176 as the latter is swung upwardly during the travel of the clip 84 toward the right as shown in Fig. 12. Pivoted on the pin 177 in the bearing 178 is a depending plate 183 with which the clip 84 first makes contact to swing it against the gripper 176 and lift the latter for the passage of the clip thereunder. As the clip 84 approaches the end of its travel it passes beyond the gripper 176 and releases it to swing downwardly under the force of the spring 180 to pinch the yarn against the top of the pad 182 and resist its release from the drum 170. During the rotation of the drum 170 the fingers 175 of the comb will carry the yarn onto the periphery of the drum under the bail 198, as shown in Fig. 7, to hold it under tension. The drum 170 preferably is covered with a roughened material such as fabric to prevent the yarn from slipping thereon. Means are provided for releasing the end of the transfer-tail from the clip 84 after the latter has connected the yarn to the drum 170. For this purpose an abutment 126¹ at the right-hand end of the framework, see Fig. 3, has a forwardly-projecting finger positioned to engage the pin 121 and rotate the cylindrical cam 120 to cause it to rock the movable jaw 102 of the clip 84 away from the fixed jaw 101 in the manner previously explained. When the clip 84 is returned in the opposite direction for positioning it to pick up the transfer-tail from the next doffed bobbin it must pass the gripper 176 and this is provided for by an opening 184 in the side of the gripper, see Fig. 14. During the further travel of the clip 84 to the left it strikes against the suspended plate 183 as indicated in Fig. 13 to rock the latter outwardly and pass thereunder. Means are provided for releasing the cylindrical cam 120 from the movable jaw 102 as the clip moves to the left toward its station. For this purpose an abutment member 127¹, see Fig. 3, is adjustably mounted on the front of the framework by means of a screw 128 engaging through a slot in said member. The member 127¹ has a right-angular portion disposed to adapt it to strike against the end of the cam-member 106 on the clip 84 to slide the latter forwardly. The abutment member 127¹ also has a finger 129 projecting forwardly from its end in position to strike against the pin 121 to rotate the cam 120 for releasing it from the movable jaw 102. In this way the parts of the clip 84 are reset with its jaws open for engaging the yarn at the next forward travel of the clip.

Transfer-tail tensioning drum enclosure

As the drum 170 is rotated a bail 198, see Fig. 7, acts to frictionally hold the end of the transfer-tail against the drum to tension the yarn as it is drawn downwardly therealong during the descent of the bobbin in the reserve magazine. It will be understood that as the bob-

bins descend in the reserve magazine they draw the transfer-tails leading therefrom downwardly along the drum 170 so that upon the release of each bobbin from the magazine its respective transfer-tail is disengaged from the drum to adapt it to be caught and held for threading in the eye of the loom shuttle. The drum 170 is enclosed in a two-part cylindrical casing 189 comprising a rearward stationary section 190 fastened to a wall of the framework by screws 191, see Fig. 7. Attached to this part 190 of the casing 189 is a tubular bearing 192 enclosing a pin 193, see Fig. 6, on which is hinged the forward section 195. The section 195 is adapted to swing outwardly to open the casing 189 for inspection of the drum 170. A spring, not herein shown, or other suitable means may be provided for holding the section 195 of the casing 189 closed. The hinged section 195 of the casing 189 has bearing lugs 196, see Fig. 7, at top and bottom for rotatably mounting the roller-bail 198 in contact with the periphery of the drum to press the yarn thereagainst.

Drum-rotating means

The drum 170 is rotated by ratchet-mechanism located therebelow and normally actuated from the reciprocation of the loom-lay, see Figs. 7 and 8. The drum 170 is mounted for rotation on a vertical stud-shaft 200 journaled in a bearing in the base 201 of the compartment 171 of the framework of the winding means. The stud-shaft 200 projects through a bore in the lower disk 173 of the drum 170 and the disk 172 at the upper end of the drum is rotatable on a shouldered stud 202 projecting downwardly from a portion of the framework. Fastened against a boss or hub 203 on the under side of the lower disk 173 is a ratchet-disk 204 formed with relatively fine teeth on its periphery. The ratchet-disk 204 is rotatable on a bushing enclosing a shouldered portion of the stud-shaft 200 and is secured rotatively with the disk 173 of the drum by means of two pins 205 passing therethrough. A pawl 208 pivoted to a member 209 which is fast on the stud-shaft 200 is resiliently held in engagement with the teeth on the ratchet-disk 204 by means of a leaf-spring 210 fastened to the member 209 at 211. Mounted fast on the lower end of the stud-shaft 200 is a triangular-shaped arm 212 carrying a pin 213 at its pointed end to which is connected a helical spring 214 anchored to a pin 215 fast in the base 201 and projecting downwardly therefrom. The triangular arm 212 has laterally-projecting pointed toe 216 at the opposite end from that connected to the spring 214. One edge of the toe 216 is adapted for engagement by a roller 220 on an oscillatable lever 221 which is pivoted on a pin 222 projecting below the base 201, see Fig. 8. The arcuately-shaped edge of the other arm of the lever 221 is positioned for engagement by a bunter 223 fastened to the top of the lay 2 of the loom. Through this arrangement the forward motion of the lay 2 causes the bunter 223 to strike the lever 221 and rock it on its pivot 222 to engage its roller 220 with toe 216 and rock the triangular arm 212. As before noted, the arm 212 is fast with the stud-shaft 200 and thereby causes the pawl-carrying member 209 to be rotated therewith to retract the pawl 208 rearwardly along the teeth of the ratchet-disk 204. Thus, when the bunter 223 recedes with the rearward stroke of the lay 2 the spring 214 will rotate the member 212 and advance the pawl 208 to rotate the ratchet-disk 204 and with it the drum 170 which turns in contra-clockwise direction as viewed in Fig. 7. This rotation is intermittent and continuous during the operation of the loom as effected by the reciprocation of the lay 2, the drum 170 being turned at a relatively slow speed since the pawl 208 is retracted only a few teeth at a time. To prevent reverse rotation of the drum 170 a brake-shoe 225, shown in Fig. 7, as pivoted on a stud 226, has an eccentric face engageable with the interior of the drum cylinder. A leaf-spring

227, shown in Fig. 7, tends to rock the brake-shoe 225 on its pivot so that normally it has substantially no braking effect against the interior of the drum cylinder when the latter is turned in the prescribed direction by the ratchet-means. However, any tendency for the drum 170 to turn in the opposite direction will cause the brake-shoe 225 to dog against its interior to resist such rotation.

Means for accelerating drum-rotation

It has been found of advantage to initially turn the drum 170 to a greater extent for insuring the attachment of the end of the transfer-tail thereto as the wound bobbin is held momentarily at the top of the reserve magazine. For this purpose a rockable lever 230 is pivoted at its upper end to a portion of the framework, see Fig. 6, to adapt its lower end to oscillate a horizontal lever 231 for actuating the ratchet-means described above. The lever 231 is pivoted on the stud-shaft 200 below the base 201 as shown in Figs. 7 and 8. The lever 231 carries a stud 232 projecting upwardly from its outer end with a convex-sided roller 233 journaled thereon and adapted to be engaged by the lower end of the lever 230. One side of the lever 231 is engageable with a lug 234 projecting upwardly from the triangular arm 212, see Fig. 6, whereby the rocking motion of the former will turn the latter to withdraw the pawl 208 a considerable distance rearwardly along the toothed periphery of the ratchet-disk 204.

The lever 230 is released by its actuating means at the end of the motion of the lever to the left as viewed in Fig. 6 whereupon a spring 228 connected at its lower end and anchored at 229 swings the lever in the opposite direction or toward the right. This latter movement of the lever 230 will release the lever 231 and allow the spring 214 to rotate the member 212 for advancing the pawl 208 to rotate the ratchet-disk 204. This action turns the ratchet-disk at a faster rate for rotating the drum 170 more rapidly to quickly draw the end of the yarn in the transfer-tail between the roller-bail 198 and the surface of the drum. In some instances it may be necessary to rotate the drum manually to wind on the end of a transfer-tail from a bobbin placed in the magazine and this may be accomplished by means of a finger-lever 235 shown in Fig. 7 as pivoted at 236 with its forward hooked end engaged with the roller 220 on the lever 221 which is operated by the bunter 223 on the lay of the loom.

The lever 230 is swung to the left as viewed in Fig. 6 by the traveling motion of the carriage 87 as it operates to traverse the clips 83 and 84 for the purpose previously explained. For this purpose the carriage 87 has a projecting stud 240 at its end adapted to strike against the end of a slidable rod 241 carrying a collar 242 fastened thereto. The collar 242 is adapted to engage the edge of the lever 230 to rock the latter toward the left as viewed in Fig. 6 to stretch and load the spring 228. When the carriage 87 reverses its motion to travel back in the opposite direction the lever 230 is released to swing toward the right and operate the ratchet-means in the manner as explained. As shown in Fig. 6, the lever 230 is connected by an angular link 243 to a bell-crank lever 245 pivoted in a casing 246. The bell-crank lever 245 is rocked by the lever 230 for actuating detention means for controlling the entrance of doffer bobbins into the reserve-magazine at the opposite side of the casing 246.

Reserve-magazine for wound bobbins

Referring to Figs. 1, 2, 3, 4 and 5, the reserve-magazine for wound bobbins is similar in general to the construction used in conventional automatic looms. The present invention contemplates certain improvements for controlling the entrance of each bobbin into the reserve-magazine to detain it on a rest or shelf for an interval while its transfer-tail is being held and tensioned by the

tensioning drum 170. The control means further provides for arresting the operation of the winding means when the magazine becomes filled with bobbins. As shown more particularly in Figs. 4 and 5, the reserve-magazine, indicated generally by the reference character 250, is provided at the top with a hinged rest or shelf 251 which sustains each bobbin for an instant while its transfer-tail is held by the gripper 176 above the drum 170 and attached thereto by the accelerated rotation of the latter. The shelf 251 is hinged to the vertical wall of the casing 246, previously referred to, to adapt it to swing downwardly to release the bobbin and allow it to drop down in the magazine 250. The wound bobbins B are thus supplied to the reserve magazine 250 in overlying relationship at the rear of the usual filling fork with the lowermost bobbin in position to be transferred to the shuttle by the transfer-hammer 252 shown in Fig. 1.

Bobbin-detaining means

The bobbin-detention shelf 251 is maintained raised in horizontal position by means of a lever 253 pivotally supported on a shaft 254 within the casing 246 and formed with a curved finger 255 projecting through an opening in the forward wall of the casing with its end engaging the under side of the shelf, see Fig. 5. The lever 253 is held in the position shown in Fig. 5 with the shelf 251 raised by means of a spring 249 on its shaft 254, see Fig. 6. After a relatively short interval the doffed bobbin B is released from the shelf 251 by the action of the mechanism contained in the casing 246, see Fig. 6, and previously referred to. The three-armed bell-crank lever 245, previously mentioned, has one of its arms 256 carrying a pin 257 engageable through a slot 258 in a vertical link 259. The upper end of the link 259 is pivotally connected to an arm 260 reaching outwardly from the lever 253 which supports the shelf 251. When the drum-accelerating lever 230 is swung to the left by the travel of the carriage 87 the connecting link 243 will rock the bell-crank lever 245 to cause its arm 256 to raise the vertical link 259 and thereby rock the lever 253 to withdraw its curved finger 255 from under the shelf 251. The shelf 251 is thereupon allowed to swing downwardly to release the bobbin held thereon and cause it to drop by gravity to the magazine 250. Clamping means, to be described in the continuing application referred to above, are provided for engaging the heads of the bobbins to hold them from turning in the magazine, the clamps being released automatically to permit the bobbins to slide down in the magazine as each lowermost one is transferred to the shuttle of the loom.

Full-magazine control for stopping winding means

The bell-crank lever 245 which operates the lever 253 to release the detention-rest or shelf 251 also has another function, namely, to arrest the operation of the winding means when the reserve magazine becomes filled with wound bobbins. The stopping mechanism for the winding means may be either mechanically or electrically operated and as herein shown a so-called "micro-switch" 275 is employed, see Fig. 6, for opening the circuit to the electric motor which drives the winder. The switch contains contact members for closing the circuit and by actuating it the circuit is opened in the usual way. For this purpose a rockable arm 276 is connected to the upright arm 277 of the bell-crank lever 245 with its forward end formed with an arcuate cam-piece 278. The cam-piece 278 is adapted to ride against a roller 279 on an arm 280 projecting from the side of the switch 275. The arm 276 is formed with a longitudinal slot 281 slidably engaged by a pin 282 projecting from the vertical link 259 which controls the position of the bobbin-detention shelf.

Normally, when the link 259 is raised by the rocking

of the bell-crank lever 245 to release the lever 253 from the shelf 251 the arm 276 will be slid to the right as viewed in Fig. 6 so that its cam-piece 278 will clear the roller 279 connected to the switch 275. Consequently, the circuit will remain closed to supply current to the winder. When, however, the magazine 250 becomes filled with bobbins and the last-entered one holds the shelf 251 depressed the above-described mechanism will function to operate the switch 275 and open the circuit to interrupt the flow of current to the motor; thereby arresting the operation of the winding means. This last described action is caused by the link 259 being lifted and held raised through its connection at 260 with the shelf 251 when the latter remains depressed by a bobbin resting thereon. As the bell-crank lever 245 returns to its rest position shown in Fig. 6 the arm 276 is slid to the left, and due to said arm being held in raised position by the link 259, as permitted by its pin-and-slot connection with the lever 245 at 281, 282, the cam-piece 278 on the arm engages with the roller 279 on the switch-lever 280 to actuate the switch 275 and open the circuit to the winder driving motor. The switch 275 is thereby operated to open the circuit to the motor and arrest the operation of the winding means until a bobbin has been transferred from the magazine 250 and the bobbins thereabove lowered to release the shelf 251. As the shelf 251 is released and the parts restored to first position the link 259 drops to the position shown in Fig. 6 and thereby rocks the arm 276 downwardly to remove the cam-piece 278 from the roller 279 to permit the switch 275 to operate to close the circuit to the motor and restart the winding means. Means are also provided for releasing the clamping means in the magazine to free the bobbins so that they cannot jam therein and prevent the release of the bobbin detained on the shelf 251. Such means are shown at the right in Fig. 6 and described in detail in a continuing application to be filed later.

Since certain changes may be made in the above apparatus without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a winding machine having a supply of yarn to be wound the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn from said supply longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, yarn cutting means for severing the strand of yarn extending from a discharged wound package to said supply to leave a free end of yarn on said package, and yarn transporting means for gripping and carrying the free end of yarn from packages in said package receiving means to said yarn holding means, said yarn cutting means and said yarn transporting means being actuated by said driving means.

2. In a winding machine having a supply of yarn to be wound the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn from said supply longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, yarn cutting means for severing the strand of yarn between a discharged wound package and said supply to leave a free end of yarn on said package, and yarn gripping and transporting means having said yarn cutting means mounted thereon for gripping and carrying the free end of yarn from packages in said package receiving means to

said yarn holding means, said yarn cutting means and said yarn transporting means being actuated by said driving means.

3. In a winding machine having a supply of yarn to be wound the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn from said supply longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, yarn cutting means for severing the strand of yarn between a discharged wound package and said supply to leave a free end of yarn on said package, and movable yarn transporting means for gripping and carrying the free end of yarn from packages in said package receiving means to said yarn holding means, said package receiving means being positioned to hold the strand of yarn extending from a wound package received therein to said supply in the path of said transporting means and said cutting means, said cutting means and said transporting means being actuated by said driving means.

4. In an automatic winding machine having a winding cycle wherein a package of yarn is wound and a preparatory cycle wherein a wound package is doffed and an empty bobbin donned the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, and yarn transporting means actuated by said driving means during said preparatory cycle for gripping and carrying a length of yarn from wound packages in said package receiving means to said yarn holding means.

5. In a winding machine the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, and reciprocable yarn transporting means having a transporting stroke actuated by said driving means for carrying a length of yarn from wound packages in said package receiving means to said yarn holding means, said transporting means including a clip having a pair of relatively movable jaws, means for moving said jaws together at the beginning of said transporting stroke to cause said jaws to grip said strand of yarn, and means for opening said jaws at the end of said transporting stroke to release said strand of yarn to said holding means.

6. In a winding machine the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn longitudinally of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, and reciprocable yarn transporting means having a transporting stroke actuated by said driving means for carrying a length of yarn from wound packages in said package receiving means to said yarn holding means, said transporting means including a clip having a pair of relatively movable jaws and a cam operably connected to and movable relative to said jaws, means for moving said cam relative to said jaws at the beginning of said transporting stroke to move said jaws together to grip said strand of yarn, and means for opening said jaws at the end of said transporting stroke to release said strand of yarn to said holding means.

7. In a winding machine the combination comprising a rotatable spindle for rotating a bobbin to be wound, a yarn guide for traversing a strand of yarn longitudinally

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of a bobbin rotated by said spindle, means for driving said spindle and guide to wind a package of yarn on said bobbin, means to receive wound packages discharged from said spindle, yarn holding means, yarn transporting means for carrying a length of yarn from wound packages in said package receiving means to said yarn holding means, and a reciprocable rack actuated by said driving means for moving said yarn transporting means.

8. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means to position said bobbin, means for seizing an end of the yarn wound on said bobbin, yarn holding means including a rotatable drum for holding said end of yarn in a predetermined position, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said holding means.

9. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means for seizing an end of the yarn wound on said bobbin, yarn holding means spaced from said bobbin and including a rotatable drum for holding said end of yarn in a predetermined position, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said holding means.

10. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means for seizing an end of the yarn wound on said bobbin, yarn holding means including a rotatable drum for holding said end of yarn in a predetermined position, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said holding means.

11. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means for seizing an end of the yarn wound on said bobbin, yarn holding means for holding said end of yarn in a predetermined position, gripping means adjacent said holding means to receive said end of yarn from said seizing means and hold it in position to be engaged by said holding means, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said gripping means.

12. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means to position said bobbin, means for seizing an end of the yarn wound on said bobbin, yarn holding means including a rotatable drum spaced from said bobbin for holding said end of yarn in a predetermined position, gripping means adjacent said holding means to receive said end of yarn from said seizing means and hold it in position to be engaged by said holding means, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said gripping means.

13. In a mechanism to operate on a wound bobbin of yarn to arrange said bobbin for a subsequent operation the combination comprising means to position said bobbin, means for seizing an end of the yarn wound on said bobbin, yarn holding means including a rotatable drum spaced from said bobbin for holding said end of yarn in a predetermined position, gripping means adjacent one end of said drum to receive said end of yarn from said seizing means and hold it in position to be engaged by said holding means, and actuating means for said seizing means to cause said seizing means to transport said end of yarn to said gripping means.

14. In combination with a loom having a lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by said lay for rotating said drum substantially continuously, and

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means for holding a portion of said transfer tail in contact with the periphery of said drum.

15. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means including a ratchet actuated by the reciprocation of said lay for rotating said drum substantially continuously, and means for holding a portion of said transfer tail in contact with the periphery of said drum.

16. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by the reciprocation of said lay for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, and a tooth projecting from said drum for guiding said transfer tail between said last mentioned means and the periphery of said drum.

17. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by the reciprocation of said lay for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, and a tooth projecting from said drum adjacent one end thereof to engage said transfer tail when it is laid across said end of said drum for guiding said transfer tail between said last mentioned means and the periphery of said drum.

18. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by the reciprocation of said lay for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, and yarn gripping means adjacent said drum to receive said transfer tail and hold it until said tail is engaged by the periphery of said drum and said last mentioned means.

19. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by the reciprocation of said lay for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, a tooth projecting from said drum adjacent one end thereof to engage said transfer tail when it is laid across said end of said drum for guiding said transfer tail between said last mentioned means and the periphery of said drum, and yarn gripping means adjacent said end of said drum to receive said transfer tail and hold it in position to be engaged by said tooth.

20. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, a plurality of upstanding teeth at one end of said drum, means actuated by the reciprocation of said lay for rotating said drum, means for holding a portion of said transfer tail in contact with the periphery of said drum, yarn gripping means including a pad within the confines of said teeth and a pivoted flap-like member adapted to engage said pad to hold said transfer tail between said flap-like member and said pad for engagement by said teeth whereby

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said teeth position said transfer tail for engagement by the periphery of said drum and said holding means.

21. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by said loom for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, and a tooth projecting from said drum for guiding said transfer tail between said last mentioned means and the periphery of said drum.

22. In combination with a loom having a reciprocating lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, means actuated by said loom for rotating said drum substantially continuously, means for holding a portion of said transfer tail in contact with the periphery of said drum, and yarn gripping means adjacent said drum to receive said transfer tail and hold it until said tail is engaged by the periphery of said drum and said last mentioned means.

23. In combination with a loom having a reciprocating

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lay, means to hold a supply of wound filling bobbins each having a length of the yarn wound thereon extending therefrom to form a transfer tail, a transfer tail holding mechanism comprising a rotatable drum, a plurality of upstanding teeth at one end of said drum, means actuated by said loom for rotating said drum, means for holding a portion of said transfer tail in contact with the periphery of said drum, yarn gripping means including a pad within the confines of said teeth and a pivoted flap-like member adapted to engage said pad to hold said transfer tail between said flap-like member and said pad for engagement by said teeth whereby said teeth position said transfer tail for engagement by the periphery of said drum and said holding means.

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