[54] AUTOMATIC LOOM FILLING WINDER

[75] Inventor: James T. Blakely, Laurens, S.C.

[73] Assignee: Blakely Industries, Greenville, S.C.

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[56] References Cited

UNITED STATES PATENTS
2,638,936 5/1953 Goodhue et al. .......... 139/224 A
2,766,779 10/1956 Goodhue et al. ........... 139/247
3,411,550 11/1968 Jenkins, Jr ............... 139/247
3,452,784 7/1969 Sides ................. 139/247
3,194,278 7/1965 Grob ................... 139/247
956,726 5/1910 Northrop ................. 139/247
3,175,588 3/1965 Angle ................... 139/256

OTHER PUBLICATIONS
The New Unifil Loom Winder Improves Your Weaving Operations Leesona Corp. 1962, 23.2.28 2M 790-S-25103

Primary Examiner—James Kee Chi
Attorney, Agent, or Firm—B. P. Fishburne, Jr.

[57] ABSTRACT

An assemblage of several parts in the nature of guides or restrainers for yarn ends is attached to the magazine section of the automatic loom filling winder on a typical fly shuttle loom. These attachment parts greatly increase the efficiency of operation of the magazine section particularly at the critical time of transfer of fully wound bobbins from the magazine into the shuttle. The tendency for very fine filling yarns of the types possessing low coefficients of friction to move improperly across the yarn ends drum and to become entangled is successfully eliminated by the invention. Additionally, at the critical transfer time, each yarn end is directed to the center or region of maximum gripping pressure of a clamping means which must hold the yarn ends securely at the time of transfer. The invention in no way interferes with the normal cycle of operation of the automatic loom filling winder and, in fact, assists this cycle of operation.

9 Claims, 6 Drawing Figures
AUTOMATIC LOOM FILLING WINDER

BACKGROUND OF THE INVENTION

U.S. Pat. No. 2,638,936, issued to W. V. Goodhue et al., May 19, 1953, essentially discloses an automatic loom filling winder applicable to a typical Draper Model XD fly shuttle loom. Such on loom filling winder has many recognized advantages and is now in wide use in a form well known as the "UNIFIL." loom winder manufactured and sold by Leesona Corporation of Warwick, Rhode Island.

As fully disclosed in the above-noted Goodhue et al. patent, the "UNIFIL." loom winder performs several important functions:
1. holds an adequate supply of filling yarn on an adjacent stand;
2. automatically winds the filling yarn onto the well-known quill or filling bobbin;
3. holds a reserve supply of fully wound quills or bobbins on the loom;
4. automatically transfers full quills or bobbins into the shuttle while ejecting spent bobbins;
5. strips off the bunch waste from each expelled bobbin;
and
6. returns the cleaned bobbin to the winder section of the apparatus.

Automatic loom filling winders of the above type have been in commercial usage in weavng rooms since about 1956, and at least 200,000 units have been sold and utilized for a wide range of filling counts or deniers. Despite the recognized economies effected by the use of the automatic loom filling winder, serious difficulties are encountered in the use of the winder with some types of yarns, in particular very fine filling yarns, such as 15 denier monofilament yarns and the like which inherently have a low coefficient of friction.

A great need exists in the industry for the use of such fine filling yarns in connection with the automatic filling winder and the overall objective of the invention is to provide simple attachment means on the automatic loom filling winder, particularly in the magazine section thereof to enable the winder to successfully and efficiently operate with the very fine slippery types of filling yarns.

In the absence of the present invention, a good deal of difficulty was experienced in the operation of the automatic loom filling winder particularly in the magazine section immediately before and at the critical period of transfer of a filled bobbin into a loom shuttle. Part of this difficulty is caused by the fact that the fine filling yarns do not move properly or at the same time in relation to the yarn ends drum of the winder mechanism which serves to maintain the yarn ends of the wound bobbins extended and separated prior to transfer and at the time of transfer. The fine yarns frequently move erratically over the vertical axis yarn ends drum and thus become entangled or twisted together. Consequently, at the time of transfer of a new bobbin into a shuttle, the yarns from two or more bobbins in twisted relation, or a single yarn end from an improper bobbin, may be delivered into the clamping or gripper means which secure the yarn end of each full bobbin at the moment of transfer under normal conditions. In the tangled or displaced condition described above, filling yarns are likely to break and stop the loom and/or cause a defect known as a broken pick or bad transfer.

In essence, to overcome the above defects of the prior art, several simple attachment parts are provided in the magazine area to aid first in the proper guidance of yarn ends from the newly wound bobbins to the vertical axis yarn ends drum and for the gradual movement of the yarn ends down along the periphery of the drum in evenly spaced generally parallel relationship. Further attachment elements forming a part of the invention prevent the lowermost bobbin in the magazine at the ready position for transfer into the shuttle from having its yarn end disengage the yarn ends drum prematurely before the transfer takes place so that the yarn end will miss the holding clamps, resulting in a bad transfer. Additional attachment elements in the invention assure the placement of the lowermost yarn end consistently in the clamp mechanism at the most advantageous point near the center of the clamp where the gripping force is the greatest. This is necessary in connection with very fine monofilament filling yarns and the like, and without this part of the invention the transfer frequently is not made properly and the efficiency of the entire loom filling winder is greatly lessened.

The several attachment components embodied in the invention, therefore, coact in a unique manner to improve the efficiency of the loom filling winder in connection with all types of filling yarns in particular to improve its efficiency with very fine yarns of the type having a low coefficient of friction. In effect, the invention allows the highly advantageous automatic loom filling winder to have greater versatility and a wider range of usage in connection with present day weaving requirements. No alteration of the basic construction or mode of operation of the commercial loom filling winder is required, and only a very small cost is involved in attaching thereto the few simple components which make up the invention.

Other features and advantages of the invention will become apparent during the course of the following detailed description.

BRIEF DESCRIPTION OF DRAWING FIGURES

FIG. 1 is a fragmentary front perspective view of the mid-portion or magazine section of an automatic loom filling winder embodying the invention.

FIG. 2 is a perpective view of a yarn end clamping device and guide means in an inactive or non-clamping position.

FIG. 3 is a further perspective view of the clamping device in the active position at the time of transfer of a wound bobbin from the magazine into the shuttle of the loom.

FIG. 4 is a perpective view of the clamping device and associated guide means looking at the opposite side of the device from that shown in FIG. 2.

FIG. 5 is a side elevation of a yarn guiding and restraining element forming a part of the invention.

FIG. 6 is a side elevation showing a modified form of the element in FIG. 5.

DETAILED DESCRIPTION

Referring to the drawings in detail wherein like numerals designate like parts throughout the same, the numeral 10 designates the magazine section of an automatic loom filling winder of the type disclosed in the aforementioned patent to Goodhue et al., U.S. Pat.
No. 2,638,936. For the purpose of simplicity of disclosure, the teachings of the Goodhue et al. patent are hereby incorporated totally into this application by reference, thus rendering it unnecessary to fully describe the construction and operation of the complete filling winder.

As is well known to anyone skilled in the art and as fully disclosed in said prior patent, the automatic loom filling winder embodies a winder section which is uppermost, a storage magazine section for wound bobbins which is below the winder section, and a stripper section which is lowermost in the overall winder apparatus. The present invention which consists of several simple attachment parts is applicable to the intermediate or magazine section and therefore the application drawings purposely show only the magazine and associated component parts for the sake of simplicity.

In connection with the overall automatic loom filling winder, it may be briefly stated that the upper winder section receives empty bobbins and winds filling yarn thereon and then delivers the filled bobbins in succession to the storage magazine shown in FIG. 1 of this application where they remain until transferred into the shuttle. This transfer is accomplished in exactly the same way as it takes place on any battery equipped loom. The empty bobbins ejected from the shuttle when each new full bobbin is placed therein drop through a chute into the stripper section of the apparatus where the remaining bunch is removed. A conveyor belt with magnetic means attached picks up the stripped bobbins and carries them in succession upwardly to the empty bobbin magazine of the winder, thus completing an automatic cycle of operation. There is an adequate supply of filling yarn on a rack at the top of the winder apparatus delivering filling yarn constantly through a tension mechanism to the winder means which is power-operated by an electric motor. The stripper is powered by a pulley and belt system from the loom drive gear. As mentioned above, all of this is conventional and well-known and fully disclosed in the Goodhue et al. patent.

Referring to FIG. 1 of the drawings, the uppermost full bobbin or Gill 13 has just been wound in the upper winder section of the automatic loom filling winder, not shown, and upon completion, the rotation of the bobbin has been interrupted automatically and it has dropped down to occupy the top position in the magazine or storage section 10 of the apparatus. As the bobbin 13 enters the top of magazine 10, FIG. 1, its filling yarn 16 has not yet been severed from the overhead supply package, not shown. Immediately following entry of the bobbin 13 into the magazine, however, the leading end 16 of yarn from this bobbin is cut and held by a conventional yarn carrier means 16a and deposited thereby on top of yarn ends drum 14 which is also a conventional component in the middle section of the loom filling winder. This drum is a vertical axis drum whose periphery rotates from left to right as viewed in FIG. 1. The drum 14 is typically covered with a section 14a of rabbit fur and a strip 14b of stiff nylon bristles. The periphery of the rotating drum 14 is partially covered by a close fitting cylindrically curved door 17.

As the now-severed yarn end 16 is laid down on the top of the drum 14 by the carrier means 16a, a top tension 15 on the drum will catch the yarn end 16 and cause it to be forced between the drum proper and the door 17 in a conventional and well known manner.

Continued rotation of the drum 14 will cause the end 16 to gradually move down to a position parallel to the next lowermost yarn end 18 of the next lowermost horizontally disposed wound bobbin 19 in the magazine 10. All of the bobbins in the magazine are securely held, thus preventing their rotation and any unwinding of their filling yarn from the bobbins and onto the drum 14. The rotating drum 14 merely exerts a continuing combing and light holding force on the several ends of yarn extending from the bobbins in the magazine to keep such ends separated and individually supported and the drum does not pull or unwind filling yarn from the bobbins in the magazine.

Upon each transfer of the lowermost bobbin 21 from the magazine into the shuttle, a conventional clamp means, not shown, in the magazine 10 holding the butts of the bobbins, releases the bobbins and they all drop downwardly in the magazine so that another bobbin will assume the lower position ready for transfer and room is made at the top of the magazine for the next full bobbin to be dropped downwardly from the winder means. As this downward movement takes place in the magazine, the several yarn ends 16, 18, etc. will all automatically seek a new lower position on the drum 14 in general parallelism so as to maintain the general arrangement shown in FIG. 1 where the ends are well separated and generally parallel and taut. With most yarns, there is little or no problem in the yarns moving downwardly together to assume their new positions on the rotating drum 14. However, very fine yarns and those having low coefficients of friction, such as for example 15 denier monofilament yarns, sometimes do not move on the drum in unison and therefore will move over and across one another and become entangled. As progressive transfers of bobbins into the shuttle occur, the ends on the revolving drum 14 may become more twisted together and therefore the yarn end 34 from the lowermost bobbin 21 in the magazine ready for transfer may sometimes be entwined with two, three or more yarn ends coming from other bobbins in the magazine. This condition causes the yarns from the incorrect bobbin to be fed into the clamping means shown in FIGS. 2 and 3 for holding during the actual transfer operation. This can cause the filling yarns to break and stop the loom and/or cause a broken pick or "bad transfer" as the defect is sometimes termed in the art.

To avoid these difficulties and others, particularly in the handling of fine low friction yarns, the invention has been conceived and developed as a simple attachment kit having a number of parts which intimately coact to improve the efficiency of operation of the magazine section of the filling winder apparatus, as above discussed. More particularly, a blade-like element 22 formed of sheet metal or plastic is mounted securely at 23 to the front face of the magazine section between the several bobbins and the yarn ends drum 14. The element 22 is essentially a right angular member including a mounting flange 22a and a yarn end guiding portion 22b having a longitudinal guidance edge 22c which slants inwardly gradually toward its upper end. Therefore, the upper terminal of the straight guidance edge 22c is considerably closer to the front face of the magazine than is the lower terminal of this straight edge. The degree of inclination to the vertical for the guidance edge 22c is approximately 24°. Below the lower terminal of the guidance edge 22c,
there is a relatively short reversely inclined edge portion 24 for a purpose to be described forming with the straight edge 22c a lower corner 24a which is the point defining the maximum distance on the element 22 from the front face or wall of the magazine section. The edges 22c and 24 form a total included angle of approximately 100°.

The guidance edge 22c has the effect, when engaging the yarn ends 16, 18, etc., of maintaining them properly spaced or separated while somewhat retarding their downward movement over the periphery of the rotating drum 14 to thus avoid the twisting together and entanglement of plural yarn ends, as described. The point or corner 24a is most important as it provides a further and final means to separate the lowermost pairs of ends 34 and 35a near or at the moment of transfer. The reversely sloping edge portion 24 below the corner 24a will tend to further lower the yarn end 34 on the drum 14 to the point where the end could be guided off of the drum before transfer of the bobbin 21 occurs and such action would be undesirable. To counteract this tendency which could result in a bad transfer, another attachment part 25 in the form of a sheet metal or plastic guide is attached to the front of the magazine 11 with suitable screws or other attaching means. The yarn end 34 extending from bobbin 21 to the rotating drum 14 is prevented from seeking too low a position by the top edge 26 of an outwardly approximately right angular extension 26b on the element 25. Another forwardly directed flange 26a on the element 25 of lesser width than the extension 26b serves to prevent any of the descending yarn ends from bobbins in the positions 20 or 21 from passing under the bottom of the magazine 10, which is undesirable.

Occasionally, as the rabbit fur covering and nylon bristles on the drum 14 become worn or when foreign matter is lodged on the interior face of the door 17, a yarn end is prematurely directed to the bottom of the drum and drops off at the bottom before the transfer of the bobbin 21 causing the clamping means in FIGS. 2 and 3 to miss that particular yarn and thus cause a bad transfer defect in the cloth. Referring again to FIG. 1, to prevent this occurrence, a support wire 27 is securely attached to drum support plate 28 in very close relation to the drum 24 although not contacting its periphery so as to interfere with its rotation. However, the wire 27 is sufficiently close to the drum 14 to prevent the yarn end 34 in the ready-for-transfer position to go low enough to drop off of the bottom of the drum prematurely, and thus the wire element 27 forms the third attachment component making up the total invention, together with the previously-described parts 22 and 25.

FIGS. 2, 3 and 4 show additional elements of the invention employed in conjunction with the conventional yarn end clamping means 38 located on a horizontally moving sliding support or bracket 38c which retracts under the bottom of magazine 10 at the time of transfer. The clamping mechanism is omitted in FIG. 1 to avoid hiding other components of the invention which are shown in that figure. The moving support bracket 38c is also visible in FIG. 4 and is located near the elevation of the drum support plate 28. The device which clamps each separate yarn end 34 at the moment of transfer of the lowermost bobbin 21 into the shuttle comprises a pair of opposing preferably serrated clamp elements 36 and 37 formed of rubber-like material which are shown separated in FIG. 2 and actively engaged to grip the yarn end 34 at the moment of transfer in FIG. 3, the yarn end 34 in FIG. 2 being not yet engaged by the clamp device but being in the ready position for the transfer operation.

More particularly, at the instant of transfer, the sliding bracket 38a with clamp section 36 is moved rearwardly toward the front of the magazine 10 and toward the relatively stationary clamp section 37 which is not on the bracket 38a but on another fixed bracket. It is desirable, particularly in connection with fine slippery type filling yarns, that each end 34 be engaged and gripped near the vertical center of the clamp sections 36 and 37, which is the point of maximum pressure or grip, FIG. 3. To assure this mode of operation, another guiding element of the invention indicated at 30 is attached suitably to the bracket 38a to move therewith. As shown in FIGS. 2 and 4, the element 30 formed of sheet metal or the like is rearwardly tapering and has a level upper edge 30a and an inclined bottom edge 30b disposed at about 35° to 40° below the horizontal. As this inclined guidance edge 30b retracts with the bracket 38a and clamp section 36, it will engage the end 34 and assure that such end is moved downwardly into a notch 39 of the bracket 38a. In this notch, the end 34 is properly held by the element 30 for gripping between the clamp sections 36 and 37 at the most advantageous point of maximum pressure at the vertical center of the clamp device.

Additionally, the invention preferably embodies a bumper piece 31 on the retractable bracket 38a covered with rubber and a supporting element 32 for the piece 31 to which the latter is secured in a conventional manner. The parts 31 and 32 are actually original equipment on the automatic loom filling winder but are slightly modified in the invention. The rubber pad on the bumper piece 31 which limits the retraction of bracket 38a is softer than the rubber customarily employed. The supporting element 32 is positioned a slightly greater distance forwardly from the front of magazine 10 so that the bracket 38a will have a slightly greater retraction stroke, namely, an increased stroke of about ¼ inch. These relatively minor changes contribute significantly, however, to the increase in efficiency of the apparatus at the critical time of transfer of the bobbin 21 to the shuttle.

It may now be seen that the several attachment parts which make up the invention work together to improve the operation of the automatic loom filling winder, particularly in connection with the use of very fine slick yarns, such as 15 denier monofilaments. The element 22 with the long inclined edge 22c maintains the ends 16, 18, etc., properly separated and parallel as they are guided downwardly across the rotating drum 14. The lower corner 24a assures a distinct separation of the ends extending from the two lowermost bobbins 20 and 21 near the point of transfer where entanglement is the most likely to occur without the use of the invention and is the most serious if it does occur in causing a bad transfer or other defect. The elements 26b and 26a work with the aforementioned parts to prevent the lowermost yarn end 34 from prematurely leaving the bottom of the drum 14 or passing under the bottom of the magazine before the clamping device 38 can be effective to hold the end 34 at the moment of transfer. The wire element 27 additionally assists in preventing the yarn end 34 from prematurely dropping off of the drum.
14. Finally, at transfer, the parts 30, 31 and 32 improve the operation of the clamp means 38 so that the fine yarn 34 will be efficiently gripped at the maximum pressure point of the two clamp sections 36 and 37, as described. The inclined edge 30e acting on top of the end 34 during retraction of the bracket 38a assures that the end is forced down into the notch 39 of the bracket 38a and held there until the clamping jaws are closed upon the yarn end. The numeral 35 shows the position of the lowermost end at transfer after separation from the drum 14 and being held by the gripping or clamping device. Also, at this point, the yarn end 35 is being further supported and restrained by a forwardly projecting wire guide element 40 secured at 23 to the magazine. The end 34, on the other hand, is shown in the position immediately before but ready for transfer. Thus, the several attachment parts in the invention perform together as a unit to produce the desired result of enabling the automatic loom filling winder to do its work more efficiently and to handle certain filling yarns which heretofore without the invention it cannot handle successfully.

In FIG. 6, a modified guide and restraining element 22' has the identical edge profile of the element 22 and serves exactly the same purposes previously described for the element 22 in the invention. The only difference is that the mounting flange 22a has been omitted so that the element 22' can be attached to the magazine in the exact position shown in FIG. 1 by a different form of fastener which engages the narrow slot shown near the center of the modified element 22'.

It is also pointed out in connection with FIG. 1 that the clamping means 38 of FIGS. 2, 3 and 4 is shown schematically in phantom lines in the position which the clamping means occupies.

It is to be understood that the form of the invention heretofore shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

1 claim:

1. A guidance and control system for an automatic loom filling winder having a magazine section where full bobbins are collected prior to transfer one at a time into a loom shuttle and a coating yarn ends rotary drum which serves to maintain ends of yarn extending from the full bobbins in the magazine section extended and separated, and a coating yarn end clamping device to hold each end securely at the moment of transfer and including at least one movable jaw, said guidance and control system comprising a blade-like member fixed to the magazine section between said bobbins and rotary drum and having a generally vertical but slightly inclined engaging edge over which the yarn ends from the full bobbins in the magazine section are extended while engaging the periphery of said drum, the upper terminal of said edge spaced a lesser distance from the front of the magazine section than the lower terminal of the edge, there being an abrupt corner at the lower terminal of the edge stranded by the two lowermost yarn ends extending from the two lowermost bobbins in the magazine section, an additional supporting and guide means for at least the lowermost yarn end expanding from the lowermost bobbin in the position ready for transfer into a shuttle and preventing premature separation of the lowermost yarn end from the rotary drum, and an additional yarn end engaging element having an inclined edge carried by said movable jaw of the clamping device and bearing down on the lowermost yarn end when the movable jaw shifts toward the opposing jaw of the clamping device to assure the most efficient gripping engagement of said jaws with the lowermost yarn end at transfer.

2. The structure of claim 1, and said additional supporting and guide means comprising a plate member secured to the front of the magazine section between said blade-like member and said rotary drum and having a substantially horizontal forwardly projecting edge underlying the lowermost yarn end and lending support to the same.

3. The structure of claim 2, and an additional restraining element for the lowermost yarn end disposed close to the periphery of the rotary drum and secured to the base mounting element of the drum and blocking premature separation of the lowermost yarn end from the drum near the bottom of the drum.

4. The structure of claim 1, and said additional yarn end engaging element having an inclined edge comprising a plate element of generally triangular configuration mounted upon support means for said movable jaw at an elevation which causes the inclined edge to ride over the lowermost yarn end when the movable jaw is retracted, the inclined edge then gradually forcing the lowermost yarn end downwardly to a position where the lowermost yarn end will be effectively gripped near the center and near the point of maximum pressure of the jaws of said clamping device.

5. The structure of claim 1, and said blade-like member additionally having a relatively short reversely inclined bottom edge portion below said abrupt corner and sloping downwardly from said corner.

6. The structure of claim 5, and said generally vertical but slightly inclined engaging edge having an angle of inclination to the vertical of approximately 22° to 26°, and said inclined engaging edge forming with said short reversely inclined bottom edge a total included angle of approximately 105° to 115°.

7. The structure of claim 3, and said additional restraining element being a generally L-shaped rod element having an uppermost projection lying close to the periphery of said drum and an upper horizontal arm arranged generally tangentially of the drum periphery, said element disposed substantially at the forward side of said drum.

8. The structure of claim 2, and said additional supporting and guide means comprising a mounting plate portion attachable to the front of the magazine section and a substantially right angular forwardly projecting flange, said flange including said substantially horizontal forwardly projecting edge and additionally including an inclined edge offset inwardly and forming generally a right angle with the horizontal forwardly projecting edge and extending upwardly therefrom for a considerable distance.

9. The structure of claim 8, and said generally vertical but slightly inclined engaging edge of said blade-like member being a long edge which extends for a substantial distance above said additional supporting and guide means.

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