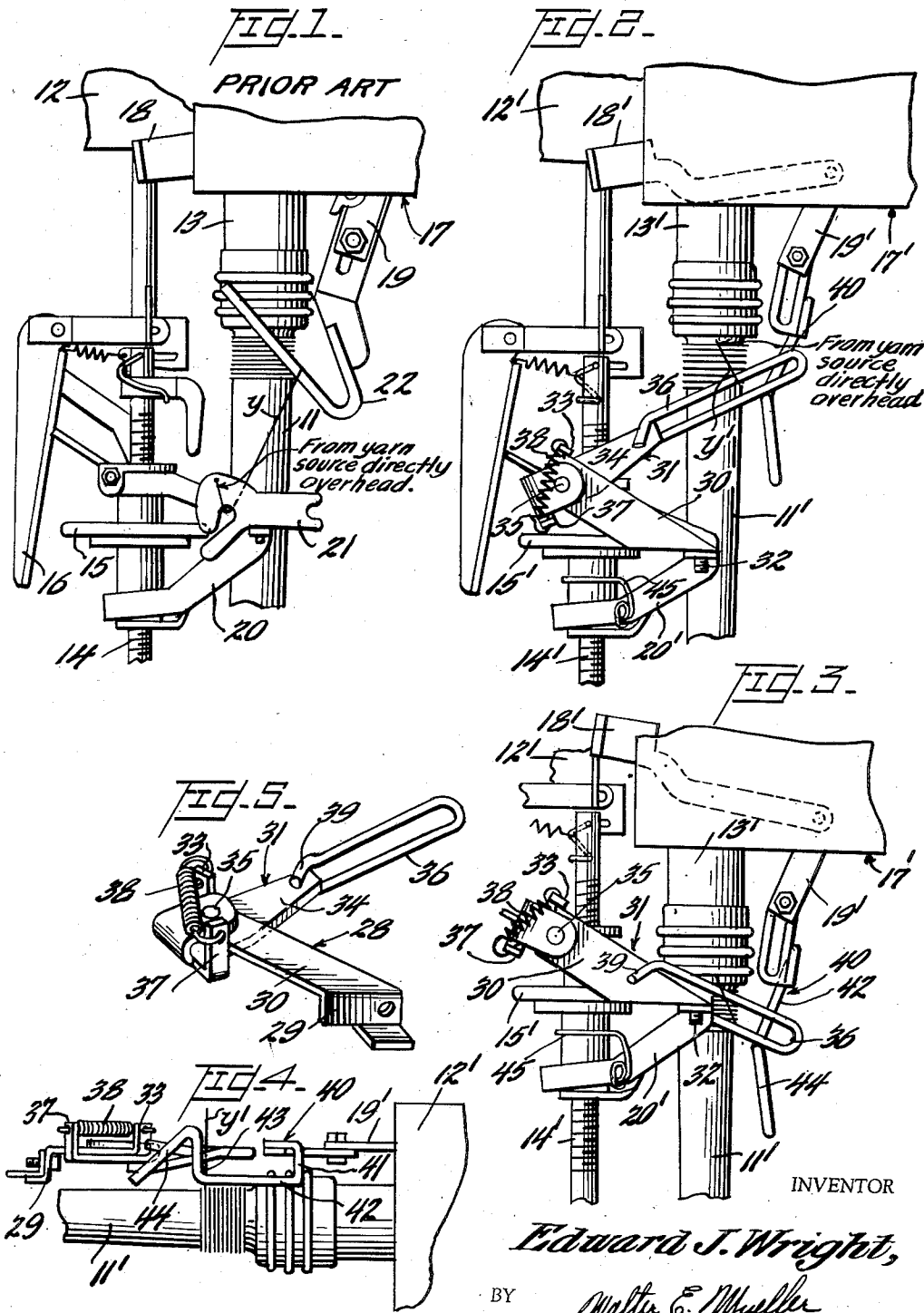


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BUNCH BUILDING MECHANISM

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BUNCH BUILDING MECHANISM

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This invention relates to winding machines and more specifically is directed to an improved yarn guide array for winding machines. As this apparatus is particularly designed and adapted for use with winding machines of the type known as the No. 90 Universal Winder manufactured by the Universal Winding Company of Providence, Rhode Island, it will be described with specific reference to such application, although, as will be readily understood, the invention in its broadest aspects is not limited thereto.

Winding machines of the type just referred to have been in widespread use in the textile industry for a number of years. Where they are employed in winding quills for use in automatic looms, attachments known as "bunch builders" are conventionally associated therewith. The function of the "bunch builder" is to wind a length of yarn equivalent to several picks on the quill adjacent the butt end thereof prior to the winding of the remainder of the quill. The builder comprises, essentially, an additional yarn guide which is inserted into the path of the yarn between the yarn guide carried by the traversing mechanism of the winder and the quill, deflecting the yarn from its normal path to the region adjacent the butt of the quill, which additional guide is automatically removed from the yarn path after a predetermined number of turns of yarn have been wound about the quill.

By virtue of the displacement of the yarn by the builder guide, the angle of contact between the yarn and the traverse guide is increased by about 90° and, in addition, the yarn wraps around the builder guide to the extent of about 90°. Thus, a total of almost 180° of "wrap-around" is introduced by the interjection of the builder guide into the quilling operation with the result that the initial tension in the yarn is materially amplified during the formation of the bunch. This tension differential shows up as defects in the woven fabric, such as "shiners," caused by stretching the yarn beyond its elastic limit, or "tight picks" before quill transfer. Such defects are more noticeable with bright rayon or thick and thin yarns than with other types. Also, excessive tension in the bunch yarn is apt to lead to breakage of the yarn during both quilling and weaving with a resultant loss in production.

Attempts have been made by the prior art to overcome this objectional feature of winders. For example, it has been proposed to reduce tension in the yarn during the formation of the bunch by lifting the disk tension devices tradi-

tionally used in response to the motion of the builder guide. Obviously, this approach involved merely compensating for a deficiency in the winder rather than correcting such deficiency.

A further undesirable feature of the No. 90 winder is that it lacked positive control of the yarn during the building of the bunch. That is to say, the yarn is not positively guided along the length of the bunch but rather depends upon changes in the angles of incidence and deflection of the yarn to and from the builder guide due to the reciprocatory motion of the traversing mechanism for its movement to and fro along the bunch.

It is therefore the primary object of this invention to provide a yarn guide array for winders which is adapted to build a bunch on a quill without the introduction of excessive tension in the yarn forming the bunch.

Another feature of this invention is the provision of a yarn guide array which positively traverses the yarn during the building of a bunch as well as during the remainder of the winding cycle.

An additional object is to provide an improved yarn guide array which does not require major deviations in the technique of threading up from that traditionally employed by winder operators.

A still further object is to provide an improved guide array which is simple in construction, inexpensive in cost and is capable of use in lieu of conventional arrays without modification of existing winders.

Other and further objects and advantages of my invention will be apparent from the following description, when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a fragmentary top plan view of one position of a conventional winding machine showing the prior art traverse guide and builder guide in association with related parts of the machine;

Fig. 2 is a top plan view similar to Fig. 1, showing my improved guide array in use in lieu of the prior art devices, the array being shown in the outer traverse position during the formation of the bunch;

Fig. 3 is a view similar to Fig. 2, except that the machine is shown in the inner traverse position;

Fig. 4 is a right elevational view of the device as shown in Fig. 2 with the conventional traverse mechanism omitted for purposes of clarity; and

Fig. 5 is a view in perspective of the yarn guide portion of my invention.

In general, the objects of my invention are accomplished by mounting on the traversing mechanism of a winder adjacent the quill an elongated yarn guide which lies within a plane perpendicular to the path of the yarn at this point and is adapted to pivot within this plane, although normally biased against pivotal movement. The guide extends from the traversing mechanism on one side of the quill, across the quill so that it is disposed between the quill and the yarn source, and projects a short distance beyond the quill on the other side thereof. Associated with the bunch building mechanism of the winding machine are detent means which engage the projecting end of the guide during the bunch building operation, restraining it against movement parallel to the axis of the quill. Thus, as the bunch is being wound, the traversing mechanism and the end of the guide carried thereby are reciprocated the full distance of the traverse; the other end of the guide, however, is not free to reciprocate and since the yarn passes through the guide at a point very near the restrained end, the extent of movement of the yarn is much less than that of the full traverse.

In order to better illustrate the improvement which my invention provides over the prior art, I have included in Fig. 1 a showing of the prior art construction as it is more or less universally used today, only so much of the mechanism of a conventional No. 90 winding machine being illustrated as is necessary for an understanding of the relation of yarn guide devices therewith. The machine winds onto a quill 11 yarn Y which issues from a source (not shown) disposed more or less directly above the quill 11, the machine per se comprising a frame 12 housing driving means (not shown) for rotating a spindle 13 which receives the quill 11, and for driving a traverse rod 14, having an associated traverse or builder wheel 15 and cop former 16. Mounted on the frame 12 is a conventional bunch building control mechanism, generally indicated by the numeral 17, which mechanism includes a ratchet feed pawl arm 18 and a lever 19. For a more complete description of the bunch building control mechanism, reference is made to Quill Patent No. 1,809,217 of June 9, 1931. The traverse wheel 15 carries a yoke-shaped bracket 20 which is mounted for pivotal movement about the traverse rod 14 independently of wheel 15 and which supports the usual porcelain guide 21. Clamped to the lever 19 of the bunch builder 17 is a hooked-shaped finger 22 which, as is well known, is adapted to be moved into the path of the yarn Y to restrict the extent of travel of the yarn during the building of the bunch.

As is readily evident from Fig. 1, the prior art configuration is such as to cause the yarn to be wrapped around both the porcelain guide 21 and the finger 22 with the resultant increase in tension in the yarn which goes into the bunch.

Attention is now directed to Figures 2 through 5, illustrating my improved guide array in association with certain related parts of a winding machine and in these figures where reference is made to conventional parts already mentioned in connection with the discussion of Fig. 1 a prime designation will be used.

In accordance with this invention, an articulated yarn guide 28 is carried by the bracket 20' of the traverse wheel 15' and consists of a rigid element 30 and a movable arm 31. The rigid element 30 is formed of sheet metal and is pro-

vided with a downwardly directed flange 29 at one end thereof which is fixedly secured to the bracket 20' by bolt 32 or any other suitable means. This element extends obliquely from the bracket 20' in a direction inwardly and away from the quill 11' and terminates in a generally rounded end having an upstanding ear or tab 33 at the inner corner thereof. The movable arm 31 has a short body section 34 also formed of sheet metal which is bent at one end to provide a U-shaped yoke into which fits the free end of the rigid element 30, the body section 34 and the end of rigid element 30 being pivotably connected together by means of a pin 35.

To the other end of body section 34 is secured, as by brazing, one leg of an elongated U-shaped guide 36 formed of heavy round stock, the other leg of the guide 36 being bent upwardly and outwardly at its extreme termination adjacent body section 34, as at 39, to provide a passageway through which the yarn Y' can be admitted into the interior of guide 36.

The end of body section 34 which is connected to the rigid element 30 is formed with an integral upstanding tab or ear 37 at the corner thereof remote from the corner of rigid element 30 which carries ear 33. The ears 33 and 37 are connected together by a tension spring 38 so that the movable arm 31 is urged to the position shown in Figure 3.

Associated with the bunch builder control mechanism 17' and clamped to the lever 19' is the detent member 40 formed from heavy wire or equivalent material. This member extends outwardly from the lever 19' in a direction generally away from the frame 12' of the winder, and, as is best shown in Fig. 4, is formed with a short downwardly directed section 41 immediately adjacent the end of lever 19', then a horizontal section 42, followed by a short upwardly directed section 43, ending in a downwardly directed inclined section 44. The function of the inclined section 44 of the detent member 40 is to eliminate the need for a separate operation in threading up the winder. It will be readily seen that as the guide array is moved rearwardly toward the machine incidental to threading-up, the element 36 will contact the inclined section 44, ride up that section and drop down into the channel defined by sections 41, 42 and 43 where it will be restrained against reciprocal movement so long as the detent 40 is in the position shown in Figures 2 and 3.

Customarily, the bracket 20' is freely pivotable about the traverse rod 14', the weight of the porcelain guide being depended upon to keep the arm 20' in position above quill 11. However, I prefer to utilize a wire spring 45 bearing against the bracket 20' to resiliently maintain it in its proper position relative to quill 11'.

The operation of my device proceeds as follows: the operator first draws down the strand of yarn Y' from the source and wraps it around the spindle 13' which is empty following the previous doff. The quill 11' is then inserted in position on spindle 13' so that the end of the yarn is securely held between the quill and the spindle. Thereafter, the operator swings the lever 19' to the left until it locks into operative position adjacent the butt of the quill and then with the left hand moves the traverse wheel 15' down the traverse rod 14' to its extreme inward position, as shown in Figure 3, and with the right hand, moves the yarn through the passageway between the upwardly bent leg of the U-shaped guide

36 and the body section 34 so that the yarn extends through the interior of guide 36. Thereafter, the winding machine is started up, rotating spindle 13' and quill 11' and reciprocating the traverse rod 14' back and forth the distance of about 2 inches parallel to the axis of the spindle 13'. The end of the movable arm 31 which is pivotably connected to the rigid element 30, of course, moves the full distance of the traverse; the other end of the arm 31, however, is engaged by the section 43 of detent 40 and is restrained against reciprocatory movement although it is free to slide transversely of the axis of the spindle 13' so as to permit the full movement of the pivotably connected end. Since the locus of the yarn passing through guide 36 is much nearer the point of engagement of the guide 36 with the vertical section 43 than it is to the pivotal axis of the movable arm 31, the distance which the yarn is caused to move along the axis of the quill 11' is much less than that of the full traverse.

The detent 40 remains in its operative position until a predetermined number of strokes of the traverse mechanism is made, at which time the bunch builder 12' is tripped, swinging lever 19' to the right in Fig. 2 which releases arm 31, permitting it to assume the position shown in Fig. 3. The arm 31 stays in this latter position throughout the remainder of the quilling cycle with the result that the arm 31 moves bodily with the traversing mechanism, carrying the yarn the full distance of each stroke.

Following the law of proportionate triangles, the distance which the yarn moves divided by the distance of the full traverse will be equal to the distance of the locus of the yarn from the point of contact of the element 36 with detent 40 divided by the distance from this point of contact to the pivotal axis of the portion 31. Thus, the length of the bunch can be determined by moving the detent either inwardly or outwardly with respect to the locus of the yarn to give either a shorter or longer bunch as may be desired.

Preferably, I mount the movable arm 31 as close to the periphery of the quill 11' as is practically feasible. This is done in order to insure quick response and good control over the yarn as it is traversed since the further this arm is spaced away from the quill, the greater the lag between the movement of the yarn and the movement of the arm and, consequently, the more difficult it is to wind a level bunch.

Also, it is desirable for the arm 31 to be perpendicular to the path of the yarn in the neighborhood of the quill since by maintaining it thus any tendency of the yarn to move along the length of the arm is substantially avoided. On the other hand, if the arm were inclined with respect to the path of the yarn near the quill, the yarn would tend to migrate toward the lower end.

By bending the termination of the inner leg of guide 36 in the fashion described, I have made it possible for an operator in charge of winding machines equipped with my array to use almost identically the same technique in threading up my array as she now uses with the porcelain type guide. This is an important feature since it bears heavily on mill and operator acceptance of any improvement in the textile industry.

In addition, my articulated yarn guide 28 and detent 40 are attached to the winder in exactly the same manner as are the conventional por-

celain guide and hook-shaped finger with the result that expensive modifications of existing winders are not required for a change-over to this invention.

It will be apparent that by virtue of my particular arrangement I have provided a yarn guide array and bunch builder in which yarn wrap-around is reduced to a bare minimum and positive control over the yarn is exercised at all times, two features that, to my knowledge, have not been hitherto available to the winding art.

As will be appreciated by one skilled in the art changes and variations in the specific construction of this invention could obviously be made without departing from the broad teachings of this application. For example, a conventional pigtail guide could be rigidly secured to the movable arm of my array which, in turn, could be solid rather than having a slotted section. Also, the inclined section of the detent could be omitted if a further operation in threading-up be deemed unobjectional. Therefore, I do not wish to be limited to the single embodiment of this invention which has been described but only by the appended claims.

The following is claimed:

1. The combination with a machine for winding yarn upon a quill, said machine including a traversing mechanism and a bunch building mechanism, of yarn guide means comprising a rigid portion carried by said traversing mechanism, an elongated pivotable portion mounted at one end on said rigid portion projecting beyond said quill and normally biased against pivotal movement, said pivotable portion having an aperture therein in general radial registration with said quill, and detent means associated with said bunch building mechanism for engaging the end of said pivotable portion remote from said rigid portion during the building of the bunch, whereby said pivotable portion is rocked about its pivotal axis by the action of said traversing means.

2. The combination with a machine for winding yarn upon a quill having a butt and a stem, said machine including means generally parallel to the axis of said quill being reciprocated a fixed distance when said machine is in operation and means carried by said reciprocating means, being adapted to be progressively moved along the length of said quill stem during the course of said winding, said machine being provided with an arm movable into operative position adjacent the butt of said quill at the start of said winding, said arm being automatically released from said position after a predetermined number of turns of yarn have been wound about said quill stem; of means for guiding said yarn to said quill comprising a bracket member fixed at one end to said means carried by said reciprocating means, a yarn guide member pivotally mounted on said bracket, said guide member having an elongated opening formed therein, said opening being in substantial registration with said quill, means biasing said guide member and said bracket together, and detent means carried by said arm for engaging the free end of said guide member when said arm is in operative position.

3. Means for winding yarn upon a rotating quill comprising a lever disposed substantially transversely of said quill in proximity thereto and generally perpendicular to the path of the yarn being wound upon said quill, a yarn guide passageway carried by said lever in radial align-

ment with said quill, means pivotably supporting one end of said lever and adapted to reciprocate a fixed distance parallel to the axis of said quill, spring means urging said lever to move bodily with said last-named means, and detent means movable into operative position adjacent said quill during a predetermined portion of the winding cycle to restrain the free end of said lever against reciprocatory motion during said portion whereby said lever is rocked about its pivot axis, restricting the extent of movement of said passageway with respect to said quill.

4. Apparatus for directing yarn from a yarn source to a rotating quill having a butt and stem comprising an elongated yarn guide member disposed adjacent said quill, having a length substantially greater than the diameter of said quill stem whereby said member projects beyond said quill on either side thereof, a yarn passageway in said member in general registration with the path of yarn from said source to said quill, means reciprocating a fixed distance in a direction parallel to the axis of said quill and pivotably supporting one end of said guide member, said member being biased for normal bodily movement with said reciprocating means and means operable for a predetermined duration of time to engage the other end of said member at a point proximate to said stem, whereby as said means reciprocates, said member is rocked about its pivotal axis.

5. Apparatus for winding yarn upon a rotating quill including a traversing mechanism and a bunch builder comprising means for delivering a strand of yarn to said quill along a path extending generally radially of said quill, a lever disposed adjacent said quill and extending generally transversely thereof, one end of said lever being spaced from said quill, means associated with said traversing means for supporting said lever at the aforementioned end thereof for pivotal movement in a plane perpendicular to the path of yarn, yarn guide means provided on said lever including a yarn passageway in general alignment with said yarn path, means normally urging said lever to move bodily with said traversing mechanism, and means adapted to restrain the other end of said lever against movement with said traversing mechanism during a predetermined portion of the winding operation.

6. Apparatus for winding yarn upon a quill comprising a frame, a spindle rotatably journaled in said frame and adapted to support a quill, means for delivering the yarn to said spindle along a path extending generally radially therefrom, a traversing mechanism adapted to move parallel to the axis of said spindle, means housed within said frame for rotating said spindle and actuating said traversing mechanism, a bunch builder control mechanism associated with said spindle, a bracket rigidly carried by said traversing mechanism, a longitudinal element rockably connected to said bracket at a point spaced from one side of said spindle and projecting beyond the other side of said spindle, said element being rockable within a plane perpendicular to the path of yarn adjacent said spindle, said element having a slot formed therein through which said yarn path extends, means urging said element to move bodily with said bracket, and means operable in conjunction with said bunch builder control mechanism to engage the projecting portion of said element at a locus contiguous to said spindle to prevent bodily movement of said element with said traversing mechanism.

7. The apparatus of claim 6 wherein said element comprises a lever rockably connected at one end to said bracket and an elongated U-shaped extension on said lever, the leg thereof nearest said frame extending upwardly from said lever and outwardly from said frame at its termination, whereby the yarn can be admitted into the interior of said U-shaped extension.

8. The apparatus of claim 7 wherein the means operable to engage the projecting portion of the rockable element comprises a channel shaped member extending from the bunch control mechanism, said channel shaped member having an inclined extension adapted to guide said element into the channel of said member.

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