J. K. ALTEMUS.

YARN WINDING MACHINE.

APPLICATION FILED APR. 7, 1915.

1,214,742.

Patented Feb. 6, 1917.

3 SHEETS—SHEET 1.

Fig. 2.

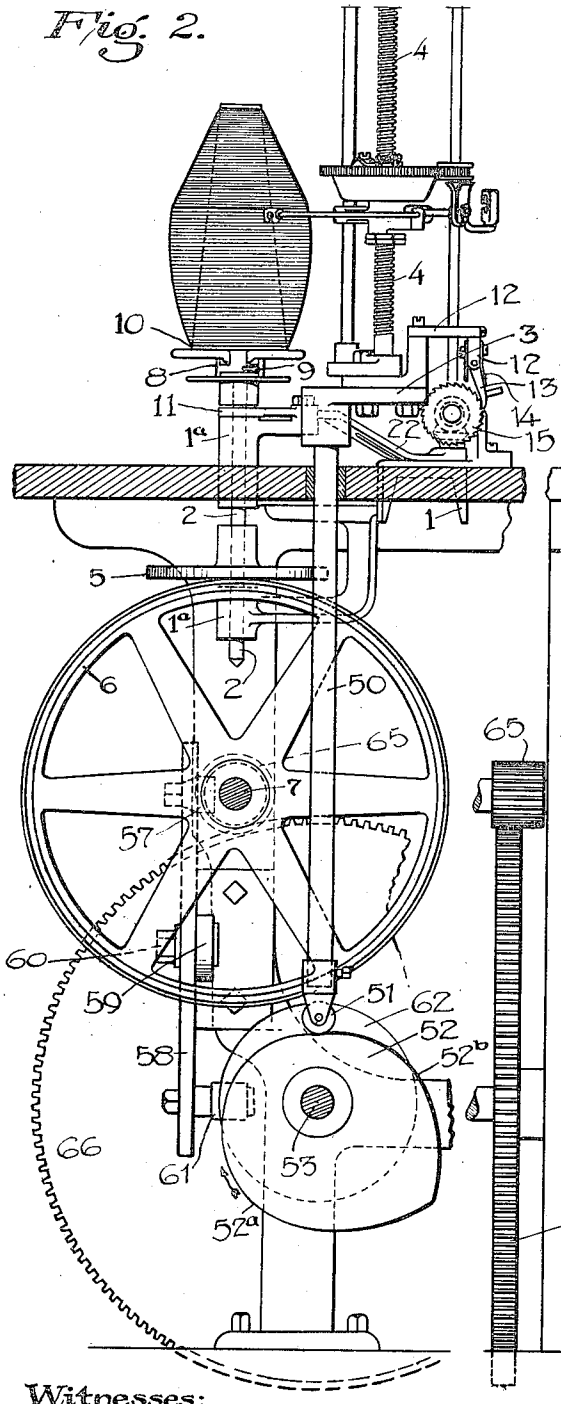
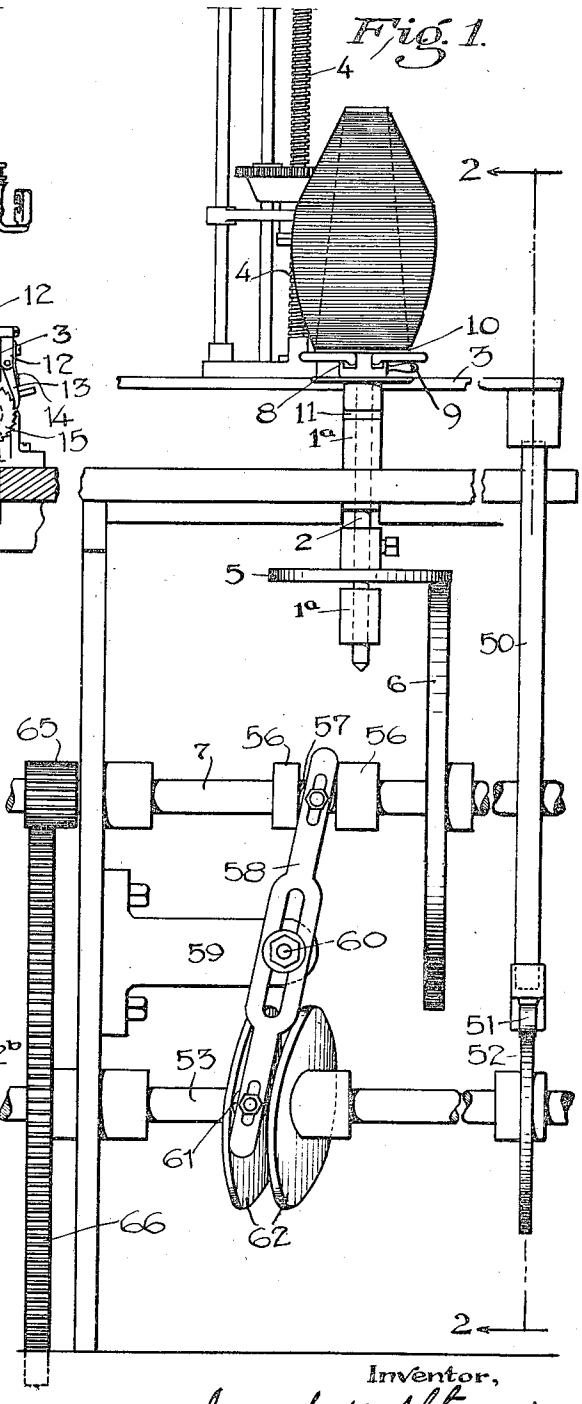


Fig. 1.



Witnesses:

C. R. Newbold

C. M. Darrell.

Inventor,

Jacob K. Altemus

by his Attorney

Walter W. Talmore

J. K. ALTEMUS.

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3 SHEETS—SHEET 2.

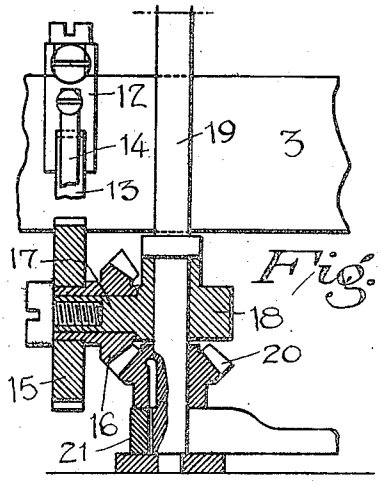


Fig. 6.

Fig. 3.

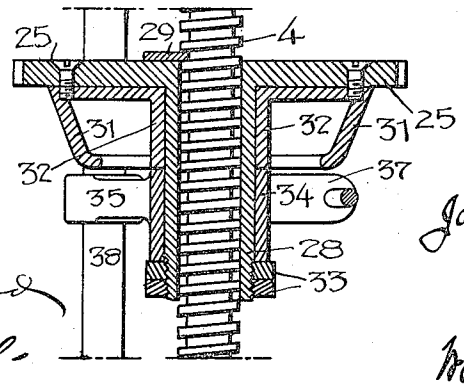


Fig. 5.

Witnesses:

C. V. Newbold

C. M. Darrell.

Inventor,

Jacob K. Altemus

by his

Attorney

Walter N. Talmore

J. K. ALTEMUS.

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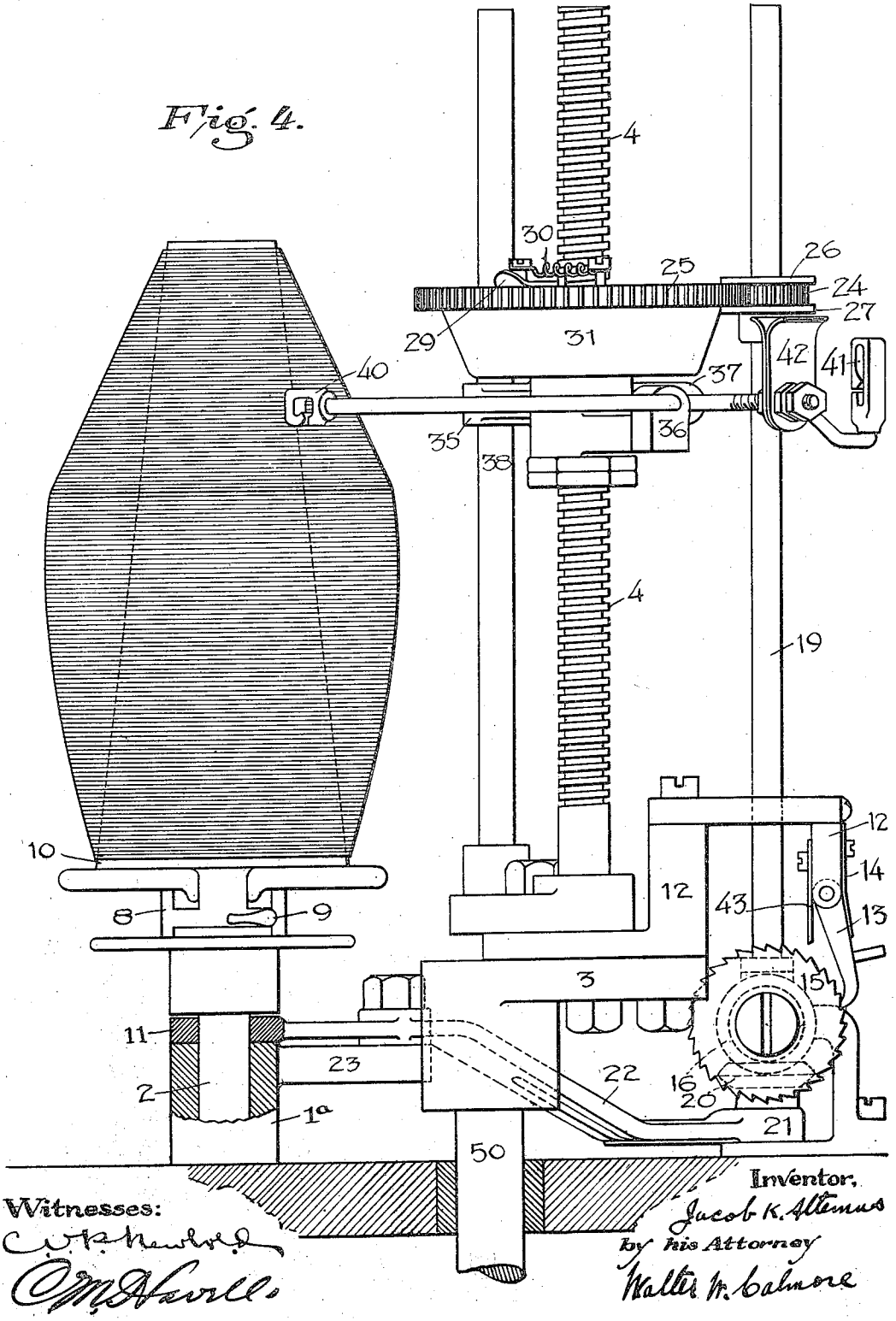
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3 SHEETS—SHEET 3.

Fig. 4.



Witnesses:

C. W. Newhall

O. M. Harrell.

Inventor,

Jacob K. Altemus

by his Attorney

Walter M. Balmore

UNITED STATES PATENT OFFICE.

JACOB K. ALTEMUS, OF PHILADELPHIA, PENNSYLVANIA.

YARN-WINDING MACHINE.

1,214,742. Specification of Letters Patent. Patented Feb. 6, 1917.

Application filed April 7, 1915. Serial No. 19,728.

To all whom it may concern:

Be it known that I, JACOB K. ALTEMUS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Yarn-Winding Machines, of which the following is a specification.

This invention relates to means for building up the body of yarn upon a knitting bobbin or cone as it is being wound thereon, the object of the invention being to provide simple and efficient means for gradually changing the position of the yarn delivery guide in respect to the bobbin and for varying the speed at which the bobbin or cone rotates according to the position of the delivery guide. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which:

Figure 1 is a view in front elevation of the machine, Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1, Fig. 3 is an enlarged view in top plan of the delivery guide mechanism and its associated parts, Fig. 4 is a view in side elevation of the mechanism illustrated in Fig. 3, Fig. 5 is a view partly in vertical section and partly in elevation of the connection between the builder nut and the screw, and Fig. 6 is a view partly in vertical section and partly in elevation of certain parts of the mechanism for imparting intermittent movements of partial rotation to the builder nut.

In the drawings, 1 represents the fixed rail to which are secured, side by side, a series of projecting brackets 1^a, each carrying a bearing for one of the bobbin or cone rotating spindles 2, and 3 represents the vertically reciprocated builder rail upon which are mounted a series of builder screws 4, one for each spindle. The spindles 2 are rotated partly by mechanism now to be described. Each spindle 2 is provided on its lower end with a horizontal friction disk 5 which is rotated by contact with the periphery of a vertical friction disk 6 fast on a horizontal driving shaft 7, as shown in Fig. 1. The rotation of the cone or bobbin is effected by means of a head 8 carrying bobbin or cone gripping means (not shown) and which gripping means is operated by a handle 9 for engagement or disengagement with the cone or bobbin. The cone or bobbin 10 rests upon the head 8. For arresting the rotation of the bobbin when necessary and without arresting the rotation of the driving shaft 7, there is provided in the present instance, a slotted cam 11 introduced between the base of the head 8 and the top of the bearing 1^a, this slotted cam serving, when in one position, to lower the spindle 2 and head 8 so as to bring the disk 5 into driving contact with the disk 6 and thereby impart rotating movement to the cone or bobbin, and when in the other position to raise the head 8 and spindle 2 so as to carry the disk 5 out of driving contact with the disk 6 and thereby arrest the rotation of the bobbin or cone.

Mounted upon and reciprocating vertically with the builder rail 3 is a bracket 12, upon which is pivotally mounted a pawl 13 acted upon by a spring 14 so as to be pressed toward the teeth of a ratchet wheel 15, which is secured to the hub of a bevel wheel 16 (Fig. 6) mounted so as to be free to turn upon a stud 17 projecting from a collar 18, the latter in turn being freely mounted upon a vertical shaft 19, so that rotation of the latter has no tendency to rotate the collar 18.

Meshing with the bevel wheel 16, is a bevel wheel 20, whose hub is splined upon the shaft 19 whereby any rotating movement of said bevel wheel 20 will be imparted to the shaft. The bevel wheel 20 is free to slide vertically on the shaft 19 and is supported upon a slotted cam 21 which, when in the position shown in Fig. 6, that is to say, with the bevel wheel 20 mounted upon the high wheel portion of the cam, maintains said bevel wheel in mesh with the bevel wheel 16. When, however, the slotted cam 21 is moved so as to bring its low portion beneath the bevel wheel 20, the latter can drop on the shaft 19 so as to carry its teeth out of mesh with those of the bevel wheel 16, and thereby prevent any movements of the latter from being imparted to the shaft 19.

The slotted cams 11 and 21 are carried respectively, by the arms of a lever 22 pivotally mounted upon an arm 23 projecting from the bearing 1^a, whereby, when said lever is moved in one direction the head 8 will be raised by the cam 11 so as to disconnect the spindle 2 from driving contact with the shaft 7 and the bevel wheel 20 will simultaneously be lowered by the cam 21, so as to disconnect the bevel wheels 16 and 20, thereby at one and the same time arresting the rotation of the bobbin 10 and shaft 19. When the lever 22 is moved in the opposite direction, the spindle 2 will be lowered into

driving connection with its operating shaft and the bevel wheel 20 will be raised into mesh with the bevel wheel 16, thereby, at one and the same time, resuming the rotation of the bobbin or cone 10 and shaft 19.

Splined to the shaft 19 is a spur pinion 24 meshing with a spur wheel 25 and having upper and lower collars 26 and 27 which overlap said spur wheel and maintain the pinion in line therewith, as shown in Fig. 1. The spur wheel 25 has a depending hub 28 free to turn on the builder screw 4, as shown in Fig. 5, and on the upper face of said spur wheel 25 is pivotally mounted an arm 29 acted upon by a coil spring 30 which serves to maintain the inner face of said arm 29 in engagement with the thread of the builder screw 4, but permits said arm 29 to be swung outwardly so as to free it from engagement with said thread when it is desired to disconnect the spur wheel 25 from the builder screw.

Secured to the spur wheel 25 and depending therefrom is an inverted cup 31 and between the hub 32 of this cup and lock nuts 33 at the lower end of the hub 28 is interposed a ring 34, which surrounds said hub 28 and is thus caused to partake of any rising or falling movement of the spur wheel 25 on the builder screw 4 but is free from rotative connection with said spur wheel. The ring 34 has three arms 35, 36, 37, the arm 35 engaging at its outer end a vertical rod 38 projecting upwardly from the builder rail and serving to guide the ring 34 and its arms 36 and 37 during their vertical movements. The arm 36 carries the guide 40 whereby the yarn is directed onto the bobbin or cone, and the arm 37 carries the preliminary yarn guide 41 and a pair of friction plates 42 through which the yarn passes in its course from the preliminary guide 41 to the delivery guide 40.

During the winding operation, the builder rail 3 reciprocates vertically in a manner and through the influence of mechanism to be described, and carries with it the parts mounted thereupon, that is to say, the builder screw 4 and the parts carried thereby, the guide rod 38, and the pawl 13. On the rise of the rail 3, said pawl 13 is disengaged from the ratchet wheel 15 and pressed inwardly by the spring 14 until it contacts with a stop bar 43 mounted upon the bracket 12, whereby, when the builder rail 3 descends, said pawl 13 will, before said rail 3 reaches the limit of its descent, engage with a tooth of the ratchet wheel 15 and will then impart forward movement to said ratchet wheel until the builder rail 3 has been fully lowered. The movement thus imparted to the ratchet wheel 15 is transmitted through the bevel wheels 16 and 20, shaft 19, and spur pinion 24, to the spur wheel 25, which is partially turned, thereby causing said spur wheel to act as a nut and rise to a certain extent on the thread of the builder screw owing to the engagement of the arm 29 on the spur wheel with the thread of the screw 4. As a consequence of this movement, repeated on each reciprocation of the builder rail 3, the yarn guides 40 and 41 will, upon each downward termination of such movement, occupy a slightly higher position in respect to the bobbin or cone than before, thus progressively raising the successive layers of yarn wound upon the bobbin or cone and gradually building up the yarn body throughout the length of said bobbin or cone. Whenever, however, the rotation of the bobbin or cone is arrested, the progressive elevation of the yarn guides will also be arrested, owing to the connection between the devices which govern the rotation of the spindles 2 and those which govern the rotation of the shaft 19.

The means for elevating the builder rail 3 and for varying the speed of rotation of the bobbin or cone spindle 2, comprises the following. The builder rail 3 is mounted at each end upon a vertically reciprocating rod 50 having a roller 51 journaled in its lower end and bearing upon the periphery of a vertical cam 52, which latter will later be described in detail. While only one cam 52, rod 50 and roller 51, is illustrated, it is to be understood that these parts are duplicated at the other end of the shaft 53, upon which shaft said cams 52 are fast for rotative movement therewith. The shaft 53 is parallel with and beneath the driving shaft 7, the latter shaft receiving driving power through any suitable means, preferably the usual loose and fast pulley, there being provision for endwise movement of this shaft 7 comprising means not essential to the disclosure of the present invention. Endwise movement is imparted to the shaft 7, for the purpose of shifting the disk 6 for engagement with the innermost or outermost periphery of the spindle driving disk 5, through the arrangement at a suitable point on the shaft 7 of two collars 56 between which extends a roller 57 of a yoke lever 58. The latter is centrally pivoted to a frame bracket 59 by a pivot bolt 60 which passes through a longitudinal slot in said lever to afford adjustment. The lower end of this lever 58 is equipped with another roller 61 which extends between two helical cams 62 fixed to the builder shaft 53, so that rotative movement of this shaft will cause, through its cams 62, rocking of the lever 58 and endwise movement of said shaft 7 to shift the disk 6 with respect to the disk 5. Fast on the driving shaft 7 is a pinion, 65, elongated to mesh at all times during endwise movement of said shaft 7 with a large gear 66 fast on the builder shaft 53.

In Fig. 2, the cam 52 is in a position wherein the delivery guide 40 and its associated mechanisms are about to rise, this being the lowest point in the cam 52. As the cam 52 rotates in the direction of the arrow, its face 52^a elevates the rod 50 and thereby the builder rail 3. After the point or toe of the cam 52 has passed beneath the roller 51 or rod 50, the face 52^b of the cam permits the rod 50 and builder rail 3 to lower until the roller 51 enters the depression in the cam 52 and is ready for the next ascent. The first portion of the cam face 52^a that passes beneath the elevating rod 50 is slower than the last portion near the point of the cam, which causes the yarn delivery guide to start up the side of the bobbin or cone slowly at first and to gradually move faster until at the upper end of its stroke it is moving fastest. This causes the yarn coils to be laid closer together near the lower portion of a layer than at the upper portion of the same layer. The first or that portion of the cam face 52^b nearest the cam point that passes beneath the elevating rod 50 on the descent of the latter is faster than the last portion near the depression in said cam, which causes the yarn delivery guide to start down the side of the bobbin or cone rapidly at first and gradually slower until the roller 51 enters the depression in the cam 52. This causes the yarn coils to be laid farthest apart near the upper portion of a layer and closest together near the lower portion of the same layer.

The ascending cam face 52^a is approximately twice as long as the descending cam face 52^b, so that the descending movement of the yarn delivery guide 40 is approximately twice as fast as the ascending movement, whereby approximately twice as many yarn coils are laid on the bobbin or cone in the ascending layer as in the descending layer. As now practised, the actual ratio is 27 to 15, or approximately 2 to 1.

The cam 62 is constructed to change the relation of the friction disk 6 with respect to the disk 5 simultaneously with the changes of the cam 52. In other words, when the roller 51 is in the depression of cam 52, the builder rail and yarn delivery guide are about to ascend and the disk 6 about to shift from the outermost to the innermost periphery of disk 5, and when the roller 51 is on the point or toe of the cam 52, the builder rail and yarn delivery guide are about to descend and the friction disk 6 about to move from the innermost to the outermost periphery of the disk 5.

By the action of the cam 52, the yarn delivery guide travels the same vertical distance on each stroke, though, in both the ascent and descent, slowest at the bottom and fastest at the top of the strokes, to gradually lay the threads closer at the bottom of a layer than at the top thereof. Because of the conical shape of the yarn package throughout and its various layers, if the spindle motion were not increased gradually as the yarn delivery guide approached the top of a layer, or the portion of smallest diameter, the thread would not be taken up rapidly enough and would sag, and it is to get this uniformity of speed that the spindle motion is varied. This uniformity of speed in the ontake is consequently in evidence with respect to the offtake as the yarn will come off with the same even tension as it went on and the effect of the even offtake will be manifested in the fabric knitted.

What is claimed is:

1. In a winding machine, a rotary winding head, a yarn delivery guide associated therewith, means for imparting uniform traversing strokes of increasing speed toward their upper limits to said guide, independently acting mechanical means to impart uniform gain movement to said yarn guide, and means for increasing the winding head speed when the yarn guide increases its rate of movement.

2. In a winding machine, a winding head, a yarn delivery guide associated therewith, means for imparting to said guide progressive and retroprogressive traversing strokes of increasing speed toward their upper limits, traversing strokes of one kind alternating with and being slower than those of the other kind, means for imparting uniform gain movement to said yarn guide after the latter has made strokes of both kinds, and means for increasing the winding head speed when the yarn guide increases its rate of movement.

In testimony whereof I affix my signature in presence of two witnesses.

JACOB K. ALTEMUS.

Witnesses:
WILLIAM J. MONTGOMERY,
WALTER W. CALMORE.