

A. PETERSEN.
WINDING MACHINE.
APPLICATION FILED DEC. 6, 1912.

1,105,453.

Patented July 28, 1914.

2 SHEETS-SHEET 1.

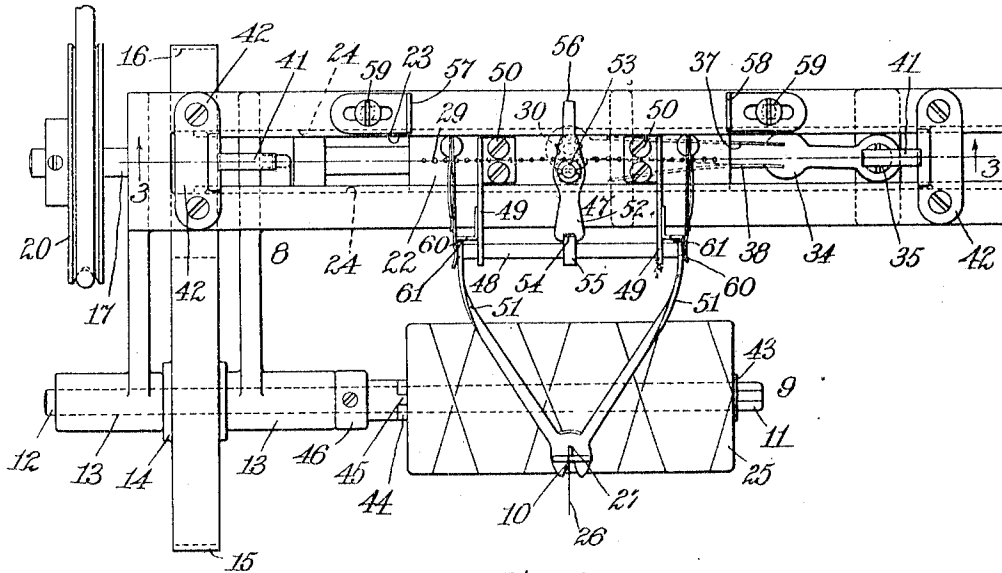
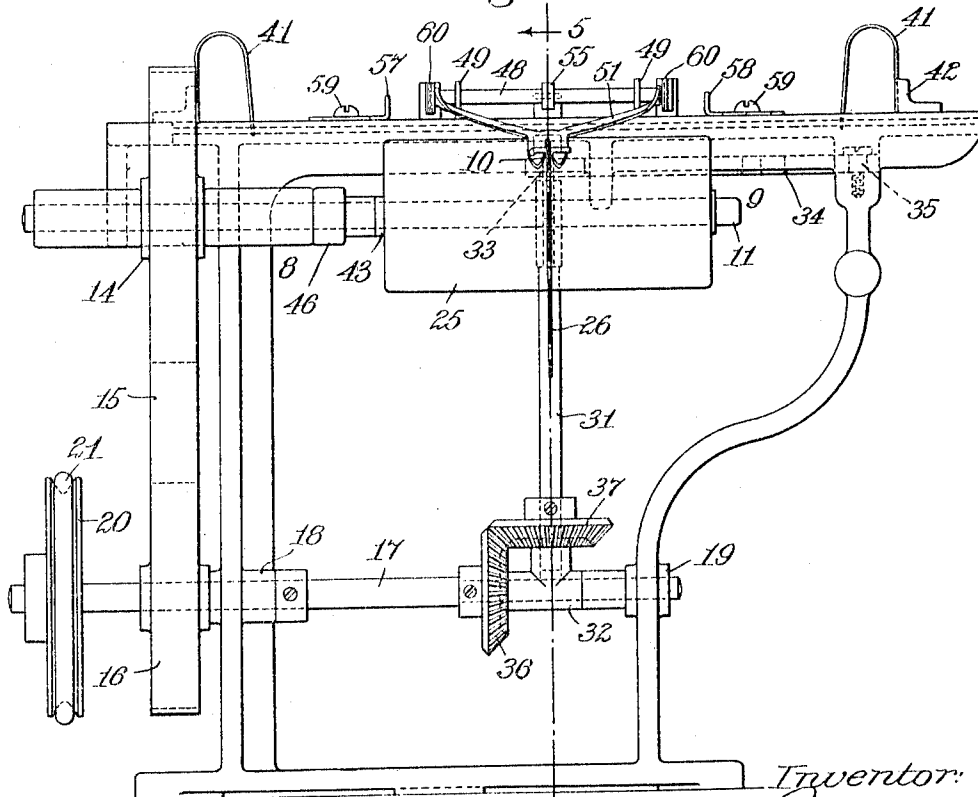


Fig. 1.



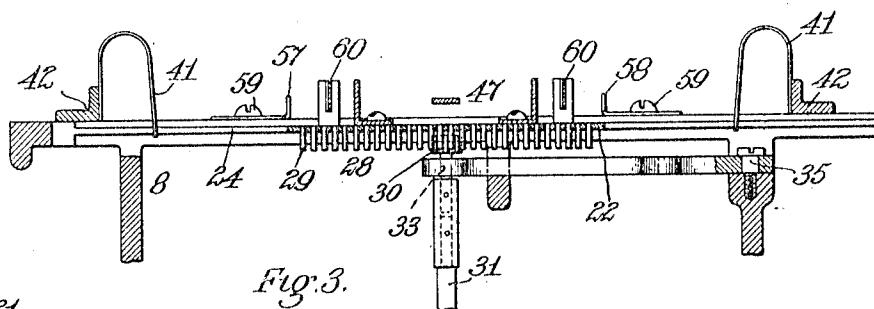
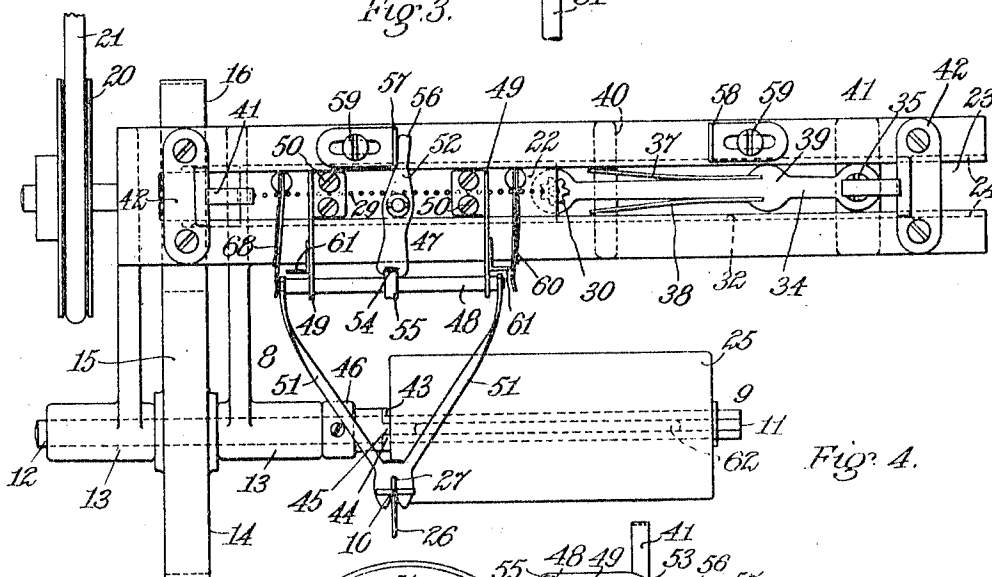
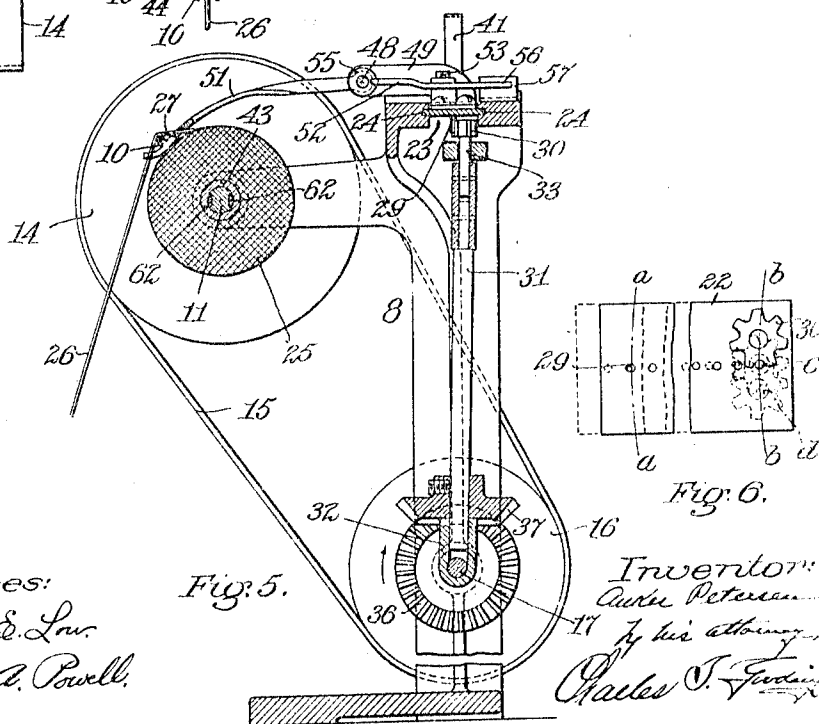
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Fig. 2.

1,105,453.

2 SHEETS—SHEET 2.



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ANKER PETERSEN, OF WINTHROP, MASSACHUSETTS, ASSIGNOR TO BOSTON
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WINDING-MACHINE.

1,105,453.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ANKER PETERSEN, a subject of the King of Denmark, residing at Winthrop, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Winding-Machines, of which the following is a specification.

This invention relates to winding machines and the machine of this invention is particularly adapted to winding yarn masses by laying a series of spirally or helically arranged coils of yarn upon a suitable form with said coils uniformly spaced at greater or less distances apart, the yarn constituting the successive series of coils being arranged alternately in opposite directions. In the accomplishment of the above yarn mass forming operation the yarn mass support is rotated while the yarn guide through which the yarn passes to said yarn mass is reciprocated longitudinally relatively to the axis of said yarn mass in opposite directions. The speed ratio of said yarn guide and said yarn mass support varies according to the distance desired between the various coils constituting said series of coils.

Applicant is aware of the fact that there are now in use machines for winding yarn masses as above stated, but owing to the nature of the yarn guide reciprocating instrumentalities said machines must necessarily be operated at a comparatively low rate of speed in order to permit a quick change in the direction of movement of said yarn guide to prevent the piling up of yarn at the ends of the yarn mass which if so permitted would produce a yarn mass whose ends are larger in diameter or out of proportion to the intervening portions of said yarn mass.

The object of this invention is to provide a machine capable of being operated at a comparatively high rate of speed, provided with instrumentalities adapted to reciprocate the yarn guide longitudinally of the yarn mass support in opposite directions and at a uniform rate of speed throughout substantially the entire length of said reciprocations.

The object is further to provide means adapted to impart an additional reciprocatory movement to said yarn guide during

the intervals when the regular reciprocating instrumentalities are diminishing in speed immediately prior to the changing in the direction of movement of said yarn guide and during the gradual increase in the movement of said regular yarn guide reciprocating instrumentalities from the starting point until the maximum speed thereof has been attained.

The invention consists in the combination and arrangement of parts by which the above objects and certain other objects hereinafter appearing are attained, as set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings: Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a longitudinal sectional elevation taken on line 3, 3 of Fig. 1. Fig. 4 is a plan view of the machine illustrating the parts in a different position from that shown in Fig. 1. Fig. 5 is a section, partly in elevation, taken on line 5, 5 of Fig. 2 and viewed in the direction of the arrows on said line. Fig. 6 is a detail view of the carrier slide and the pinion which reciprocates said slide illustrated in the several positions occupied thereby during the transverse movement thereof from one side of the rack 28 to the other.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 8 is the frame of the machine upon which are mounted a yarn mass support 9 and a yarn guide 10 and to said yarn mass support and said yarn guide a relative rotary movement is imparted and a relative movement longitudinally of said yarn mass support is also imparted thereto. A relative rotary movement between said yarn mass support and said yarn guide is preferably created by rotating said yarn mass support through a spindle 11 which constitutes said support and is formed upon the end of a shaft 12 journaled to rotate in bearings 13, 13 formed in the frame 8. A pulley 14 is secured to said shaft 12 between the bearings 13, 13 and has a rotary motion imparted thereto by a belt 15 engaging a pulley 16 secured to a driving shaft 17, said driving shaft being journaled to rotate in bearings 18 and 19 in the frame 8, while secured to said driving shaft 17 is a driving

pulley 20 which is in turn rotated by a belt 21 connected with any suitable driving instrumentalities. The relative movement of said yarn guide and said yarn mass longitudinally relatively to said yarn mass support is preferably accomplished by providing a traveler or yarn guide adapted to be reciprocated longitudinally of the spindle 11, said yarn guide being mounted upon a carrier slide 22 which is arranged to reciprocate longitudinally of the slot 23 in the frame 8 in grooves 24, 24 formed in opposite sides of said frame and arranged substantially parallel with the axis of the spindle 11, thus when said slide 22 is reciprocated along said grooves 24, 24 the yarn guide 10 will be reciprocated along the face of the yarn mass 25 at a suitable rate of speed to permit the yarn 26, which is led through the eye 27 of the yarn guide 10, to be laid in a series of coils, see Fig. 1, about the surface of said yarn mass the desired distances apart, said distances being greater or less according to the use to which the yarn mass is to be applied.

Many types of reciprocating means might be employed to reciprocate the slide 22 along the grooves 24, 24 but it is essential that the speed of said slide be uniform for substantially the entire reciprocation thereof in order that the various coils constituting said series of coils may be evenly spaced. For this purpose I have employed a device known as a mangle rack 28, said rack comprising a series of detachable pins 29, uniformly spaced longitudinally of the slide 22 and projecting downwardly therefrom. A pinion 30 secured to the upper end of a vibratory shaft 31 is adapted to engage said pins and as said pinion is rotated said pins 29 will be engaged thereby and said slide 22 will be reciprocated in one direction or the other along the grooves 24, 24 according to the position of the pinion 30 relatively to said series of pins. The vibratory shaft 31 is journaled at its lower end in a rocker frame 32, mounted upon the driving shaft 17, while at its upper end said vibratory shaft is journaled to rotate in a bearing 33 formed in the end of the horizontally arranged vibratory arm 34, said vibratory arm being pivoted upon the screw 35 secured in the frame 8. A rotary motion is imparted to the shaft 31 by a bevel gear 36 secured to the driving shaft 17, said bevel gear 36 meshing with a gear 37 secured to the vibratory shaft 31, thus when said driving shaft is rotated said vibratory shaft will also be rotated together with the pinion 30. The teeth of said pinion 30 by engaging the pins 29 will force said slide 22 along the grooves 24, 24 until the last pin in said series of pins has been moved out of the path of travel of the axis of said pinion 30 in its vibratory movement from one side of the plane con-

taining said series of pins to the other, whereupon said pinion will be transferred from the position occupied thereby upon one side of said plane across the end of said rack to a position upon the other side thereof, and upon the arrival of said pinion to this position the movement of said slide will be reversed and said yarn guide will be reciprocated in the opposite direction longitudinally of the yarn mass 25. To insure the engagement of the teeth of the pinion 30 with the pins 29 of the rack 28, springs 37 and 38 are provided, the same being secured in the enlarged portion 39 of the vibratory arm 34 while the opposite ends of said springs are free to engage a cross head 40 connecting the sides of the frame 8 which form the slot 23. When the pinion 30 is in the position illustrated in Fig. 4 the pressure of the springs 37 and 38 will be neutralized, but when said pinion is moved to one side or the other of said series of pins, such for instance as shown in Fig. 1, one of said springs will be deflected, as illustrated in said figure, whereupon said pinion will be yieldingly retained in contact with said pins 29. When the slide 22 has arrived at the end of its reciprocation, or to such a position that the end pin is engaged by said pinion, the opposite end of said slide 22 from which said pinion is located will engage the free end of a U-shaped spring 41, which is secured to a bracket 42 mounted upon the frame 8, said spring projecting into the slot 23, thus said end pin will be yieldingly retained in contact with said pinion 30 during the transferal of said pinion from one side of said series of pins to the other thereof, it being understood that the bearing 32 is large enough to permit said vibratory shaft 31 to rock slightly therein during said transferal movement.

By the use of the rack 28 and pinion 30 as a reciprocating means for the slide 22 it will be seen that the movement of said slide will be uniform for a distance equal to that between the centers of the end pins, as indicated by "a" and "b," Fig. 6, after which there will be a gradual diminution in the speed of said slide until the pinion 30 has been rotated 90° whereupon the axis thereof will be moved from its position on the line "b," as indicated in full lines, to the position "c" as indicated in dotted lines, and into the longitudinal plane containing the centers of all of the pins 29 and at which time said slide will have come to a dead stop. From this position the rotation of said pinion another 90° in the same direction will bring the center of said pinion into the position "d," as indicated in dot and dash lines Fig. 6, upon the opposite side of the longitudinal plane containing the centers of said series of pins from the positions first occupied by said pinion on said line "b."

At the beginning of the diminution in the speed of the carrier slide during said last 90° of rotation, in which the pinion 30 moves from the position "c" into the position "d," the carrier slide 22 will have been gradually started in its return reciprocation and from this point on the movement of said slide will be uniform until the pin at "a" will have been brought into alignment with the plane of movement of the pinion 30, as indicated by the line "b," when the next 90° of rotation of said pinion will gradually diminish the speed of said slide until the same comes to a dead stop and then gradually increase the speed of said slide in an opposite direction during the next 90° of rotation of the pinion 30 until the maximum speed thereof has been attained.

The speed of the shaft 12 is substantially uniform and as the yarn mass 25 is positively driven thereby through a core 43 upon which said yarn is formed, said core being provided with notches 44 which are engaged by projections 45 formed upon the collar 46 secured to said shaft 12, no lost motion between said yarn mass 25 or shaft 12, or spindle 11 will be permitted, consequently when the end pin of the series of pins 29 arrives at the position "b" the speed of the yarn guide 10 longitudinally of the spindle 11 begins to diminish and causes the yarn to pile up at the end of said yarn mass, and if such were permitted the finished yarn mass would be larger in diameter at its ends than at intermediate points thereof. To prevent such an occurrence, auxiliary reciprocating means 47 are provided for said yarn guide, to extend the movement of said yarn guide during said diminution in speed of said slide 22, thereby counteracting said diminishing effect, said auxiliary means comprising a shaft 48 pivotally and slidably arranged in brackets 49 secured by screws 50 to the slide 22.

The yarn guide 10 is provided with arms 51 which are secured at opposite ends of the shaft 48 outside of the brackets 49. A lever 52 pivoted at 53 upon the slide 22 is provided with a forked end 54 which straddles an annular collar 55 upon the shaft 48. The opposite end 56 of said lever projects outwardly from said slide over the frame 8 and is adapted to be engaged by stops 57 and 58 which are adjustably secured by screws 59 to the frame 8, and as said slide 22 is reciprocated along the grooves 24, the end 56 of said lever 52 will be engaged by one or the other of the stops 57 and 58 simultaneously with the arrival of the end pin of the pinion 30, as indicated by the lines "a" and "b," Fig. 6, whereby said lever 52 will be rocked upon its pivot and the shaft 48 will be reciprocated in the bearings formed in the brackets 49, thus imparting an

additional reciprocation to the yarn guide 10 the movement thereof counteracting the gradual decrease or diminution in the speed of the slide 22 during the transverse movement of the pinion 30 from one side of the series of pins 29 into alignment with the longitudinal plane containing the centers of said pins. As the slide 22 starts its return reciprocation, or during the time the pinion 30 is rotating through 90° from said longitudinal plane to a point upon the opposite side of said series of pins, the yarn guide 10 is likewise given an additional movement in the opposite direction to that hereinbefore stated, by springs 60 secured to the slide 22 and whose free ends engage opposite ends of the shaft 48. These springs normally retain the shaft 48 in its central position relatively to the brackets 49, the action of said springs being neutralized at such a time by stops 61 secured to said brackets 49, but immediately upon the engagement of the lever 52 with one or the other of the stops 57 or 58 one of said springs will be engaged by said shaft and deflected by the movement thereof, while the other of said springs will be held out of engagement with said shaft by the stop 61 and upon the return movement of the slide 22 said spring 60 will force said shaft 48 back to the position occupied thereby prior to the engagement of said lever 52 by said stop.

The general operation of the winding machine hereinbefore specifically described is as follows: A core 43 of any suitable character or design is slipped upon the spindle 11 over the springs 62 until the notches 44 engage the projections 45 upon the collar 46 secured to the shaft 12, said springs 62 causing friction enough upon the core 43 to prevent the same from becoming disengaged from the teeth 45. A yarn 25 is then led through the eye 27 of the yarn guide 10 and connected with said core. Power is then applied to the driving pulley 20 through the belt 21 whereby the shaft 17 is rotated and through the pulleys 14 and 16 and belt 15 a rotary motion is imparted to the spindle 11. At the same time the gear 36 upon the shaft 17 is rotated which in turn rotates the gear 37 upon the vibratory shaft 31 and thus a rotary motion is imparted to the pinion 30, it being understood that the ratio of speed between the spindle 11 and the pinion 30 has been predetermined. The rotation of the pinion 30 whose teeth are held in engagement with the pins 29 by the spring 37 or 38 according to the side of the series of pins 29 upon which said pinion is located, causes said slide 22 to move longitudinally of the slot 23 through the guides or grooves 24. Thus said yarn guide 10 will be reciprocated longitudinally of the spindle at the proper speed to lay a series of coils of yarn upon the surface of

the core 43. As the last pin of said series of pins approaches the pinion 30 and is engaged thereby, said pinion will be forced from a position upon one side of the plane containing the centers of said series of pins, to the other side of said plane in a manner well known to those skilled in the art and during the transverse movement of said pinion from one side to the other of said series of pins the lever 52 will engage one or the other of the stops 57 and 58, according to the position occupied by said slide and said yarn guide will be given an additional reciprocation longitudinally of said spindle to overcome the decrease of the speed of said slide 22 during said transverse movement of the pinion 30. This additional movement moves said yarn guide through a greater distance thus preventing the yarn from piling up at the end of the yarn mass and causing the face thereof to be uneven or the diameter of the ends thereof to be out of proportion to the intermediate sections thereof. As the slide 22 starts in its reverse movement the spring 60, which has been deflected by the movement of the shaft 48 caused by the rocking of the lever 52, will return said yarn guide to its normal position upon the slide 22 where it will remain until the lever 52 is engaged by the stop at the end of the next reciprocation of said carrier slide.

The yarn guide 10 normally rests upon the surface of the yarn mass and being pivoted in the brackets 49 as the diameter of said yarn mass increases said yarn guide will be gradually rocked in said brackets in the plane of rotation of said spindle. When it is desired to vary the length of the yarn mass more or less of the pins 29 may be removed thereby lengthening or shortening the length of the rack 28 as the case may be and causing the pinion 30 to transfer from one side to the other at longer or shorter intervals and as the length of said rack is varied the positions of the stops 57 and 58 are correspondingly moved.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. A winding machine having, in combination, a rotary spindle adapted to support and rotate a yarn mass core, a frame, a carrier slide, means to reciprocate said carrier slide on said frame longitudinally relatively to said spindle, a traveler carried by said carrier slide, a lever pivoted on said carrier slide and engaging said traveler, and stops on said frame adapted to engage and rock said lever during the latter portion of the movement of said carrier slide in opposite directions, to move said traveler in the direction of movement of said carrier slide and at a relatively greater speed than that of said carrier slide.

2. A winding machine having, in combination, a yarn winding spindle, a carrier slide, means to reciprocate said carrier slide longitudinally relatively to said spindle, a yarn guide arranged on said carrier slide to rock substantially in the plane of rotation of said spindle, said yarn guide being also arranged to slide on said carrier slide longitudinally relatively to the axis of said spindle in opposite directions, resilient means adapted to retain said yarn guide in its normal position on said carrier slide, and means adapted to move said yarn guide on said carrier slide in opposite directions for predetermined distances during the reciprocations of said carrier slide.

3. A winding machine having, in combination, a yarn winding spindle, a carrier slide, means to reciprocate said carrier slide longitudinally relatively to said spindle, a yarn guide arranged upon said slide to rock substantially in the plane of rotation of said spindle, said yarn guide being also arranged to slide on said carrier slide longitudinally relatively to the axis of said spindle in opposite directions, means to move said yarn guide on said carrier slide during the latter part of the movement of said carrier slide in opposite directions, and means to return said yarn guide to its normal position on said carrier slide during the first part of the return movement of said carrier slide in opposite directions.

4. A winding machine having, in combination, a yarn winding spindle, a carrier slide, means to reciprocate said carrier slide longitudinally relatively to said spindle, a shaft pivotally and slidably arranged on said carrier slide and having a collar secured thereon, a yarn guide secured to said shaft and adapted to be sustained by said spindle, means adapted to yieldingly retain said shaft in its central position relatively to said carrier slide, a lever pivoted on said carrier slide having a forked end adapted to straddle said collar, and stops adapted to be engaged by said lever at predetermined points during the reciprocations of said slide, to move said shaft and said yarn guide on said carrier slide longitudinally relatively to said spindle.

5. A winding machine having, in combination, a frame, a yarn winding spindle, journaled to rotate in said frame, a slide arranged to reciprocate in guides on said frame, a yarn guide pivotally and slidably arranged on said slide adapted to engage said spindle and to be rocked on said slide as the yarn being wound on said spindle increases the diameter thereof, a driving shaft operatively connected with said spindle, means operated by said driving shaft adapted to impart a reciprocating movement to said slide to move said yarn guide longitudinally relatively to the axis of said spindle,

and means actuated by the reciprocations of said slide adapted to move said yarn guide on said carrier slide longitudinally relatively to the axis of said spindle.

5 6. A winding machine having, in combination, a yarn winding spindle, a reciprocatory slide, a yarn guide pivotally and slidably arranged on said slide adapted to engage said spindle and to be rocked on said slide as the yarn being wound on said spindle increases the diameter thereof, a series of uniformly spaced pins arranged longitudinally of said slide and constituting a mangle rack, a pinion adapted to engage 10 said pins and to reciprocate said slide in opposite directions, instrumentalities adapted to rotate said pinion and said spindle, and means actuated by the movement of said slide adapted to move said yarn guide a predetermined amount on said slide during the latter portion of the reciprocations thereof in opposite directions.

7. A winding machine having, in combination, a yarn winding spindle, a reciprocatory slide, a yarn guide pivotally and slidably arranged on said slide adapted to engage said spindle and to be rocked on said slide as the yarn being wound on said spindle increases the diameter thereof, a series of detachable pins arranged longitudinally of said slide and constituting a mangle rack, a pinion adapted to engage said rack and reciprocate said slide in opposite directions, instrumentalities adapted to rotate 30 said pinion and said spindle, and means actuated by the movement of said slide adapted to move said yarn guide a predetermined amount on said slide during the latter portion of the reciprocations thereof in opposite directions.

8. A winding machine having, in combination, a yarn winding spindle, a reciprocatory slide, a yarn guide pivotally and slidably arranged on said slide adapted to engage said spindle and to be rocked on said slide as the yarn being wound on said spindle 45

increases the diameter thereof, a driving shaft, means operatively connecting said spindle with said driving shaft, a vibratory shaft pivoted on and rotated by said driving shaft, mangle gearing adapted to reciprocate said slide longitudinally relatively to said spindle, said gearing embodying in its construction a series of detachable pins arranged longitudinally of said slide, a pinion secured to the free end of said vibratory shaft adapted to be vibrated transversely of said series of pins and to alternately engage each of said pins from opposite sides respectively of said series, whereby said slide will be reciprocated to move said yarn guide longitudinally relatively to said spindle, and means actuated by the movements of said slide immediately prior to the changing of the direction of movement of said slide to move said yarn guide on said slide longitudinally relatively to the axis of said spindle.

9. A winding machine having, in combination, a driving shaft, a rotatable vibratory shaft adapted to be rotated by said driving shaft, a pinion secured to the free end of said vibratory shaft, a carrier slide, a rack on said carrier slide arranged longitudinally thereof and adapted to be engaged by said pinion to move said carrier slide in opposite directions, a yarn guide pivotally and slidably mounted upon said carrier slide, a winding spindle adapted to be rotated by said driving shaft to receive yarn from said yarn guide, and means actuated by the movement of said slide in opposite directions adapted to impart an additional movement to said yarn guide in opposite directions.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ANKER PETERSEN.

Witnesses:

MARGARET E. HORN,
SYDNEY E. TAFT.