

May 13, 1924.

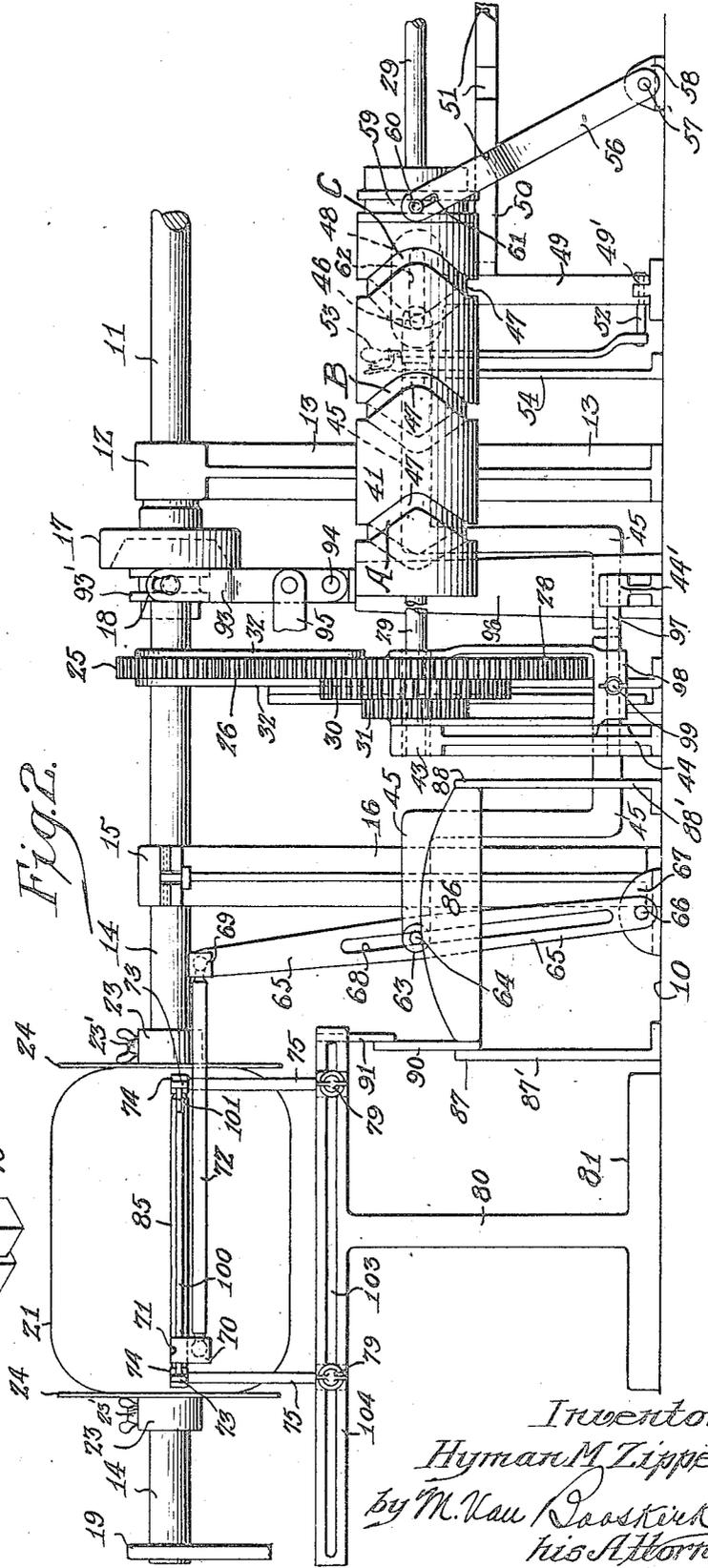
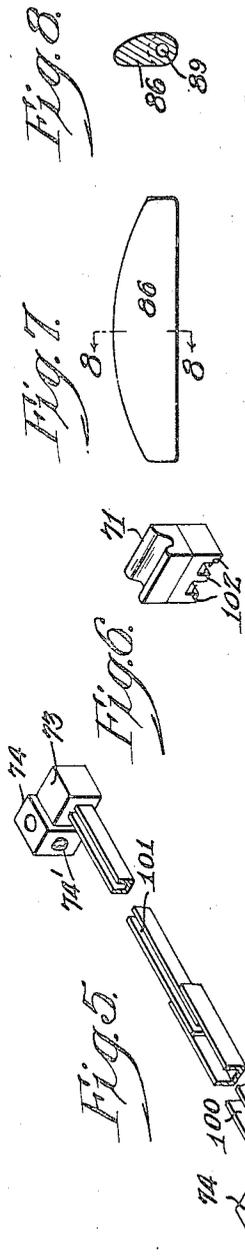
1,493,719

H. M. ZIPPEL

UNIVERSAL YARN WINDING MACHINE

Filed March 30 1922

3 Sheets-Sheet 2



Witness:
Walter Chum

Inventor:
Hyman M. Zippel
by M. Van Rookveld,
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May 13, 1924.

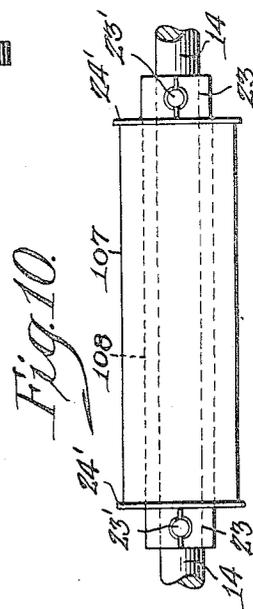
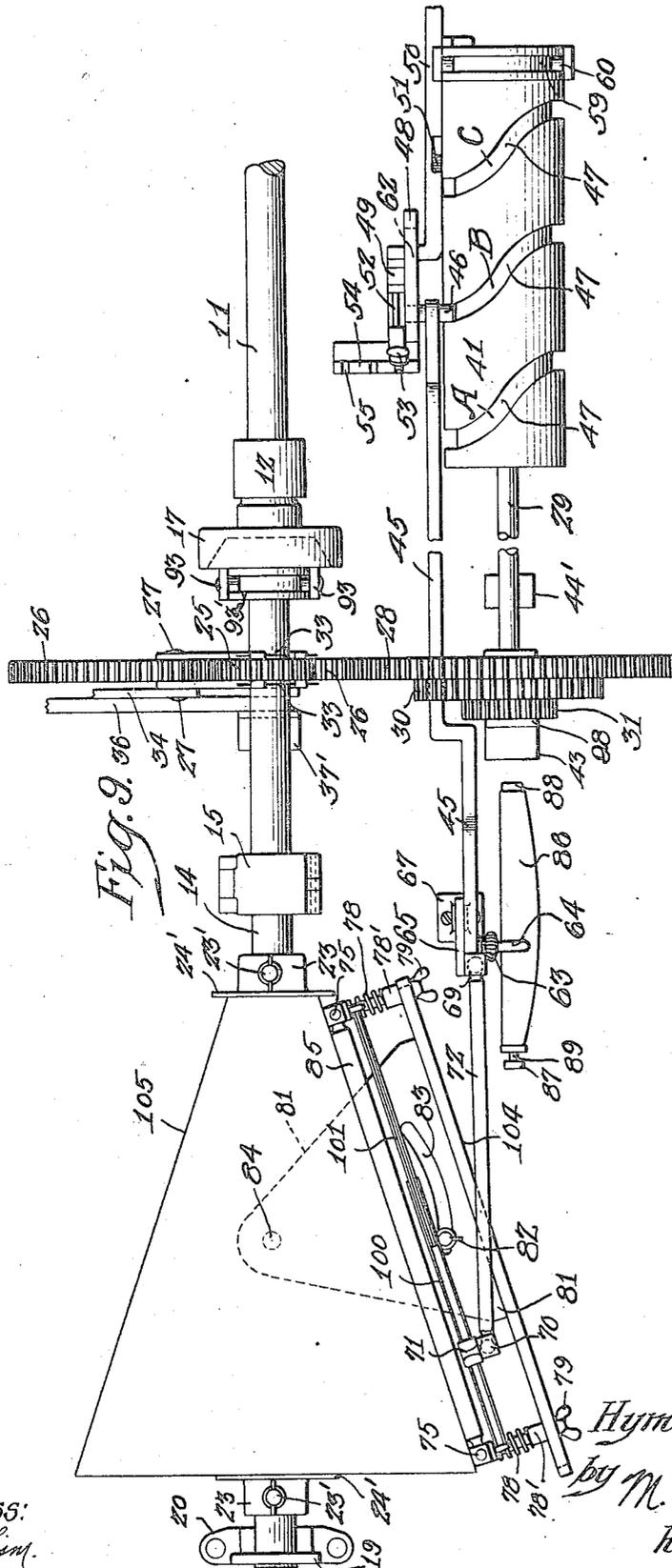
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UNIVERSAL YARN WINDING MACHINE

Filed March 30, 1922

3 Sheets—Sheet 3



Witness:
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Patented May 13, 1924.

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UNITED STATES PATENT OFFICE.

HYMAN M. ZIPPEL, OF PHILADELPHIA, PENNSYLVANIA.

UNIVERSAL YARN-WINDING MACHINE.

Application filed March 30, 1922. Serial No. 547,978.

To all whom it may concern:

Be it known that HYMAN M. ZIPPEL, a subject of the King of Great Britain, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, has invented certain new and useful Improvements in Universal Yarn-Winding Machines, of which the following is a specification.

This invention relates to yarn winding devices.

The principal object of the invention is to provide a device, of the class described, adapted for universal yarn winding, irrespective of whether the yarn is to be wound on a ball, a cylinder or a cone.

A further object of the invention is to provide a device of the class described that may be readily adjusted for the winding of yarn on a ball, a cylinder or a cone of varying lengths.

With these and such other objects in view, as may hereinafter more fully appear, my invention consists in the novel arrangement and construction of parts set forth in the following specification, more particularly pointed out in the claims and which are shown in the accompanying drawings, wherein:—

Figure 1 is a plan view of the assembled device;

Figure 2 is a front elevational view thereof;

Figure 3 is a sectional view on line 3—3 of Fig. 1;

Figure 4 is likewise a sectional view, on line 4—4 of Fig. 1;

Figure 5 is a perspective view of the telescopic member employed on which is adapted to travel a thread guide, shown in perspective in Fig. 6;

Figure 7 is a front view of a semi-elliptical cam employed;

Figure 8 is a sectional view of said cam on line 8—8 of Fig. 7;

Figure 9 is a plan view of the device illustrating the employment of a cone on which to wind the yarn, and

Figure 10 is a plan view of a cylinder employed for such purpose, the spindle 14 being broken away.

Referring to the drawings by numerals, the device, as hereinafter described, is mounted on a common base 10. A main driving shaft 11, from a suitable source of power or energy, is journaled in a bearing 12 mounted in a support 13 and a spindle 14

is journaled in a hinged cap bearing 15 mounted in a support 16.

The spindle 14 at its inner terminal is operably connected with the driving shaft 11 by means of a cone clutch 17, one member of which is mounted solidly on the driving shaft 11 and the opposite member is slidably feathered on the spindle 14, as at 18, in order that when said clutch members are in engagement the spindle 14 will rotate in unison with said driving shaft 11. The outer terminal of said spindle 14 is journaled in a bearing 19 having a hinged base support 20.

A ball 21 is positioned on the spindle 14, adjacent its outer terminal, by means of a transverse core therethrough, and is secured in position and so that it will rotate with said spindle 14, by means of the collars 23—23, having the integral guide plates 24—24 to prevent lateral movement of the ball 21, secured on said spindle 14 and against the said ball 21 by the wing nuts 23'—23'.

A main driving gear 25 is mounted integral with the spindle 14, between the clutch 17 and the hinged cap bearing 15. An intermeshing idler gear 26, mounted on the stud 27, connects said main driving gear 25 with a driven gear 28 mounted integral with a cam shaft 29.

Stepped gears 30 and 31 are likewise mounted on the cam shaft 29. A forked member 32, mounted on the stud 27, engages the spindle 14 and is held in position thereon by means of a cotter pin 33 through the forks thereof.

A lever arm 34, likewise mounted on the stud 27, has its opposite terminal pivoted as at 35, in a hand locking lever 36 fulcrumed in a bearing 37 on a support 37' on the base 10. A notched curved post or sector 38 and the support 37' are mounted on a slidable base (not shown) on the common base 10. By means of said lever 36 and its arm 34 and the slidable sector 38 and lever support 37', the idler gear 26 may be shifted and locked in mesh with either of the gears 28, 30 or 31 as occasion may require for a variation of speed, the free end of a compression hand grip 40 being adapted to engage either of the notches 39 in said sector 38.

A three movement cam 41 is slidably mounted on the cam shaft 29 and is constrained to rotate therewith by means of a

feather 42. (Fig. 1). The said cam shaft 29 is journaled at its inner terminal in a bearing 43 mounted on a support 44 to the base 10 and is likewise journaled in a similar bearing at its outer terminal (not shown).

A deformed link rod 45, provided with a pin 46 through its outer terminal, extends, as illustrated, to a slotted lever 65, pivotally mounted at its base 66 to a fixture 67 on the base 10. Said link rod 45 is secured to said lever 65 by means of a clamp screw 63 engageable in the slot 68 in said lever 65.

The pin 46 extends through the outer terminal of the link rod 45, as before said, and projects from each side thereof, the outer portion of said pin 46 being adapted to engage either of the curved slots 47 in the cam 41 and the inner portion thereof being adapted to travel in a slot 62 in the head portion 48.

A vertical support 49 to the base 10 is provided with an integral right angled member 50, having the notches 51 for engagement with a forked lever 56 pivotally mounted at its lower end in a bearing 57 mounted in a support 58 to the base 10, and at its upper terminal is secured by a pin 60, through an opening 61 in said lever, to a shift collar 59 on the cam 41. A hand lever is fulcrumed in the vertical support 49 at its base, as at 49', by means of the horizontal connecting rod 52. A sector 54 is mounted on the base 10 and is provided with the notches 55 for engagement with the hand lever 53. By means of this lever 53, the support 49 carrying the right angled member 50 is shifted rearwardly, causing the notches 51 to lose engagement with the forked lever 56.

The notches 51 in the member 50 are shown as three in number to correspond with the positions the lever 56 assumes in shifting the cam 41 to its three positions; the central notch being substantially square in form to engage the lever 56 when it assumes a vertical position and the end notches being of opposite oblique angles, in form, to conform to the angularity of the lever 56 when shifted to the remaining positions of said cam 41.

The lever 65 at its upper terminal is connected with a longitudinally extending link rod 72, by means of a ball and socket joint 69. The opposite terminal of said link rod 72 is secured to a yarn guide 71 by means of a like ball and socket joint or knuckle 70. A telescopic member 73, having the integral brackets 74-74, is secured on the upper terminals of vertical supports 75-75.

A cam 86, semi-elliptical in form, is mounted on a cam shaft 89, journaled in bearings 87 and 88, mounted in supports 87' and 88', respectively, to the base 10.

An arm 90 is swivelly mounted on the outer

portion of the cam shaft 89 and its opposite terminal is likewise pivotally mounted, as at 89', to the lower terminal of a link rod 91, the opposite end of said rod 91 being secured to a member 76 on an extension 75' of the inner support 75. The clamp screw 63 is provided with an outwardly extending projection or pin 64 adapted to ride on the cam 86.

To shift the clutch 17 in and out of engagement with the spindle 14, a forked lever 93 fulcrumed at 94 to a support 96 to the base 10 is adapted to engage a shift collar 93' on said spindle 14. Said lever 93 is actuated by a handle 95 connected therewith. With the clutch 17 thrown out of engagement with the spindle 14, the entire spindle may be readily removed for repairs or replacement by turning over the hinged cap bearing 15 and the hinged base 20 of the bearing 19 and the withdrawal of the cotter pin 33 through the forks of the member 32.

A forked member 98 is shown in engagement with the cam shaft 29 and encircling the gears 28, 30 and 31, and the said member is shiftable at its base on a transverse rod 97 mounted in the cam bearing support 44 and a fixture 44' on the base 10. This provides means for shifting the gears 28, 30 and 31 for engagement with the idler 26. Said forked member 98 is locked in position on said transverse rod by means of a wing nut 99.

Longitudinally extending arms 77-77, terminating at their outer ends in integral bosses 78'-78', are secured to a vertical support 80, mounted on a horizontal base 81 on the main base 10, by means of wing nuts 79-79. Coiled spiral springs 78-78 are mounted on said arms 77-77 and are adapted for compression between said bosses 78'-78' and the members 76-76 on the supports 75-75 on the upper ends of which the telescopic member 73 is secured. The function of these springs 78-78 is to keep the roller 85, mounted in openings 74'-74' in the brackets 74-74 on the telescopic member 73 in contact with the yarn as the ball 21 increases in diameter by reason of the yarn or thread 106 being wound thereon.

The link rod 91 is secured to the member 76 by means of a wing nut 92.

The vertical supports 75-75 are secured at their base, by means of wing nuts 79-79, to a cross bar 104 integral with the vertical support 80 which has the horizontal base portion 81 pivotally mounted on the common base portion 10, as at 84.

The cross bar 104 has the horizontal slot 103 therein in order that the supports 75-75 may be adjusted therealong to provide for a ball 21, or a cone 105, or a cylinder 107 of a greater or lesser length.

The horizontal base support 81 for the

vertical support 80 is provided with the curved slot 83 therein, as shown, in order that the entire framework, comprising the supports 80, 81 and 104 may be swung on an angle by means of the pivot 84. The framework is locked in the desired position by means of a wing nut 82. When the ball 21, or a cylinder 107, is employed no angularity is required in the cross bar 104, hence the framework is shown on a parallel plane with the ball 21 in those views in which said ball is shown.

When, however, it is desired to employ a cone, such as 105, in Fig. 9, on which to wind the yarn, then the cross arm 104 is required to assume the angle of the periphery of the said cone, in order that the yarn may be properly wound thereon. The cone 105 is positioned and secured on the spindle 14 in the same manner as the ball 21, preferably with the broadest portion of the cone adjacent the outer terminal of the spindle 14. The integral guide plates 24'-24', in this instance, being considerably shorter in length than the guide plates 24-24 employed when the ball 21 is to be positioned, owing to the different contour of said cone 105. The cylinder 107 is likewise positioned on the spindle 14 in the same manner as the ball 21, it having a core 108 for the purpose.

When the cone 105, or the cylinder 107, is employed the cam 86 is disconnected from engagement with the arm 90, as its function is not required, and said cam 86 is turned with the radial portion thereof in a reverse position.

A telescopic member 73, having the projecting flanged channeled sections 100 and 101, as particularly illustrated in Fig. 5 of the drawings, is positioned and secured in the manner hereinbefore described, the section 101 being adapted to fit within the section 100. The thread guide 71 is provided with the duplicate grooves 102-102 therein, as particularly shown in Fig. 6, which are adapted to successively engage the flanges on the said sections 100 and 101 as the guide travels along said sections; said guide 71 being connected by the knuckle 70 to the link rod 72.

By the employment of this telescopic member 73 the member on which the yarn is to be wound may be of varying lengths.

The slots in the cam 41 are of different contours in order to vary the speed of the transverse guide 71 as it passes across the face of the spool to modify the form of the yarn being wound thereon, the contour of the slot A being adapted for use in the winding of a spool in the form of a cylinder 107 which requires a quick return of the stroke of the lever 65 at each end of the cylinder; the contour of the slot B being adapted for use in the winding of a spool in the form of a cone 105 which requires

a quick return of the stroke of the lever 65 at one end of the cone and a gradual return of the stroke at the opposite end of the cone and the contour of the slot C being adapted for use in the winding of a spool in the form of a ball 21 which requires a gradual return of the stroke of the lever 65 at each end of the said ball 21. These contours are indicated by solid and dotted lines in the front elevational view of the device as disclosed in Fig. 2 of the drawings.

The above described three movements of the cam 41 are not intended to vary the length of the throw of the lever 65 but, as abovesaid, are intended to vary the speed of the transverse guide 71 as it passes across the face of the spool, in order to modify the form or contour of the yarn being wound thereon.

The length of the throw of the said lever 65 is adjusted by the positioning of the link rod 45 in the slot 68, in said lever 65, at a determinate height.

In operation:—Power is applied to the shaft 11 and said shaft thereby is caused to rotate, rotating the spindle 14, the clutch 17 being in, causing the ball 21 to rotate therewith, it being constrained to so rotate by reason of the collars 23-23 and locking means 23'-23' on the said spindle 14. The rotation of the spindle 14 imparts motion to the driving gear 25, mounted integral therewith, which is in mesh with either of the gears 28, 30 or 31, mounted on the cam shaft 29, through idler gear 26, as the exigencies of speed may require, thereby causing said cam shaft 29 to rotate which in turn rotates the cam 41, said cam 41 being feathered on the said shaft 29, imparting a reciprocal motion to the deformed link rod 45 operably connected with said cam 41 as hereinbefore described and connected at its opposite terminal to a lever 65, fulcrumed at its base in a bearing 66, the opposite terminal whereof is secured to a horizontal link rod 72 by a knuckle 69, said link rod 72 at its opposite terminal being connected to the thread guide 71 by means of a like knuckle 70, whereby the thread guide 71 will be caused to travel to and fro on the member 73 which is positioned on the vertical supports 75-75 adjacent a roller 85 in contact with the yarn 106 that is being wound on the ball 21; the tension of the spring 78-78 keeping said roller 85 in contact with the yarn as the ball 21 is being wound. Should the tension of the springs 78-78 produce an uneven pressure against the roller 85 as the ball 21 increases in diameter by the yarn being wound thereon, then a levered weight or weights may be utilized in lieu of the springs 78-78 to retain said roller 85 in contact with the yarn.

The lever 65 is provided with the vertical slot 68 therein in order that the link rod

45 may be secured to said lever 65 at various heights, dependent upon the stroke required of said lever, which will be determined by the length of the ball 21, or other member employed on which the yarn is to be wound. Variations will thus be required in the stroke of the lever 65 while the stroke of the cam 41 will be uniform. To adjust the stroke of the lever 65 with the stroke of the cam 41, the rod 45 is shifted in the slot 68; below the plane of the cam 41 if the stroke of the lever is to be increased and above the plane of said cam if the stroke is to be lessened. The rod 45 is secured in position in said slot by means of the clamp screw 63.

The function of the cam 86 is as follows:—When a ball 21 is being wound the yarn is required to be wound from one end thereof to the other simultaneously with being wound around the same, the winding being, substantially, in the form of an elongated figure 8. This is accomplished by the pin 46 being positioned in the slot C of the cam 41 and the said pin following the contour of said slot, the connecting link rod 45 being secured in the slot 68 in the lever 65 at the required height needed for the throw of said lever which will be determined by the length of the ball 21. In winding a ball 21, however, in the manner above described, it is requisite to round the corners thereof and this is accomplished by means of the radius cam 86. As the yarn pushes the roller 85 outwardly the pivoted link rod 91 connected with said roller 85, as hereinbefore described and mounted on the cam shaft 89, will cause said cam 86 to assume the arc required to form said rounded corners on said ball 21.

From the foregoing description, taken in connection with the accompanying drawings, the advantage of the construction and operation of the device shown will be readily understood by those skilled in the art to which the invention pertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made as are within the scope of the appended claims.

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

1. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having

knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft, substantially as described.

2. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide, a driving gear on said spindle, stepped driven gears on said cam shaft, an idler connecting said driving gear with a driven gear and means to shift said driven gears for a variation of speed, substantially as described.

3. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide, gearing to simultaneously rotate said spindle and said cam shaft, and means for the removal of said spindle independently of the other portions of said device, substantially as described.

4. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever, and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide, gearing to simultaneously rotate said spindle and said cam shaft and means for retaining said roller in contact with the yarn, substantially as described.

5. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft, said

lever being vertically slotted whereby said link rod, connecting said cam and lever, may be shifted and secured therein to adjust the stroke of said lever with said cam, the stroke of the cam being uniform while the stroke of the lever is determined by the length of the member on which the yarn is wound, substantially as described.

6. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a telescopic slide positioned adjacent said member, a roller secured thereto, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft, substantially as described.

7. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a supporting structure provided with a cross member, vertical supports secured to said cross member, a telescopic slide secured to the upper terminals of said vertical supports adjacent said yarn member, a roller secured to said slide, a slotted yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft, substantially as described.

8. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a supporting structure provided with a cross member, vertical supports secured to said cross member, a telescopic slide secured to the upper terminals of said vertical supports adjacent said roller, a roller secured to said slide, a slotted yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever,

a rod having knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft; said telescopic slide comprising two channeled members, one adapted to fit within the other, whereby the yarn guide may successively engage the flanges of said channeled members in its reciprocal movement, substantially as described.

9. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a supporting structure provided with a cross member, vertical supports secured to said cross member, a telescopic slide secured to the upper terminals of said vertical supports adjacent said yarn member, a roller secured to said slide, a slotted yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said lever and yarn guide and gearing to simultaneously rotate said spindle and said cam shaft; said cross member of the supporting structure being longitudinally slotted whereby the vertical supports of the said telescopic slide member may be adjusted therealong for varying lengths of the member on which the yarn is wound, substantially as described.

10. A universal yarn winding device, comprising a spindle, a member rotatable therewith on which the yarn is wound, a supporting structure pivoted at its base, vertical supports secured to a cross member thereof, a slide secured to the upper terminals of said vertical supports, a yarn guide adapted for reciprocal movement on said slide, a transverse shaft, a cam rotatable therewith, a vertical lever pivoted at its base, a link rod connecting said cam and said lever and adapted to actuate said lever, a rod having knuckle connections with said yarn guide and lever; said slide being positioned at an angle to conform to the angularity of the member on which the yarn is wound and gearing to simultaneously rotate said spindle and said cam shaft, substantially as described.

In testimony whereof I affix my signature.
HYMAN M. ZIPPEL.