

June 16, 1931.

E. A. DE WOLF

1,809,890

WINDING MACHINE

Filed May 17, 1929.

4 Sheets-Sheet 1

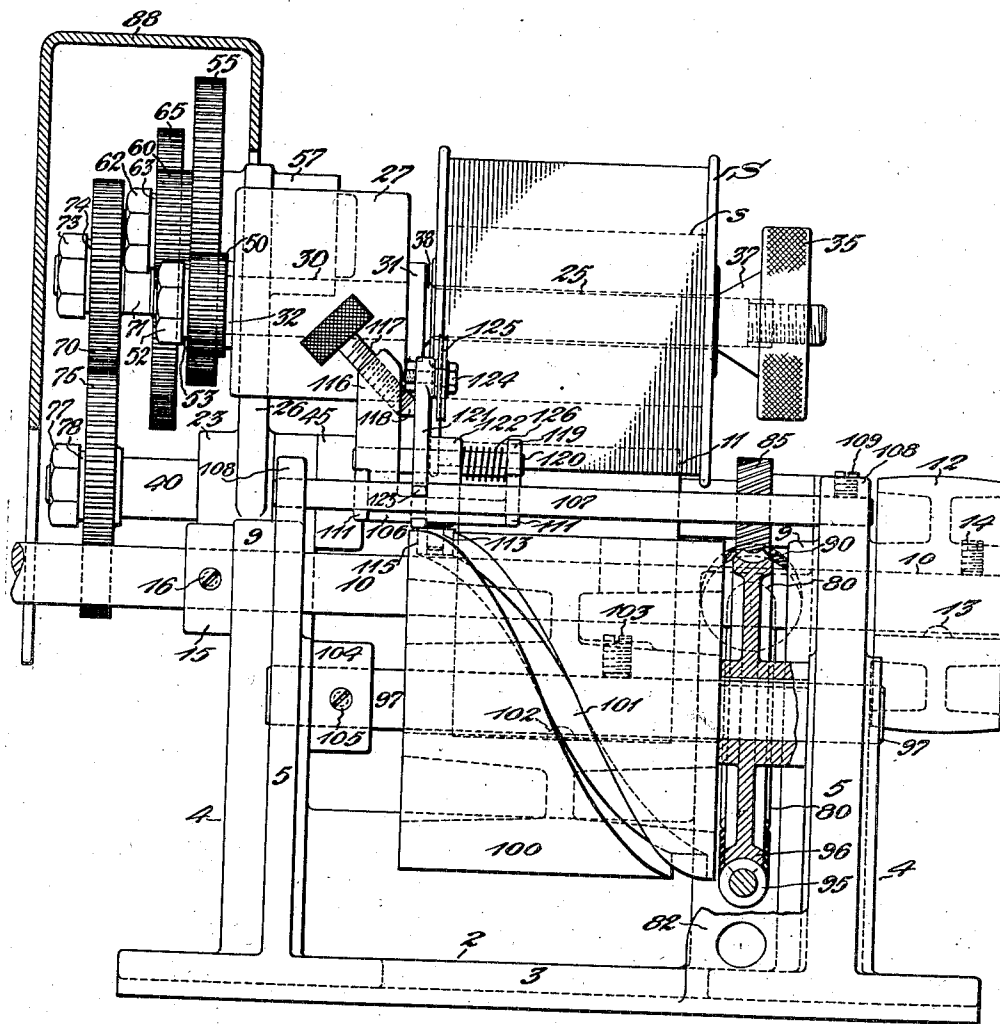


Fig. 1.

Inventor:

By Ernest A. Kle Wolf
Watson, Coit, Morse & Grindle
Attorneys.

June 16, 1931.

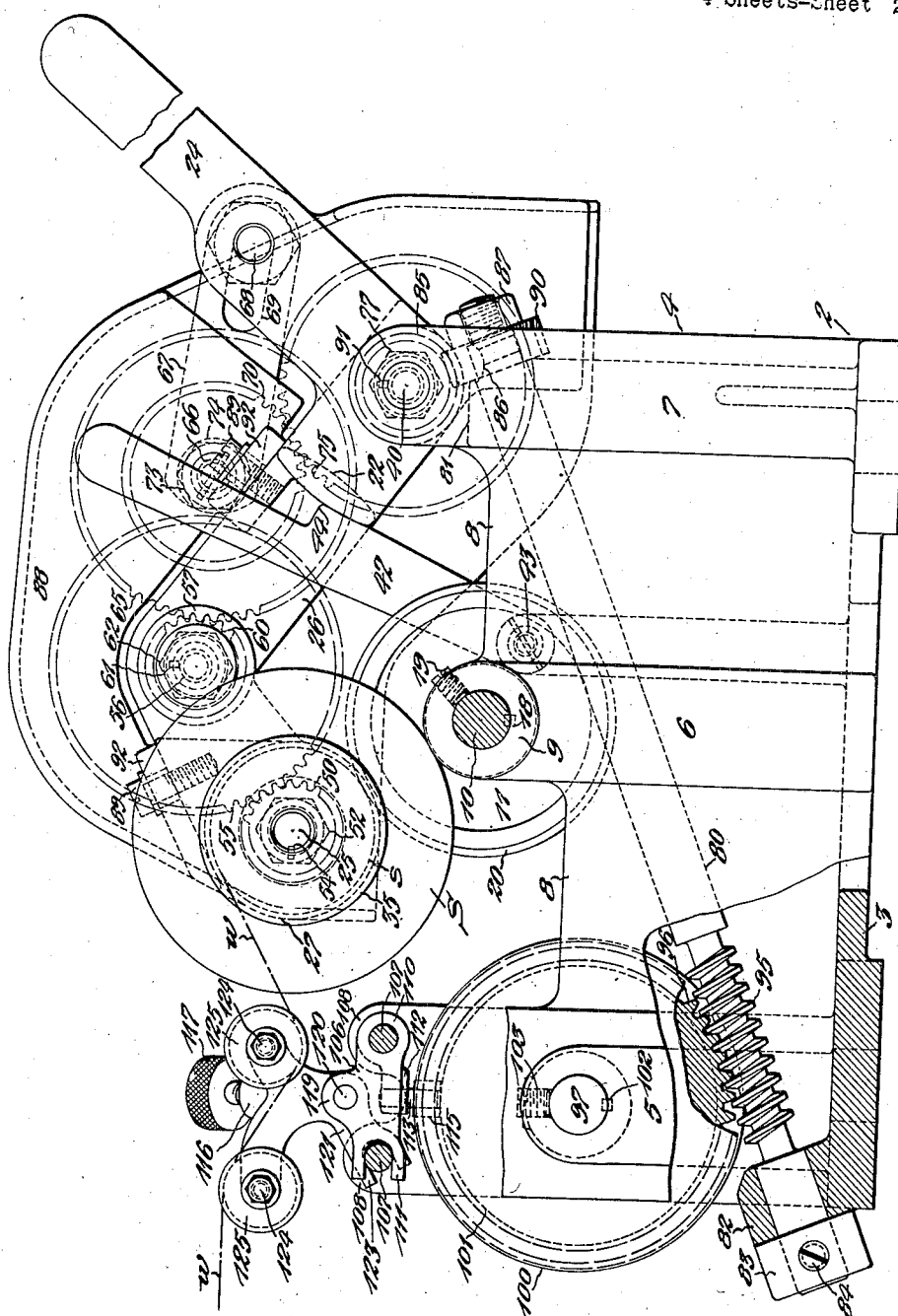
E. A. DE WOLF

1,809,890

WINDING MACHINE

Filed May 17, 1929

4 Sheets-Sheet 2



Inventor:
By Ernest A. de Wolf
Watson, Brit, Marks & Shindle
Attorneys.

June 16, 1931.

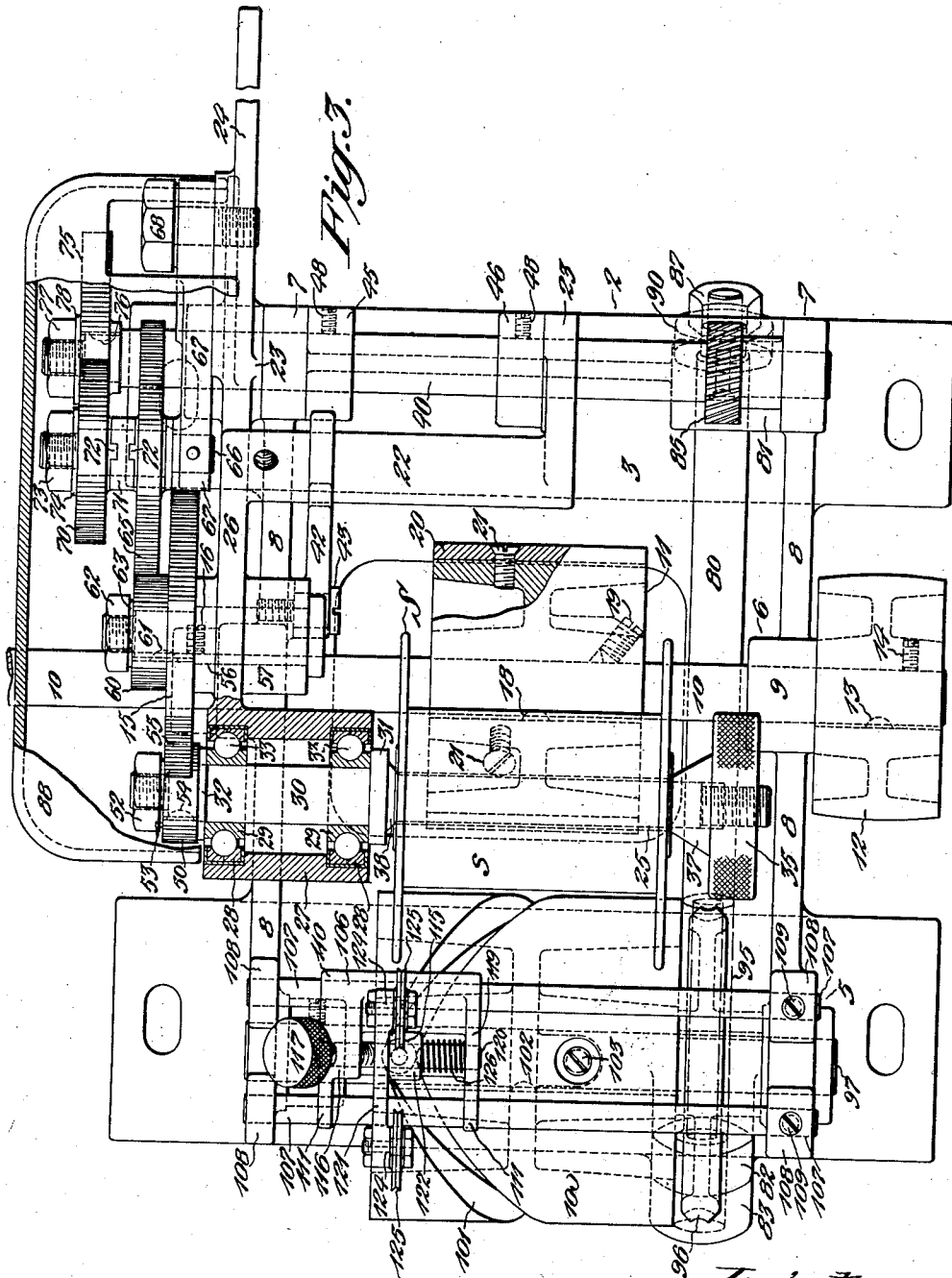
E. A. DE WOLF

1,809,890

WINDING MACHINE

Filed May 17, 1929

4 Sheets-Sheet 3



Inventor:
By *E. A. De Wolf*
Watson, Brit. Morse & Knudde
Attorneys.

June 16, 1931.

E. A. DE WOLF

1,809,890

WINDING MACHINE

Filed May 17, 1929

4 Sheets-Sheet 4

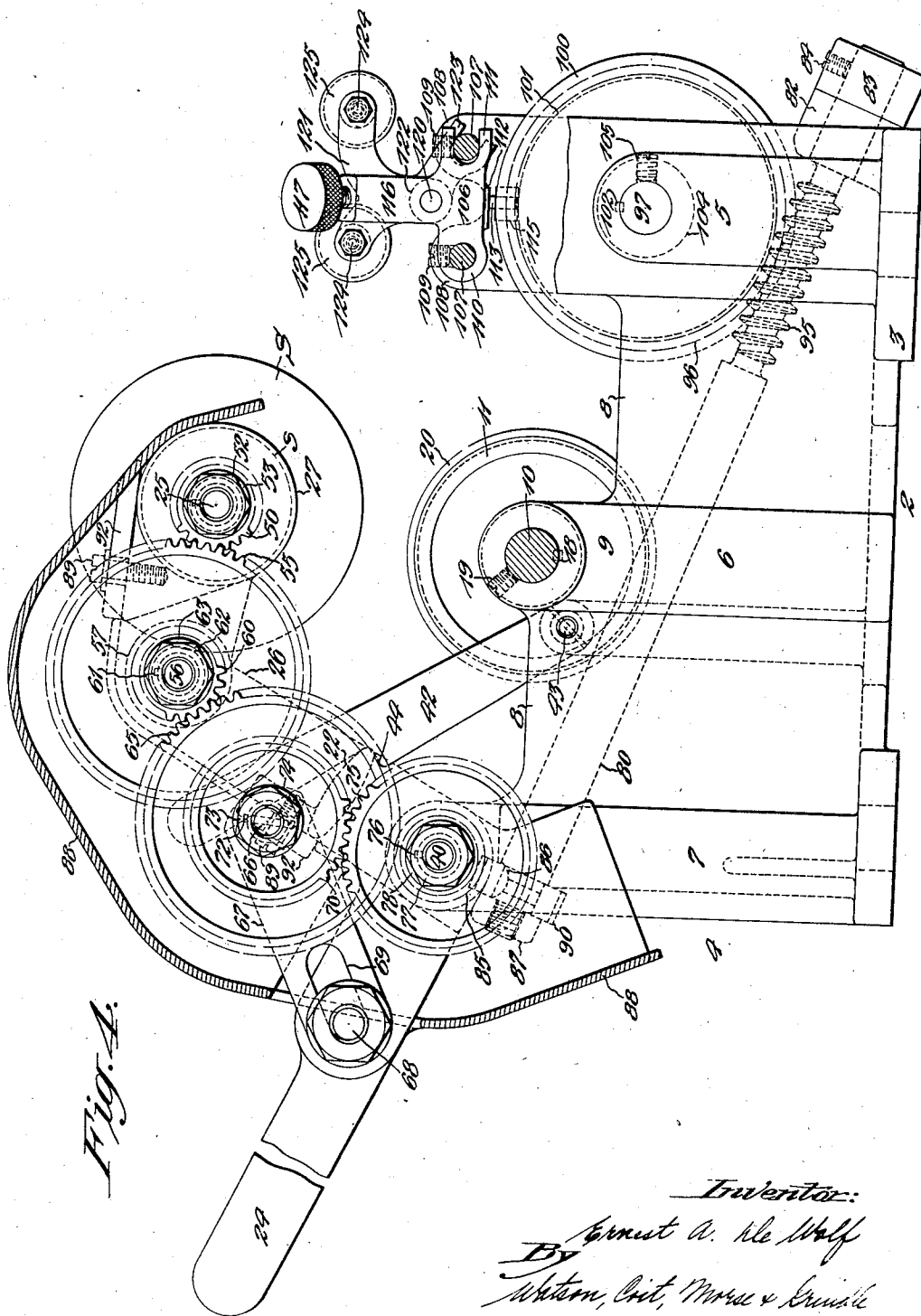


Fig. 4.

Inventor:
 By *Ernest A. de Wolf*
Watson, Critt, Morse & Grinnell
 Attorneys.

UNITED STATES PATENT OFFICE

ERNEST A. DE WOLF, OF CRANSTON, RHODE ISLAND, ASSIGNOR TO UNIVERSAL WINDING COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

WINDING MACHINE

Application filed May 17, 1929. Serial No. 363,918.

This invention relates to winding machines and particularly to a machine for winding or spooling wire and other attenuated materials.

One object of the invention is to provide a winding machine wherein the spool or other receiver on which the material is wound is rotated from a drum or drive-roll whereby the rate of draft on the strand material remains constant from start to finish of the winding.

Another object of the invention is to provide a winding machine having means for traversing the material longitudinally of the spool or receiver which is operated from the rotation of the spool itself so as to synchronize the rate of movement of the traversing-means with the rotation of the spool as the speed of the latter changes from start to finish of the winding.

Another object of the invention is to provide a winding machine wherein the traversing-means is driven from the rotating spool or other receiver on which the material is wound through the intermediary of gearing adapted to be altered in ratio to provide for the proper disposition of the turns of the winding in accordance with the thickness or diameter of the material being wound.

Another object of the invention is to provide a winding machine of simple construction, capable of operation at high speeds to effect maximum production, with its mechanism proof against derangement or getting out of order and durable in use over long periods.

Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the invention by way of example as illustrated by the accompanying drawings.

In the drawings:

Fig. 1 is a front view of the improved winding machine showing its gear-casing in part section to illustrate the arrangement of the gearing therein;

Fig. 2 is a side elevation of the machine showing a portion of its frame broken away to illustrate the worm gearing which drives the traversing-means;

Fig. 3 is a plan view of the machine show-

ing the gear-casing broken away and the winding-spindle bearing in section to illustrate the parts inclosed therein; and

Fig. 4 is a side view of the machine looking in the direction opposite to that of Fig. 2 and showing the gear-casing in section.

In the present embodiment of the invention the winding machine is shown as adapted for winding wire on spools, but it is to be understood that it may be employed for winding other kinds of material and different types of packages.

As shown in Figs. 1 and 2, the winding mechanism is mounted on a frame 2 comprising a base 3 adapted to be bolted to a table, bench or other support and having upright side-members 4 which carry the bearings for the various shafts of the machine. The side-members 4 may be constructed in the form of posts or stanchions 5, 6 and 7 arranged in opposite relation at the sides of the base and connected by web-like ribs 8. The forward stanchions 5 carry the traverse-mechanism, the rearward stanchions 7 serve as a support for the frame in which the winding-spindle is journaled, and the central stanchions 6 are provided with bearings for the drive-shaft 10 which carries the friction drive-roll or drum 11. As shown more particularly in Figs. 1 and 3, the drive-shaft 10 is journaled in bearings 9 at the top of the posts 6 and extends beyond the side of the machine to adapt it to be connected to drive other units if desired. On its right-hand end, as viewed in Fig. 1, is a suitable belt-pulley 12 keyed rotatively therewith at 13 and secured in place by a set-screw 14. The hub of the pulley 12 abuts the side of one of the bearings 9, and a collar 15 on the outside of the opposite bearing is secured to the shaft 10 by means of a set-screw 16 to prevent longitudinal movement of the shaft.

The friction drive-roll or drum 11, shown in part sectional view in Fig. 3, is mounted on the shaft 10 midway between the bearings 9, being secured rotatively with the shaft by means of a key 18 and fastened in place by a set-screw 19 in its hub. Preferably, the roll or drum 11 has a covering 20 of suitable resilient material such as leather or fiber on its periphery which is held in place by counter-

sunk screws 21. The drive-roll or drum 11 is driven directly from the pulley 12 which may be belted to a suitable source of power, for example, a line-shaft or an electric motor.

5 The drive-roll or drum 11 is adapted to bear against the barrels of a spool S on which the winding is performed or to contact with any other suitable form of core or receiver to rotate the latter. As herein shown, the spool
10 S is carried on a winding-spindle 25 which is rotatably journaled in bearings on a swinging frame 26. As illustrated in Fig. 3, the frame 26 is provided with an enlarged hub 27, the ends of which are counterbored to receive a pair of outer ball-races 28. A corresponding pair of inner ball-races 29 are held
15 on the shank 30 of the winding-spindle 25 between a flange 31 at one end and a washer 32 at the other end. The races 28 and 29 are of usual form adapted to receive balls 33 which revolve therebetween, thus providing an anti-friction bearing for the winding-spindle.

25 The spool S is received on the projecting portion of the spindle 25 and a hand-nut 35 is screwed onto the threaded end of the spindle to hold it in place. Preferably, the nut 35 has a tapered or frusto-conical portion 37 which cooperates with a similar tapered portion 38 on the flange 31 to enter the ends
30 of the bore of the spool S to center it on the spindle and secure it rotatively therewith.

The frame 26 carrying the winding-spindle 25 is rockably supported on a cross-shaft 40 which is journaled in suitable bearings at the top of the posts 7 at the rear of the frame 2. As shown more particularly in Fig. 3, the frame 26 is provided at its rearward end with a forked portion or yoke 22 having hubs 23
40 pivoted on the shaft 40. Referring to Fig. 2, the frame 26 is of elbow-shape in side elevation, being provided with a rearwardly extending arm or lever 24 shaped at its end to form a handle by means of which the frame
45 may be rocked upwardly to remove the spool from contact with the driving-drum 10 when it is desired to arrest the winding operation. A detent-lever or latch 42 pivoted at 43 to the side of the frame 2 rests across the side of the yoke 22 of the frame 26 and is provided
50 with a step or shoulder 44 adapted to drop into engagement with the edge of the yoke when the frame 26 is raised into the position illustrated in Fig. 4. The lever 42 thus acts
55 to sustain the frame 26 in raised position with the spool removed from contact with the driving-drum 11, the manual release of the lever permitting the frame to be lowered to replace the spool against the drum.

60 Referring again to Fig. 3, one hub 23 of the frame 26 is held against the side of the bearing on the post 7 by means of a collar 45, and a second collar 46 abuts the side of the opposite hub 23 of the frame. The collars 45
65 and 46 are secured fast to the shaft 40 by

means of set-screws 48 and thus serve to prevent movement of the frame longitudinally of the shaft.

It has been stated that the winding-spindle 25 serves as the driving means for the traversing-mechanism of the machine and for this purpose it is caused to drive the rearward shaft 40 through a train of gearing carried on the side of the frame 26. The outer end of the shank 30 of the winding-spindle 25
70 is reduced in diameter to receive a spur-pinion 50 secured in place against the washer 32 which abuts the side of the outer ball-race 29 by means of a nut 52. The nut 52 is screwed onto the reduced threaded end of the shank 30 against a washer 53 and the pinion 50 is keyed to the shank at 54. The pinion 50 meshes with a gear 55 which is carried
75 on a stud 56 projecting through a hub 57 on the frame 26. The gear 55 is formed integral with or carries fast on its side a gear 60, the two gears being keyed to the stud 56 at 61 and secured in place by a nut 62 abutting a washer 63, it being understood that the stud 56 is arranged to rotate in its bearing in the hub 57. The gear 60 meshes with a gear 65 which, in the present form of construction, serves as a change gear adapted to be replaced
80 by others of different size to vary the ratio of the gearing. The gear 65 is rotatively journaled on a stud 66 held fast in the end of the arm 67, see Fig. 4, which is attached to the side of the frame 26 by means of a bolt 68. The bolt 68 extends through a slot 69 in the arm 67, thus rendering the arm adjustable to adapt it to be set in different positions in accordance with the diameter of the change gears carried by the stud 66. The gear 65 is rotatively connected with a gear 70
85 by means of a slotted collar 71 arranged between the hubs of the gears which have lugs 72 engaging the slots in the sides of the collar. The gears 65 and 70 are held in place on the stud 66 by means of a nut 73 and washer 74 abutting the side of the gear 70.
90

The gear 70, which also constitutes a change gear to be displaced by others of different size, meshes with a driven gear 75 keyed to the end of the shaft 40 at 76 and secured in place by means of a nut 77 and washer 78. It will be observed that through the train of gearing above described the shaft 40 is driven from the winding-spindle 25 at a greatly reduced rate of speed, which may be varied by substituting other gears for the change gears 65 and 70. The shaft 40 is connected by gears 85 and 90 to drive an inclined shaft 80 which extends forwardly to the front of the machine to adapt it to drive the traversing-mechanism to be later described. As shown most clearly in Figs. 2 and 4, the rearward end of the shaft 80 is journaled in a bearing 81 on the side of the post 7 while its forward end turns in a bearing 82 projecting upwardly from the base 3
95
100
105
110
115
120
125
130

on the frame 2. A collar 83 is secured to the forward end of the shaft 80 abutting the side of the bearing 82, being held in place by a set-screw 84, and on its rearward end is the skew-gear 90, previously referred to, keyed thereto at 86 and held in place by a nut 87. The skew-gear 90 meshes with the similar gear 85 keyed to the shaft 40 at 91.

The above described gearing is enclosed and protected by a casing 88 arched over the top of the frame 26 and secured thereto by screws 89 passing through suitable ears 92 on the side of the casing.

The forward end of the shaft 80 is provided with a worm 95, either secured fast thereon or formed integral therewith as illustrated in the present drawings. As shown most clearly in Figs. 1, 2 and 4, the worm 95 meshes with a worm-wheel 96 which is keyed fast to a cam-shaft 97 journaled in bearings in the posts 5. The shaft 97 carries a cylindrical cam 100 having its periphery provided with a helical groove 101 which acts in the usual manner to impart reciprocation to a traversing-guide for the wire or other material to be wound. As shown in Fig. 1, the cam 100 is keyed to the shaft 97 at 102 and secured in place by a set-screw 103. The hub of the worm-wheel 96 is arranged between the end of the cam 100 and the side of one of the bearings on the post 5, whereby it cooperates with a collar 104 abutting the side of the bearing on the opposite post 5, and secured to the shaft 97 by a set-screw 105, to hold the shaft from axial movement in its bearings.

The traverse-guide for the wire or other material is reciprocated from the cam 100 and may be of any suitable construction. As herein shown it comprises a carriage 106 adapted to slide on a trackway extending between the two opposite posts 5. The trackway may consist of two parallel horizontal bars or rods 107 held in ears 108 at the top of the posts 5 by means of set-screws 109. The carriage 106 is formed with a rearward portion 110 bored to receive the rod 107 and forked bearings 111 straddling the forward rod 107. Projecting from a lug 112 on the under-side of the carriage 106 is a pin or stud 113 carrying a bowl or roll 115 which engages the helical groove 101 in the cam 100. Rising from one side of the carriage 106 is a post 116 provided with an inclined, interiorly-threaded hole for receiving a thumb-screw 117 which is formed with a tapered point 118.

Driven through a hole in the post 116 is a pin or rod 120 having its opposite end held in a hole in an ear 119 at the opposite side of the carriage 106. Mounted to slide on the pin 120 is a vertical arm 121 provided with a hub 122 surrounding the pin. The arm 121 has a forwardly extending leg 123 which is forked at its end to adapt it to straddle the

rod 107 on which the carriage 106 slides. The upper end of the arm 121 is formed with two divergent branches provided with hubs at their ends carrying shouldered studs 124. The studs 124 provide journals for a pair of peripherally-grooved disks or guide-sheaves 125 around which the strand of wire *w* or other material passes as it feeds to the spool S on which it is wound. A helical spring 126 is coiled around the pin 120 between the hub 122 of the arm 121 and the ear 119. The spring 126 tends to hold the arm 121 pressed against the conically pointed end 118 of the thumb-screw 117, and by turning the screw the arm may be adjusted one way or the other to set the strand-guiding sheaves or wheels 125 in alinement with the end flanges of the spool S after the latter has been placed on the spindle 25.

In use the complete machine is operated as follows: The spool S, which is usually provided with a relatively large barrel and narrow end-flanges or heads, is placed on the spindle 25 and the hand-nut 35 screwed up against its end to clamp it in position with the tapered projections 37 and 38 tightly engaging its bore. The wire *w* or other material to be wound on the spool is drawn off from its source of supply, carried around the periphery of the first guide-sheave 125, thence down under the second sheave, whence it is led to the barrel of the spool S to which its end is fixedly attached. While the machine is being prepared for operation the frame 26 is held in raised position, as shown in Fig. 4, by the engagement of the notched detent-lever 42 with the yoke 22 of the frame. It will be understood that the drive-shaft 10 carrying the pulley 12 is driven continuously from any suitable source of power. Therefore, to start the winding operation it is only necessary for the operator to release the lever 42 and lower the frame 26 by means of the handle 24 until the barrel of the spool comes into contact with the periphery of the drum 11, as shown in Fig. 2 of the drawings. The drum 11 will then act to rotate the spool S through contact of its periphery with the barrel of the spool and the wire *w* or other material will thus be wound onto the spool. As the spool S is rotated from the drum 11 it drives the winding-spindle 25 carrying the pinion 50 fast on its end. The pinion 50 turns the gear 55, and through the latter's connected gear 60 drives the coupled change-gears 65 and 70. The gear 70 drives the gear 75 to rotate the rearward shaft 40 and the skew-gear 85 carried on the opposite end thereof is caused to drive the gear 90 to rotate the inclined shaft 80. The worm 95 on the inclined shaft 80 drives the worm-gear 96, which, in turn, drives the shaft 97 to rotate the cam 100. The turning of the cam 100 causes the roll 115 to travel in its groove 101, whereby the traverse-guide carriage 106

is caused to be reciprocated back and forth on its tracks 107. The reciprocation of the traverse-guide causes the strand w of wire or other material passing over the guide-wheels 125 to be traversed axially of the spool S whereby to deposit it in helical turns disposed in adjacent relation between the end flanges of the spool.

It has been explained that the arm 121 carrying the guide-wheels 125 may be adjusted laterally on the carriage 106, this adjustment being performed when the spool S is first placed on the winding-spindle 25. The spools S may vary somewhat as regards the size of their bores, and due to this they may not always assume the same position longitudinally of the spindle 25 when the hand-nut 35 is tightened against their ends. Therefore, to insure that the traverse of the guide-wheels 125 may register with the space between the heads of the spool S the position of the arm 121 carrying the wheels is shifted one way or the other as required by simply turning the adjusting-screw 117.

As the machine winds the wire or other material onto the barrel of the spool S it will be deposited in overlying layers of closely spaced helical coils, and as the diameter of the wound mass increases it will cause the frame 26 to be swung upwardly to accommodate the growth in the winding. When the spool is filled the frame 26 is lifted by means of the handle 24 to remove the surface of the wound material from contact with the drive-roll 11 to arrest the winding operation. As the frame 26 is rocked upwardly the detent shoulder 44 on the lever 42 will engage across the edge of the yoke 22, and thereupon the frame will be held in its elevated position until it is desired to start the winding of a new spool.

It will be observed from the foregoing that the present invention provides a particularly simple and efficient machine for winding wire and other materials onto spools or for packaging the same in other forms.

It is to be particularly noted that the spool or other receiver for the material is driven from a constantly rotating drum through the contact of the winding with its periphery. It will therefore be understood that as the wound mass increases in diameter the speed of rotation of the spool will decrease, but on the other hand the lineal speed of draft on the material will remain constant.

As the rotative speed of the spool is decreased it is necessary that the rate of movement of the traversing-means for the wire be correspondingly reduced and this is accomplished by reason of the fact that the traversing-mechanism or reciprocating-means for the traverse-guide is driven directly from the winding-spindle. Through this arrangement of the mechanism the rate of traverse of the guide is regulated to deposit the coils

of winding in predetermined relation to lay the material on the spool in smooth, even layers with a uniform spacing of the turns or coils of winding therein. It will further be seen that the speed of traverse of the guide may be adjusted in ratio with the speed of rotation of the spool in accordance with the diameter or thickness of the wire or other material being wound. This adjustment is readily accomplished by substituting gears of different diameter for the change gears 65 and 70. In changing the gears 65 and 70 it is only necessary to remove the nut 73 from the end of the stud 66, and in substituting other gears therefor their hubs are connected by the collar 71 and the arm 67 is adjusted to position to bring the gears into mesh by means of the bolt 68 extending through the slot 69 in the arm.

The present improved machine is especially simple in design and sturdy in construction to render it durable in use over long periods. It is particularly to be noted that the machine requires no clutches or other manually-operated drive-control and thus its operating parts are reduced to the minimum.

The improved machine operates with greater efficiency to produce spools, packages or coils of wire and other materials at high speed to render it capable of maximum productivity.

While the present specification and drawings illustrate a preferred form of construction of the improved winding or spooling machine, it is to be understood that various modifications may be made in the design and arrangement of the parts without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a winding machine, the combination of a rotatable drive-roll, a winding-spindle for supporting a spool or other receiver to adapt it to be rotated from the drive-roll, means for mounting the winding-spindle to adapt it to move away from the drive-roll during the growth in the winding on the spool or receiver, a train of gearing driven directly from the winding-spindle, means for traversing the strand material back and forth axially of the spool or receiver, and gearing for operating the traversing-means from the train of gearing driven from the winding-spindle.

2. In a winding machine, the combination of a rotatable drive-roll, a frame pivoted to swing on an axis parallel with the axis of the drive-roll, a winding-spindle journaled in said frame for supporting a spool or other receiver to adapt it to be rotated from the drive-roll, a gear rotatable on the axis on which the frame pivots, gearing connecting the winding-spindle to drive the first named gear, a traverse-mechanism for traversing the material axially of the spool or other receiver,

and gearing driven from the first named gear to operate the traverse-mechanism in synchronism with the speed of the spool or other receiver.

3. In a winding machine, the combination of a rotatable drive-roll, a shaft arranged parallel with the axis of the drive-roll, a frame pivoted on said shaft, a winding-spindle journaled in said frame to adapt it to support a spool or other receiver to be driven from the drive-roll, gearing connecting the winding-spindle to drive the shaft on which the frame pivots, a second shaft extending at substantially right-angles to the first shaft, gearing connecting the first shaft to drive the second shaft, and traversing-means operated from the second shaft to traverse the strand material with respect to the winding-spindle with its rate of traverse synchronized with the speed of rotation of the spool or receiver on which the material is wound.

4. In a winding machine, the combination of a rotatable drive-roll, a shaft arranged parallel with the axis of said drive-roll, a frame pivoted on said shaft, a winding-spindle journaled in the frame and arranged to support a spool or other receiver for the material to be wound to adapt it to be driven from the drive-roll, gearing connecting the spindle to drive the first mentioned shaft, a second shaft extending at substantially right-angles to the first shaft, gearing connecting the first shaft to drive the second shaft, a cam driven from the second shaft, and a traverse-guide reciprocated from the cam to feed the material axially back and forth on the spool or other receiver with the rate of traverse synchronized with the changing speed of rotation of the spool.

5. In a winding machine, the combination of a rotatable drive-roll, means for rotating said drive-roll, a shaft arranged in parallel relation with the axis of the drive-roll, a frame pivoted to rock on said shaft, a spindle journaled in the frame and adapted to support a spool or other receiver in position to be driven from the drive-roll, a train of gearing connecting the spindle to drive the first mentioned shaft, change gears in said train for altering the ratio of speed between the spindle and shaft, a second shaft extending at substantially right-angles to the first shaft, gears connecting the first shaft to drive the second shaft, traversing-means for traversing the strand material axially back and forth on the spool or receiver, means for reciprocating the traverse-means, and gearing connecting the second shaft to drive the reciprocating-means.

6. In a winding machine, the combination of a frame, a drive-shaft journaled in said frame, a drive-roll driven from the drive-shaft, a second shaft journaled in the frame in parallel relation with the first shaft, a

swinging frame pivoted on the axis of the second shaft, a winding-spindle journaled in the swinging frame and adapted to support a spool or other receiver for the material being wound, gearing connecting the winding-spindle to drive the second shaft, a third shaft extending at right-angles to the second shaft, gearing connecting the second shaft to drive the third shaft, a cam driven from the third shaft, and a traverse-guide reciprocated from the cam to traverse the material longitudinally of the axis of the spool or receiver.

7. In a winding machine, the combination of a frame, a drive-roll rotatably supported on the frame, a swinging frame pivoted on an axis parallel with the axis of the drive-roll, a winding-spindle journaled in said frame and adapted to support a spool or other receiver in position to be driven from the drive-roll, a train of gearing driven from the winding-spindle, reciprocating-means driven from the gearing, a traverse-guide rotated by the reciprocating-means to traverse the material on the spool or other receiver, manually-operable means for swinging the pivoted frame to remove the spool from contact with the drive-roll, and a latch adapted to engage the frame to hold the spool away from the drive-roll.

8. In a winding machine, the combination of a rotatable drive-roll, a shaft arranged parallel with the axis of the drive-roll, a swinging frame pivoted on said shaft, a winding-spindle journaled in said frame and adapted to support a spool or other receiver in position to be driven from the drive-roll, a train of gearing connecting the winding-spindle to drive the first mentioned shaft, an arm adjustable on the frame and carrying certain of the gears in the train to adapt them to be displaced by others of different size to change the ratio of the gearing between the winding-spindle and the first shaft, a second shaft geared to the first shaft, and traversing-means driven from the second shaft to traverse the strand material axially back and forth on the spool or receiver.

9. In a winding machine, the combination of a frame, a drive-shaft journaled in said frame, a drive-roll driven from said shaft, a second shaft journaled in the frame in parallel relation to the drive-shaft, a swinging frame pivoted on the second shaft, a winding-spindle journaled in the swinging frame to adapt it to support a spool or other receiver in position to be driven from the drive-roll, a train of gearing connecting the winding-spindle to drive the second shaft, a third shaft extending forwardly from the second shaft, gearing connecting the second shaft to drive the third shaft, a worm on the third shaft, a worm-wheel driven therefrom, a cam connected to be driven from the worm-wheel, and a traverse-guide reciprocated from the

cam to adapt it to traverse the material axially of the spool or receiver.

10. In a winding machine, the combination of a rotatable winding-spindle for supporting a spool or other receiver for the material to be wound, means for rotating the winding-spindle, a traverse-member reciprocable longitudinally of the winding-spindle, means for reciprocating the traverse-member, guiding-means on the traverse-member through which the material feeds to direct it onto the spool or receiver, resilient means acting against said guiding-means to hold it in predetermined position on the traverse-member, and manually-operable means for moving said guiding-means laterally of the traverse-member against the action of the resilient means whereby to adjust the throw of the guiding-means to regulate the terminal points of traverse of the material with respect to the ends of the spool.

11. In a winding machine, the combination of a rotating winding-spindle, a reciprocating traverse-member arranged opposite the winding-spindle, means for rotating the winding-spindle and reciprocating the traverse-member, guiding-means carried by the traverse-member and adjustable laterally thereof, resilient means acting against the guiding-means to locate it in predetermined position on the traverse-member, and manually-operable means for moving the guiding-means in opposition to the resilient means to adjust it laterally of the traverse-member to regulate the terminal points of the traverse of the strand fed through the guiding-means in conformity with the ends of the spool.

12. In a winding machine, the combination of a rotating winding-spindle for supporting a spool or other receiver for the material to be wound, means to rotate the winding-spindle, a traverse-guide comprising a carriage reciprocable longitudinally of the winding-spindle, a support slidable laterally of the traverse-guide, a guide wheel for the strand material carried on said support, a spring acting against the support, and a set-screw for adjusting the support along the carriage against the tension of the spring.

13. In a winding machine, the combination of a winding-spindle for supporting a spool or other receiver for the material to be wound, means for rotating the winding-spindle, a track arranged opposite the winding-spindle, a traverse-guide comprising a carriage mounted to slide on the track, means for reciprocating the carriage, a slide slidable laterally of the carriage, a guide-wheel for the material carried on the slide, a spring acting against the slide, and a set-screw for adjusting the slide on the carriage against the tension of the spring.

14. In a winding machine, the combination of a winding-spindle for supporting a spool or other receiver for the material to be

wound, means for rotating the spindle, a trackway, a carriage slidable on the trackway, means for reciprocating the carriage on the trackway, a pin on the carriage, an arm supported from said pin and slidable thereon, a guide-wheel for the material carried on the arm, a spring enclosing the pin and acting against the arm to slide the latter, and a set-screw in the carriage engaging the arm to slide the latter against the tension of the spring.

15. In a winding machine, the combination of a winding-spindle for supporting a spool or other receiver for the material to be wound, a trackway comprising parallel rods arranged opposite the winding-spindle, a carriage having means embracing said rods to adapt it to slide thereon, means for reciprocating the carriage on the trackway, a pin extending laterally of the carriage, an arm slidable on the pin and having means engaging one of the rods to hold it from turning on the pin, a guide-wheel carried on the arm, a spring acting against one side of the arm, and a set-screw in the carriage inclined at an angle to the arm and having a conical point bearing thereagainst to adjust the arm against the pressure of the spring.

16. In a winding machine, the combination of means for rotatably supporting a spool or other receiver for the material to be wound, means for rotating said receiver, a traverse-member reciprocable longitudinally of the axis of the receiver, means for reciprocating said traverse-member, guiding-means for the material movably mounted on the traverse-member, and a screw for moving the guiding-means in the direction of the path of movement of the traverse-member to secure an accurate adjustment of the terminal points of the traverse of the material as it feeds through the guiding-means.

17. In a winding machine, the combination of means for rotatably supporting a spool or other receiver for the material to be wound, means for rotating said receiver, a carriage reciprocable longitudinally of the axis of the receiver, means for reciprocating the carriage, guiding-means for the material slidable on the carriage, and a manually-operable screw for shifting the guiding-means on the carriage in the direction of the path of traverse to regulate the terminal points of the traverse of the material.

In testimony whereof I hereunto affix my signature.

ERNEST A. DE WOLF.