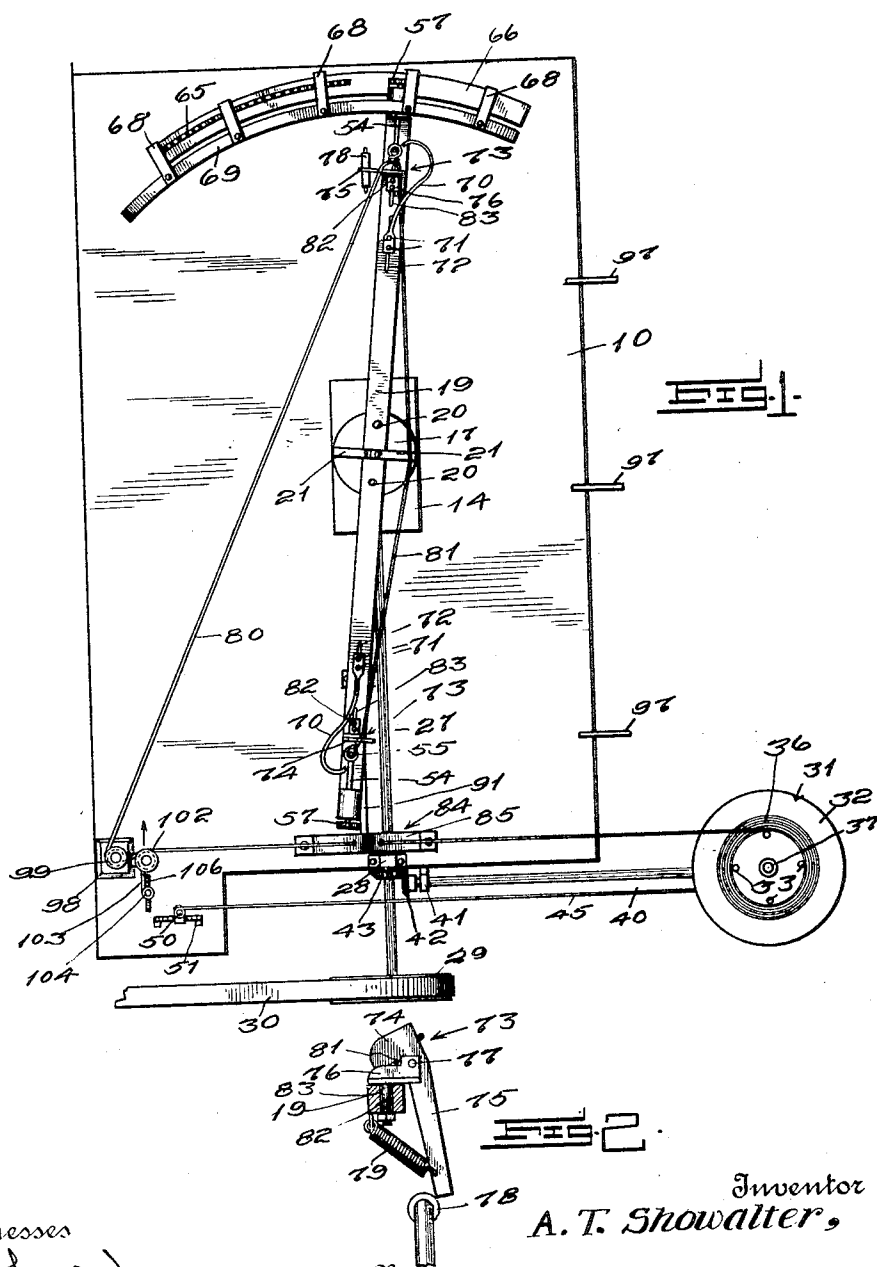


A. T. SHOWALTER.
BALE TIE FORMING MACHINE.
APPLICATION FILED APR. 16, 1914.

Patented Mar. 30, 1915.
2 SHEETS-SHEET 1.

1,134,020.



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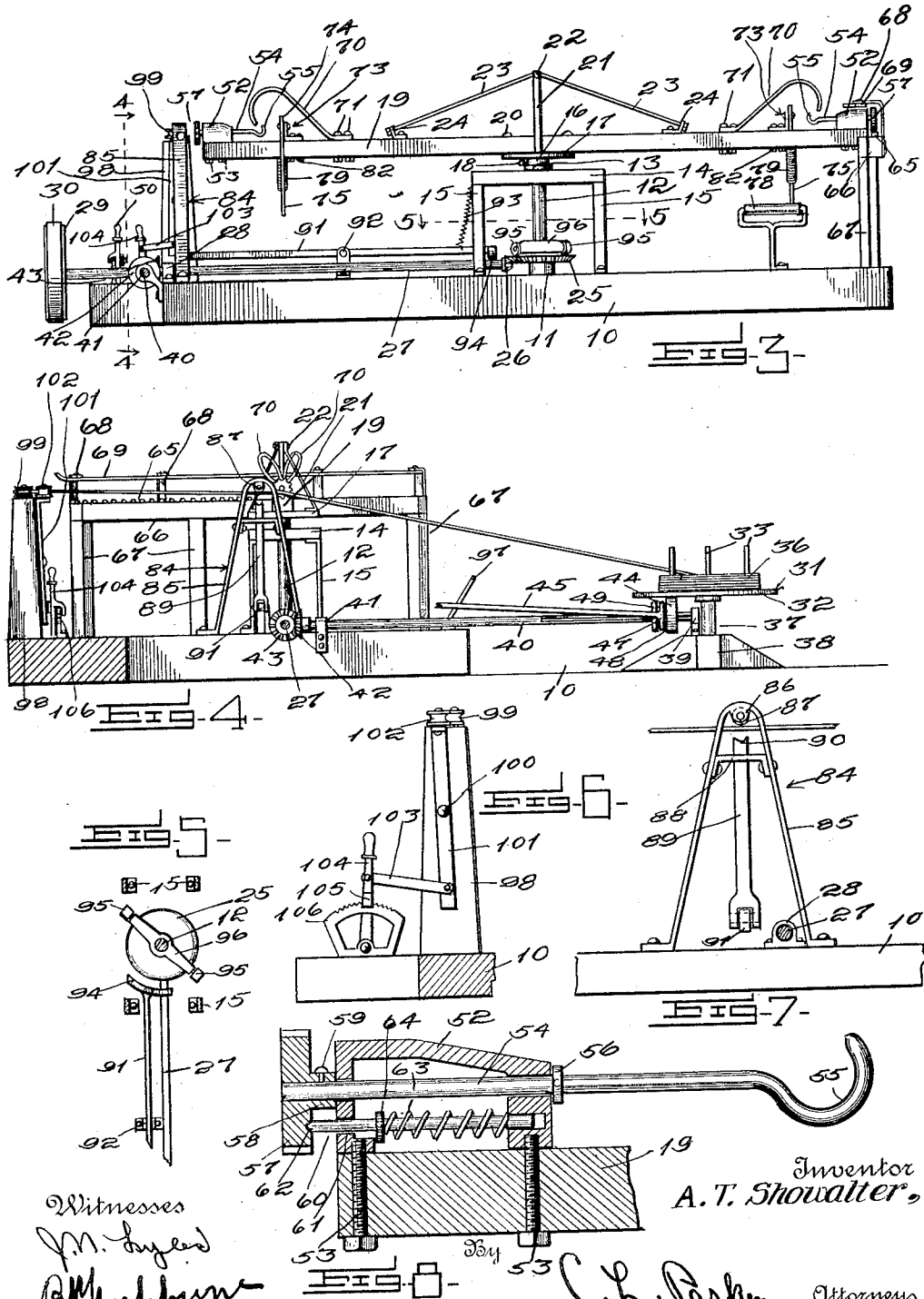
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UNITED STATES PATENT OFFICE.

AMOS T. SHOWALTER, OF HAGERSTOWN, MARYLAND.

BALE-TIE-FORMING MACHINE.

1,134,020.

Specification of Letters Patent.

Patented Mar. 30, 1915.

Application filed April 16, 1914. Serial No. 832,325.

To all whom it may concern:

Be it known that I, AMOS T. SHOWALTER, a citizen of the United States, residing at Hagerstown, in the county of Washington and State of Maryland, have invented certain new and useful Improvements in Bale-Tie-Forming Machines, of which the following is a specification.

My invention relates to machines for forming bale-ties, by cutting a continuous strand of wire or the like into sections of suitable lengths and providing an eye upon one end of each section, whereby the two ends of the section may be quickly and conveniently tied together, and has particular reference to improvements in a machine of this character disclosed in Patent No. 1,046,661, granted to me under date of December 10, 1912.

An important object of the present invention is to provide adjustable means whereby the machine may be employed for forming bale-ties of the above mentioned character, having different lengths, for use in connection with bales of different sizes.

A further object of the invention is to improve upon the tension means to retard the feeding movement of the wire, about or prior to the time that the same is cut, whereby the machine will operate in a more satisfactory manner.

A further object of the invention is to provide means for positively rotating the spool or reel from which the wire is unwound, at a proper speed with respect to the rotation of other parts of the apparatus.

A further object of the invention is to simplify the construction of the apparatus covered by my Patent No. 1,046,661, with a view of eliminating parts thereof, and increasing the efficiency of the operation of the apparatus.

A further object of the invention is to provide means for permanently adjusting the tension of the wire during the free feeding movement thereof.

A further object of the invention is to provide means to catch the completed bale-ties as they are thrown from or jumped off of the apparatus.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like

parts throughout the same, Figure 1 is a plan view of apparatus embodying my invention, Fig. 2 is a side elevation of cutting mechanism, the rotatable support or arm being shown in section, Fig. 3 is a side elevation of the apparatus, the rotatable support or arm being shown parallel with the foundation or base of the same, Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 3, Fig. 5 is a horizontal sectional view taken on line 5—5 of Fig. 3, Fig. 6 is a side elevation of wire feeding tension means, Fig. 7 is a similar view of wire retarding tension means, and, Fig. 8 is an enlarged longitudinal sectional view through a housing carrying the wire holding and twisting element, associated elements being shown in section and in elevation.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a foundation, arranged centrally upon which is a relatively stationary bearing 11 (see Fig. 3), receiving a vertically rotatable shaft 12. The upper end of this vertically rotatable shaft 12 is journaled through a bearing 13, carried by an upper horizontal platform or support 14. This platform or support is supported by legs 15 or the like, secured to the foundation 10, as shown. The shaft 12 extends upwardly beyond the bearing 13 and has its upper end passed into a sleeve 16 formed upon and depending from a rotatable table 17, the shaft 12 being clamped within the sleeve 16 for rotation therewith by a bolt 18, as shown. Arranged upon the rotatable table 17 and extending diametrically thereof is a preferably horizontal rotatable support, bar, or arm 19, rigidly connected therewith by means of bolts 20 or the like.

The numeral 21 designates upstanding angular arms or brackets, the lower ends of which are bolted or otherwise rigidly secured to the table 17, upon opposite sides of the rotatable support or bar 19, as more clearly illustrated in Figs. 1 and 4, these arms or brackets converging upwardly and being connected by a transverse bolt 22, as shown. Connected with the upper ends of the upstanding brackets or arms 21, preferably by means of the bolt 22, are diagonal brace rods 23, inclined downwardly toward their outer ends for connection with the rotatable support or bar 19, as shown at 24. Means are provided to rotate the vertical

shaft 12, comprising a bevel gear 25 arranged adjacent the bearing 11 and driven by a smaller bevel gear 26. This smaller bevel gear is rotated by a drive-shaft 27 mounted within bearings 28. At its outer end, the drive-shaft 27 (see more particularly Figs. 1 and 3), has a pulley 29 rigidly connected therewith, rotated by a belt 30, in turn driven by a suitable prime mover (not shown), such as a gasoline engine, steam engine, or electric motor. It is thus seen that the rotation of the shaft 27 will be imparted to the horizontal support or bar 19, for rotating the same.

As more clearly shown in Figs. 1 and 4, the numeral 31 designates a rotatable reel, spool, or support, carrying the wire to be formed into the bale-ties. This rotatable support comprises a rotatable platform 32, carrying upstanding arms 33, adapted to receive an annular roll 36 of the wire about the same. Connected with the rotatable platform 32 is a depending spindle or shaft 37 journaled within and supported by a relatively stationary bearing 38. Connected with this bearing 38 and arranged inwardly of and near the spindle or shaft 37 is a bearing 39, rotatably receiving one end of a transverse rotatable shaft 40, as shown. The inner end of the shaft 40 is journaled through a bearing 41 and has a bevel gear 42 rigidly connected therewith, driven by a bevel gear 43 secured to the drive-shaft 27 for rotation therewith. Splined upon the outer portion of the shaft 40 to move longitudinally of the same and to rotate therewith is a friction pulley or wheel 44, adapted to engage the lower face of the rotatable table 32, and drive the same. It is obvious that the friction pulley 44 will drive the table 32 at different speeds as the same is moved toward and away from the center of the table. The longitudinal movement of the friction pulley 44 is effected by a longitudinally movable shifting rod 45, the outer end of which is forked, as shown at 47, to fit within the annular groove 48 of a sleeve 49 carried by the friction pulley 44. The shifting rod 45 is moved by a vertically swinging manually operated lever 50, (see Figs. 1 and 4). The manually operated lever is provided with suitable latch means to engage a stationary toothed quadrant 51, whereby the lever may be locked in the desired angular position.

Mounted upon the outer ends or portions of the horizontal rotatable support or bar 19 (see Figs. 1, 3 and 8) are housings 52, secured thereto by means of bolts 53 or the like. The upper or top portions of these housings are preferably curved in cross-sections, for a purpose to be explained. Journaled through and removably mounted within each of the housings 52 is a rotatable wire holding and twisting element 54, having its

inner end provided with a hook 55, as shown. Rigidly connected with each of the wire holding and twisting elements 54 is an inner stop-ring 56, rigidly secured thereto by any suitable means. At its outer end, a driving gear 57 is mounted upon the rotatable wire holding and twisting element 54 and is provided with an inwardly extending sleeve 58, adapted to be clamped to the same by means of a binding or clamping bolt 59. It is thus seen that the gear 57 is rigidly and detachably connected with the holding and twisting element 54, whereby the same may be removed from its bearing, and another similar holding and twisting element, of a greater or different length, substituted therefor, for the purpose of forming bale-ties of corresponding different lengths. When the wire is being passed to or threaded into the hook 55 of the holding and twisting element 54, it is important that the hook should be vertically or substantially vertically arranged, and extend upwardly, for which reason I provide a reciprocatory holding pawl 60, mounted within openings 61 formed through the ends of the housing 52. The outer end of this holding pawl is tapered or conical, to enter a correspondingly shaped opening 62 formed in the pinion or gear 57, as shown. The holding pawl 60 is forced outwardly by a coil spring 63, engaging a stop-ring 64, rigidly mounted upon the holding pawl. It should be stated that the spring 63 is sufficiently stiff to retain the tapered end of the holding pawl 60 within the opening 62, to prevent the accidental rotation of the pinion or gear 57, but will yield to permit of the inward movement of the holding pawl, whereby the pinion or gear may be rotated by the proper means, as will be described.

The means to successively rotate the wire holding and twisting elements 54, for a suitable number of revolutions, comprises a horizontally-arranged longitudinally-curved rack-bar track 65 (see Figs. 1 and 4), arranged to be engaged by the pinion or gears 57, as they are successively brought into proximity to one end thereof. The rack-bar track 65 is of suitable length whereby after each gear has engaged the same and been rotated thereby, and upon disengaging therewith, the gear 57 will come to rest at a point whereby holding pawl 60 will enter recess 62, and the hook 55 will extend upwardly in a substantially vertical position. This rack-bar track is secured to a horizontal longitudinally-curved rail 66, mounted upon the upper ends of stationary posts 67. Connected with the rail 66 are vertical L-shaped overhanging brackets 68, to the upper ends of which is secured a guide rail 69. One end of this guide rail is preferably bent upwardly slightly, as clearly illustrated in Fig. 4. Each of the housings 52 has its

curved top adapted to pass beneath and slidably engage with the guide rail 69, which thereby prevents the upward movement of the outer end of the support or bar 19, whereby the pinion or gear 57 cannot disengage the rack-bar track, by an upward vertical movement.

I provide means to thread or pass the wire to the hooks 55 of the wire holding and twisting elements 54, during the continuous rotation of the support or bar 19, the same comprising upstanding rods 70, which are curved longitudinally upwardly and downwardly toward their outer ends and are also curved laterally, as best illustrated in Figs. 1, 3 and 4. The free ends of these curved guide rods 70 are arranged near and above the hooks 55, as more clearly shown in Fig. 3. As the holding and twisting elements 54 are removable, whereby others of different length may be substituted therefor, I provide means whereby the guide rods 70 may be adjusted longitudinally of the rotatable support or bar 19, such means preferably comprising clamping bolts 71, secured to the inner ends of these guide rods and arranged to operate within elongated slots 72 formed through the rotatable support or bar 19, as more clearly illustrated in Fig. 1.

Disposed inwardly of and near the wire holding and twisting elements 54 are cutting mechanisms 73, including pivoted cutters 74, having depending extensions 75, which are disposed upon opposite sides of the rotatable support or bar 19 and are swung in opposite directions with relation to each other, to cut the wire. As more clearly shown in Fig. 2, each of the cutters 74 is pivotally connected with a coacting relatively stationary cutter 76, as shown at 77. That portion of the wire to be cut is caught between the pivoted cutter 74 and the stationary cutter 76, such wire being cut when the pivoted cutter 74 is swung in one direction, which takes place when the depending extension 75 is moved into engagement with a stationary trip 78, (see more particularly Figs. 1 and 3). Attention is called to the fact that the trip 78 is so arranged with relation to the rack-bar track 65, that the same will not move the cutter 74 until the pinion or gear 57 has disengaged said track, as clearly shown in Fig. 1. Connected with the lower end of each extension 75 of the cutter 74 is a retractile coil spring 79, the upper end of which is attached to the support or bar 19. This spring serves to normally hold the cutter 74 in its open or inoperative position so that the wire may be fed between the same and the coacting stationary cutter 76. Attention is called to the fact that when the section 80 of the wire is threaded into the hook 55 of the element 54, (to the right) there is formed a section 81 of the wire,

which has one end portion disposed between the cutters 74 and 76, whereby this portion of the wire will be cut when the cutter 74 is moved by the trip 78. The right end portion of the section 80, adjacent the right end of the section 81, engages behind the cutter 74, as shown, and is not cut but has an eye formed thereon by the rotation of the element 54. After the pinion has traveled the entire length of the rack-bar track 65, this eye is formed, and when the pinion disengages the rack-bar track, the section 81 of the wire is cut, and is thrown from the rotatable support or bar 19, as will be explained. As the holding and twisting elements 54 are removable for the substitution of similar elements of different length, it is necessary that the cutting mechanisms be longitudinally adjustable along the supports or bars 19, for which reason the lower cutters 76 have clamping bolts 82 secured thereto, such clamping bolts passing through elongated slots 83 formed in the support or bar 19. The trip 78 is made sufficiently long whereby it will engage with the extensions 75, when the cutting mechanisms are longitudinally shifted or adjusted upon the rotatable support or bar 19.

I have also provided improved wire retarding tension means, designated, as a whole by the numeral 84, (see more particularly Figs. 1, 3 and 7.) Such means comprise an upstanding inverted U-shaped bracket 85, rigidly bolted or otherwise secured to the foundation 10. This bracket is provided near its upper end with apertures for receiving the wire, and above the same with depending ears 86, having a roller 87 arranged between the same and pivotally connected therewith. Arranged below the roller 87 is a horizontal guide bracket 88, apertured for receiving a vertically reciprocatory clamping element 89, having its upper end provided with a concave recess 90 for engagement with the wire, to force the same into clamping engagement with the roller 87. The lower end of the reciprocatory element 89 is preferably forked and is pivotally connected with a vertically swinging lever 91 (see Fig. 1), which is pivoted between its ends to a fixed support, as shown at 92. Connected with the inner end of the vertically swinging lever 91 is a retractile coil spring 93, serving to normally retain such inner end in an elevated position. Secured to the inner end of the lever 91 is a depression shoe or member 94, having an upper engaging face curved longitudinally in a vertical plane and extending downwardly toward its ends. This depression shoe is disposed in the path of travel of and is adapted to be engaged by rollers 95, rotatably mounted upon the outer ends of a rotatable arm 96, rigidly mounted upon the shaft 12, above and adjacent the bevel

gear 25. The parts of the apparatus are so timed in operation, that the roller 95 will engage the shoe 94 to force the same downwardly, whereby the clamping element 89 is moved upwardly to retard the movement of the wire, to place the same under increased tension, a little before the time that the trip 78 moves the cutter 74, whereby when the cutting action does take place, the wire will be placed under additional tension, so that the same will quickly jump off of the holding and twisting elements 54, the same striking against upstanding catches 97.

The numeral 98 designates an upstanding post upon the upper end of which is pivotally connected a rotatable grooved pulley 99, receiving the wire thereabout and serving as a guide. Pivotaly connected (see Fig. 6), with the post 98 as shown at 100, is a vertically swinging lever 101, the upper end of which has a rotatable grooved pulley 102 pivotally connected therewith, the same being adapted to be swung inwardly with respect to the pulley 99, for permanently regulating the tension of the wire as the same is being continuously fed. The lever 101 is moved or swung by a link 103 pivotally connected therewith, said link having pivotal connection with a manually operated lever 104, provided with latch means 105 to cooperate with a stationary toothed segment 106 whereby such lever may be locked in adjustment at a desired angular position.

The operation of the apparatus is as follows:—The wire is passed through the apertures in the bracket 85 and about the grooved pulleys 99 and 102. An eye is first formed by hand upon the free end of the wire, which eye is placed in or upon the hook 55, the portion of the wire which is adjacent this eye being arranged in engagement with the back of the cutter 74. The shaft 12 is now rotated. When the element 54 (at the left) moves into proximity to the section 80 of the wire, the curved guide rod or element 70 will thread the same into the hook 55 of the element 54. The right end of section 81 of the wire is arranged between cutters 74 and 76, while the right end of section 80 engages the back of this cutter. The pinion 57 is now moved into engagement with the rack-bar track 65, whereby the element 54 is rotated and an eye is formed or twisted upon the right end of the section 80. When the pinion 57 disengages the rack-bar track, the stationary trip 78 engages the extension 75 of the cutter 74, to swing the cutter 74 in the direction to cut the section 81, having the eye formed upon the left end thereof, whereby this completed bale tie will automatically jump off of the elements 54 and be caught by the elements 97. The automatic jumping off of the completed bale-tie is due to the fact that the wire is placed under additional tension, just

before or at the time of the cutting operation. A little before the depending extension 75 engages the trip 78, one roller 95 will engage the depression shoe 94, forcing the same downwardly and elevating the reciprocatory clamping element 89. This clamping element forces the wire into clamping engagement with the roll 87, thus retarding the feeding movement thereof and placing the same under additional tension. This means also serves to prevent too much of the wire being fed during the cutting operation, which may perceptibly retard the movement of the rotatable support. In order that the wire may be continuously fed under a predetermined tension, I have provided the grooved pulleys 99 and 102, such permanent tension being regulated by swinging the lever 104 in the desired direction, the tension being increased when the grooved pulley 102 is swung inwardly, in the direction of the arrow, as clearly illustrated in Fig. 1. As before explained, the elements 54 come to rest with their hooks 55 extending upwardly in a substantially vertical position, the same being temporarily locked in such positions by the elements 60. The curved top of the housings 52 slidably engage with the guide rails 69, thus dispensing with the necessity of additional rollers. The elements 54 are readily removable so that similar elements of different length may be substituted therefor, and the wire guide or threading means and the cutting mechanisms may be readily moved or adjusted longitudinally of the rotatable support 19, as fully explained.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having described the invention, I claim:—

1. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, wire holding and twisting elements mounted upon the rotatable support near the ends thereof, means to rotate the wire holding and twisting elements with relation to the rotatable support during the rotation thereof, means to guide the wire into engagement with the wire holding and twisting elements, cutting mechanisms arranged near the wire holding and twisting elements and radially adjustably connected with the rotatable support, and means to rotate the support.

2. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, wire holding and twisting ele-

ments mounted upon the rotatable support near the ends thereof, means to rotate the wire holding and twisting elements with relation to the rotatable support during the rotation thereof, elements radially adjustably connected with the rotatable support and arranged near the wire holding and twisting elements to guide the wire thereto, cutting mechanisms connected with the rotatable support and arranged near the guide elements, and means to rotate the support.

3. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, wire holding and twisting elements removably mounted upon the rotatable support near the ends thereof, means to rotate the wire holding and twisting elements with relation to the rotatable support during the rotation thereof, wire guide elements adjustably mounted upon the rotatable support near the wire holding and twisting elements and adapted to be moved longitudinally of the rotatable support, cutting mechanisms adjustably mounted upon the rotatable support to be moved longitudinally thereof and arranged near the wire guide elements, and means to rotate the support.

4. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, rotatable wire holding and twisting elements connected with the rotatable support near the ends thereof, means to rotate the wire holding and twisting elements with relation to the rotatable support during the rotation thereof, means to guide the wire into engagement with the wire holding and twisting elements, means to cut the wire, means to rotate the support, and adjustable means to regulate the tension of the wire during the feeding movement thereof.

5. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, wire holding and twisting elements mounted upon the rotatable support near the ends thereof, means to rotate the wire holding and twisting elements with relation to the rotatable support, means carried by the rotatable support to guide the wire into engagement with the holding and twisting elements, means to cut the wire, means to rotate the support, an upstanding support, a pulley rotatably mounted upon the upstanding support and engaging the wire, a lever pivoted to the upstanding support, a pulley carried by the pivoted lever and engaging the wire, and means to swing the lever in the desired direction.

6. In a machine of the character described, the combination with a supporting structure, of a rotatable support mounted upon the same, housings mounted upon the rotatable

support, wire holding and twisting elements journaled through the housings, gears connected with the wire holding and twisting elements to rotate the same, a lower track disposed in the path of travel of the gears to rotate them, an upper track arranged to slidably engage the upper portion of the housings, means to guide the wire to the wire holding and twisting elements, means to cut the wire, and means to rotate the rotatable support.

7. In a machine of the character described, a rotatable support, wire holding and twisting elements connected therewith, wire guide elements connected with the rotatable support and arranged in coöperative relation to the wire holding and twisting elements, means to cut the wire, and means to retard the feeding movement of the wire, embodying a reciprocatory member, a pivoted lever connected with the reciprocatory member, a depression shoe connected with the pivoted lever, and a member rotatable with the support and adapted to engage with the depression member to move the same downwardly.

8. In a machine of the character described, a rotatable support, wire holding and twisting elements connected therewith, means to rotate the wire holding and twisting elements with relation to the rotatable support, means to guide the wire to the wire holding and twisting elements, means to cut the wire, and means to retard the feeding movement of the wire, embodying a reciprocatory clamping member, a pivoted lever connected with the clamping member, a depression shoe connected with the pivoted lever and having an inclined upper face, a member rotatable with the support, a roller carried by the member to engage the depression shoe, means to rotate the support, and tension means engaging the wire.

9. In a machine of the character described, a rotatable support, wire holding and twisting elements mounted upon the rotatable support, wire guide elements mounted upon the rotatable support and arranged near the holding and twisting elements, means to cut the wire, a rotatable wire roll holding member, gearing between the rotatable wire roll holding member and the rotatable support, and means to drive the rotatable support.

10. In a machine of the character described, a rotatable support, wire holding and twisting elements mounted upon the rotatable support, wire guide elements mounted upon the rotatable support and arranged near the holding and twisting elements, means to cut the wire, a rotatable wire roll holding member, and variable speed gearing between the wire roll holding member and the rotatable support.

11. In a machine of the character described, a rotatable support, wire holding

and twisting elements mounted upon the support, wire guide elements mounted upon the rotatable support and arranged near the holding and twisting elements, a rotatable
5 wire roll holding member, a shaft to drive the rotatable support, a second shaft geared with the first shaft for rotation therewith, a friction pulley splined upon the second shaft and operating in engagement with the

lower surface of the rotatable wire roll holding member, and means to shift the friction pulley.

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

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."