Dec. 30, 1924.

1,521,201

W. G. MUELLER

BOX STRAPPING MACHINE

Filed July 15, 1921

4 Sheets-Sheet 1

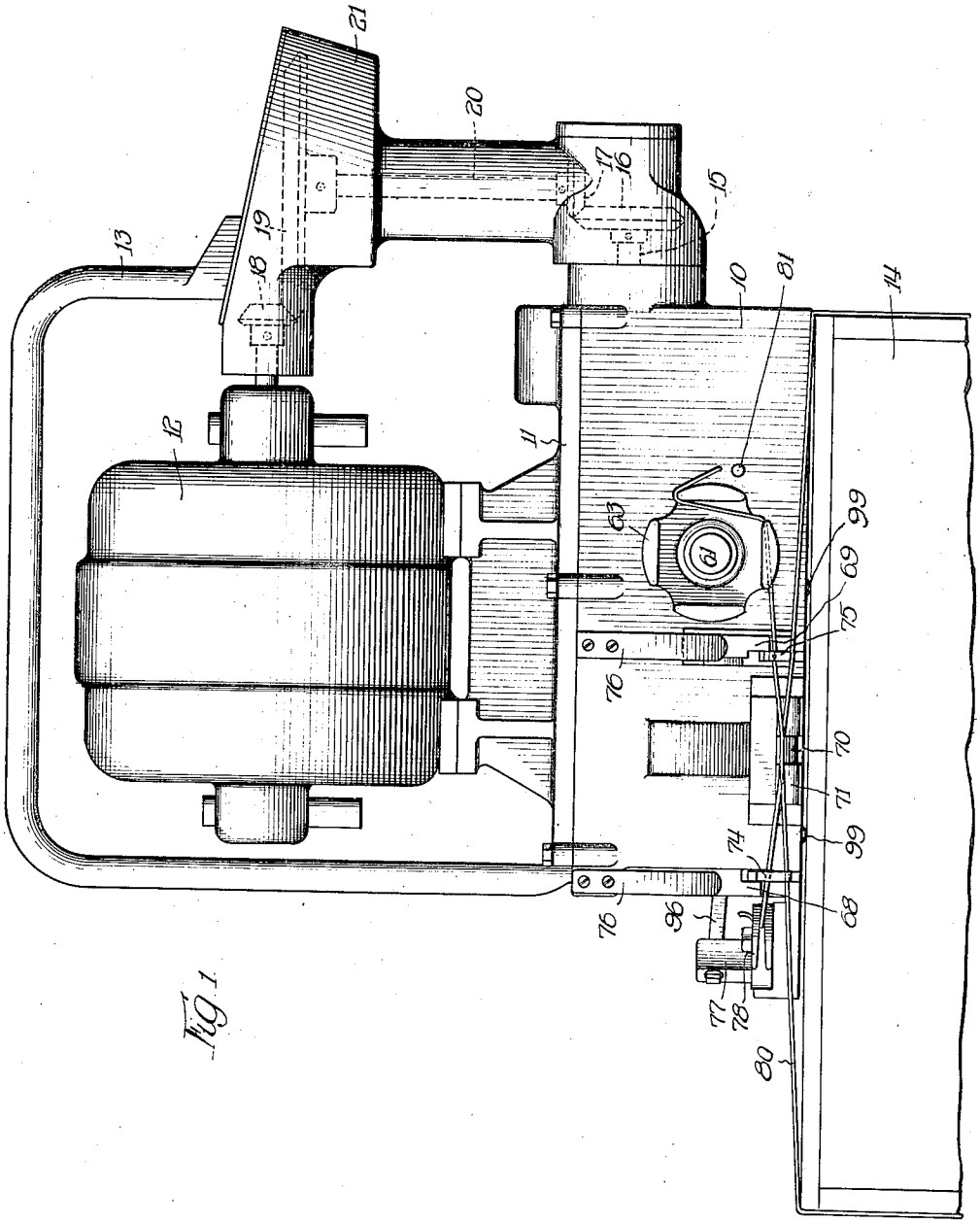

Fig. 1.

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BOX STRAPPING MACHINE

Filed July 15, 1921

4 Sheets-Sheet 2

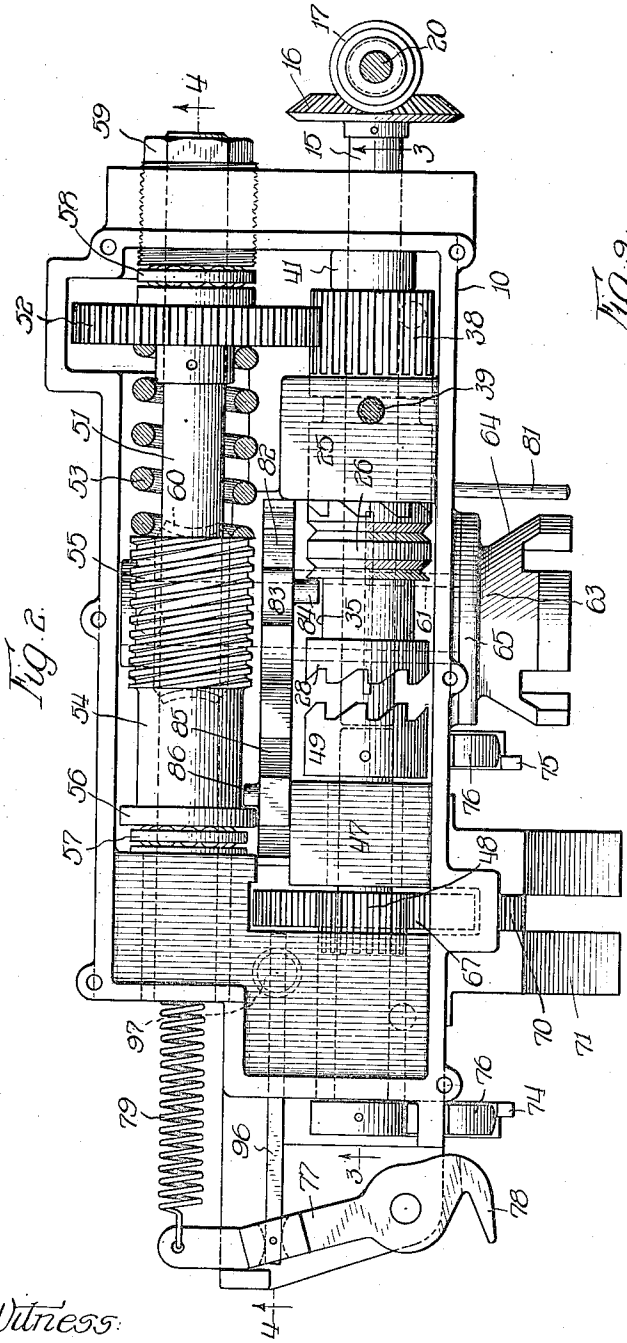

Fig. 2.

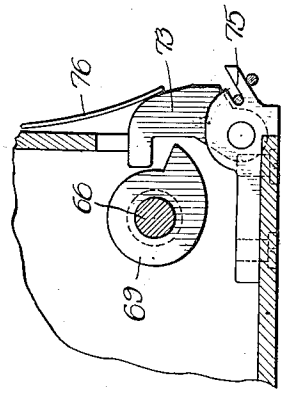

Fig. 9

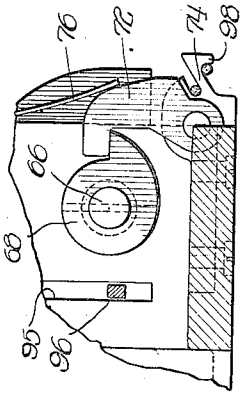

Fig. 8

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BOX STRAPPING MACHINE

Filed July 15, 1921 4 Sheets-Sheet 3

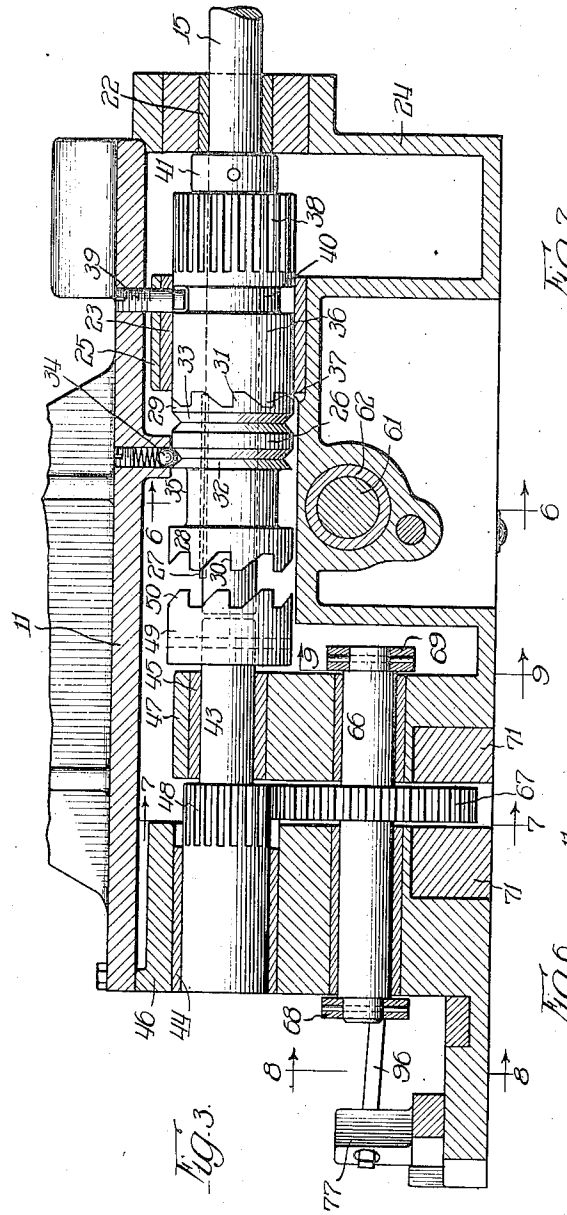

Fig. 3.

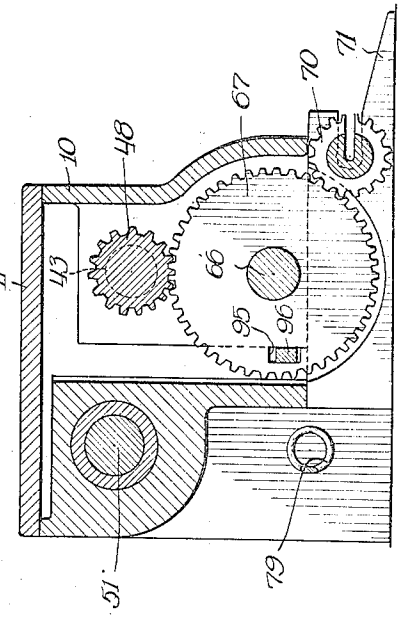

Fig. 7

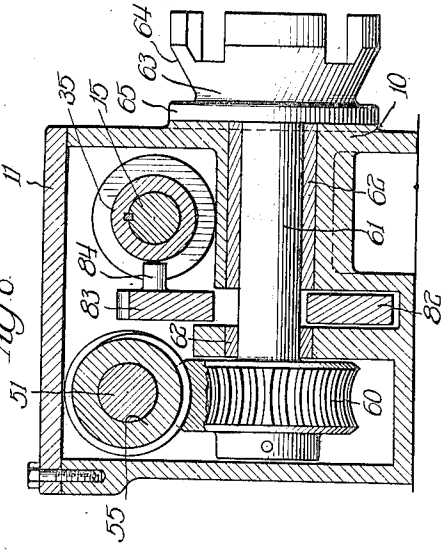

Fig. 6.

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BOX STRAPPING MACHINE

Filed July 15, 1921 4 Sheets-Sheet 4

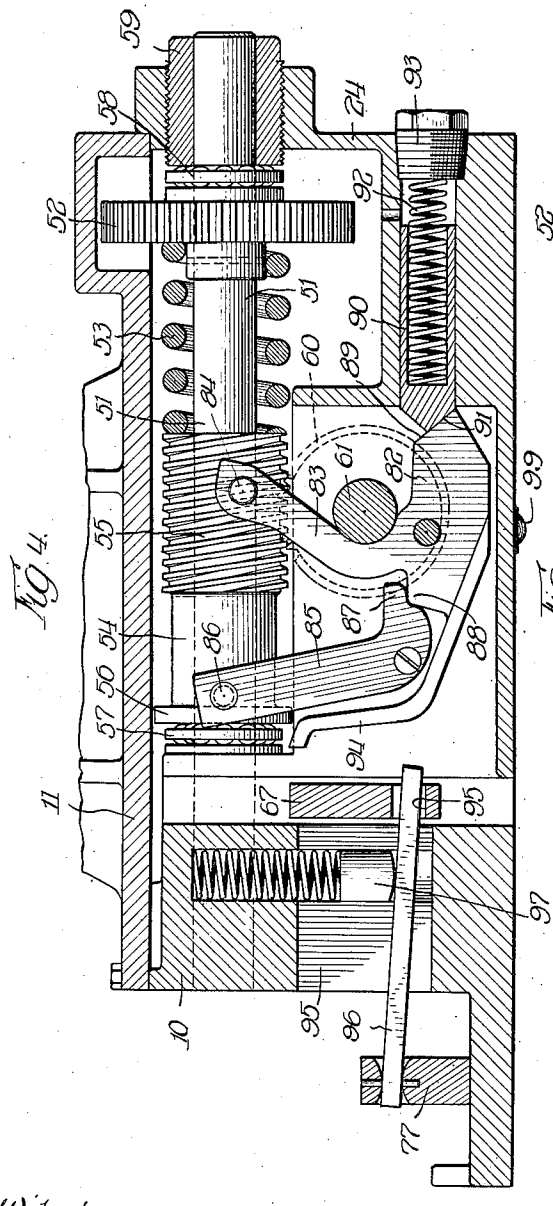

Fig. 4.

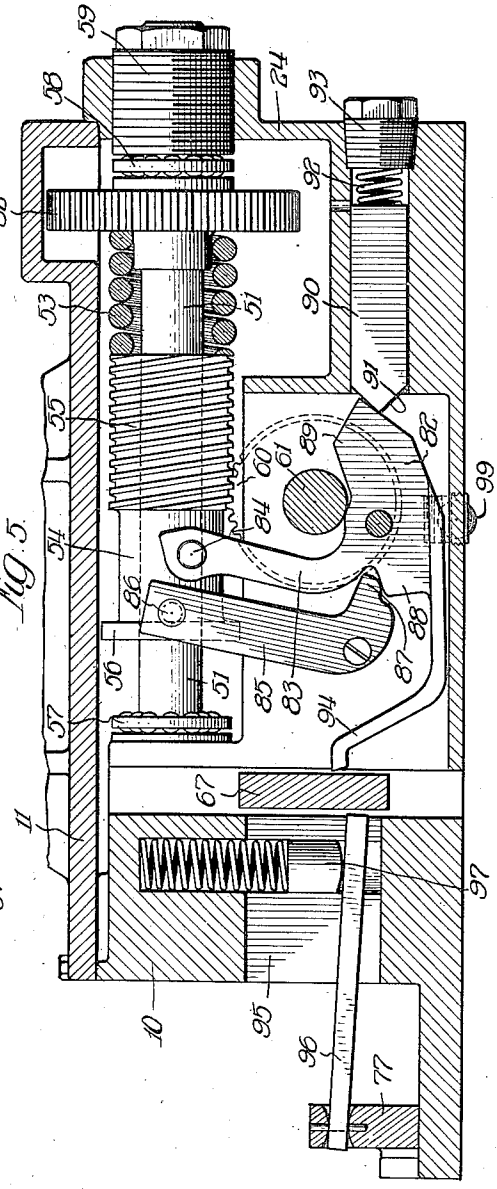

Fig. 5.

Witness
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Patented Dec. 30, 1924. 1,521,201

UNITED STATES PATENT OFFICE.

WILLIAM G. MUELLER, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALEC J. GERRARD, OF CICERO, ILLINOIS.

BOX-STRAPPING MACHINE.

Application filed July 15, 1921. Serial No. 484,889.

To all whom it may concern:

Be it known that I, WILLIAM G. MUELLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Box-Strapping Machines, of which the following is a specification.

This invention relates to wire-tying appliances, and more specifically has to do with an improved and power-operated wire-tying machine of the particular portable type disclosed in my co-pending application Serial No. 434,310, filed December 31, 1920.

The main and primary object of the invention resides in the provision of improved means for accomplishing more efficiently the various automatic and successive operations of a portable wire-tying machine adapted for automatically tensioning, twisting and cutting portions of wire in the formation therefrom of a box encircling loop.

Other objects and advantages of the invention will become apparent as the nature of the same is more fully understood from the following description and accompanying drawings wherein is set forth what is now considered to be a preferred embodiment. It should be understood, however, that this particular embodiment of the invention is chosen principally for the purpose of exemplification, and that slight variations therefrom in minor details of construction or arrangement of parts may accordingly be effected and yet remain within the spirit and scope of the invention as the same is set forth in the appended claims.

In the drawings,

Fig. 1 is a front elevation of the machine showing the same positioned upon a box and engaging the crossed ends of a tying wire in the act of tensioning the same prior to the twisting and cutting operations;

Fig. 2 is a plan view of the machine with the cover removed;

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a view similar to Fig. 4, but showing the various parts of the tensioning mechanism in the positions they assume when the wire has become fully tensioned;

Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 3;

Fig. 7 is a similar section on the line 7—7 of Fig. 3;

Fig. 8 is a fragmentary section on the line 8—8 of Fig. 3; and

Fig. 9 is a similar section on the line 9—9 of Fig. 3.

Referring more in detail to the drawings, the numeral 10 designates the substantially rectangular casing of the wire-tying machine on the cover 11 of which is rigidly mounted a motor 12. An inverted U-shaped handle 13 is secured to the machine and provides convenient handling means when moving the same on to or off of the box 14 to be wired.

Within the front upper portion of the casing 10 is journaled a drive shaft 15 which projects through one end of the said casing and is connected exteriorly thereof to the motor 12 in approximately an 8 to 1 gear reduction, by means of bevel gears 16, 17, 18 and 19 and a countershaft 20. The enumerated connecting means are preferably enclosed in a housing 21 to which the adjacent end of the previously mentioned handle 13 is rigidly fastened. As shown most clearly in Figs. 2 and 3, the shaft 15 extends into the casing for approximately two-thirds of the length thereof, and is journaled in suitable bearing members 22 and 23 positioned respectively in the end wall 24 and in an interior collar construction 25 of the machine casing. A driving collar 26 is concentrically disposed on the shaft 15 and has associated therewith a key 27 which permits axial movement of the collar on the shaft while preventing relative rotation therebetween. The ends 28 and 29 of this collar are provided with ratchet teeth 30 and 31 respectively for a purpose hereinafter explained. Near the end 29 of the collar is provided two annular V-shaped grooves 32 and 33 which cooperate alternately with a spring pressed ball 34 carried above said collar in a boss on the under side of the cover 11. The purpose of the ball and its cooperating annular grooves is to tend to hold the collar in either of two positions lengthwise of the shaft. A wider annular groove 35 having abrupt sides is also formed on the collar 26 intermediate the previously mentioned narrow V-shaped grooves and the end 28 of the collar disposed opposite thereto. The function of this groove will be pointed out later.

A second collar 36 is rotatably positioned on the shaft 15 between the collar 26 and the end wall 24. The face of this collar adjacent the ratchet teeth of the drive collar 36 is provided with ratchet teeth 37 which are adapted for engagement therewith, while the opposite end of the collar 36 is provided with gear teeth 38. Intermediate the ends of the collar 36 the same is characterized by a flat cylindrical surface which forms the indirect journal of the shaft 15 in the aforesaid bearing 23. A pin 39, which is screwed into the cover 11 and extends downwardly therefrom, projects through aligned apertures in the integral collar construction 25 of the casing and the bearing member 23 into an annular groove 40 formed in the surface of the collar 36, whereby to prevent axial movement of the said collar upon the shaft 15. A spacer sleeve 41 is pinned to the shaft 15 intermediate the end wall 24 and the collar 36, and, because of the axially stationary mounting of the said collar serves to prevent longitudinal movement of the shaft within its bearings.

A second shaft 43 is rotatably mounted, in alignment with the shaft 15, in bearing members 44 and 45 which are carried respectively in the end 46 of the casing and in an interior collar construction 47 thereof. The outer end of the shaft 43, which is journaled in the bearing member 44, is enlarged, and is provided with gear teeth 48 just inwardly of the journalling portion at the point where the enlarged portion of the shaft 43 is reduced to enter the bearing member 45. The inner end of the shaft 45, which approximately abuts the adjacent end of the shaft 15, has pinned thereon a short collar 49 which is equipped with ratchet teeth 50 adapted to engage with the adjacent ratchet teeth 30 of the collar 36 when the last mentioned collar is shifted to the left as viewed in Fig. 3.

From the foregoing construction it will be appreciated that the motor 12, through its beveled pinions, countershaft 20, drive shaft 15 and drive collar 26 is adapted to alternately rotate therewith the pinions 38 and 48 which are formed respectively on the collar 36 and shaft 43. Because of the space separating the collars 36 and 49 the sliding drive collar 26 is capable of engaging with only one of the two at a time, whereby simultaneous rotation of the pinion 38 which operates the tensioning mechanism, and of the pinion 48 which operates the twisting and cutting mechanisms cannot be imparted to the same by the collar 26. The mechanism for shifting the said collar axially whereby to engage selectively with the ratchet teeth 37 or 50 will be later set forth.

The tensioning mechanism will now be described. A shaft 51 is suitably journaled in the rear upper portion of the casing in parallel spaced relation to the shafts 15 and 43, and has rigidly secured thereto a gear wheel 52 adapted to mesh with the previously described pinion 38 of the collar 36. A heavy coil spring 53 spaces this gear 52 from an elongated sleeve 54 which encompasses the shaft 51 and is keyed thereto in such a way as to permit axial movement while preventing angular movement of the same relative to the said shaft. One end of the sleeve 54 is formed as a worm 55, and the other end is characterized by a radially projecting rib 56 which provides between the latter and the said worm a wide annular groove. The flanged end 56 of the sleeve 54 is spaced from the adjacent bearing wall of the casing by a ball bearing annulus 57 in order to obviate the friction otherwise caused by end thrust of the sleeve in that direction under the pressure of the coil spring 53. A similar ball bearing annulus 58 is disposed between the outer hub portion of the gear 52 and the face of an axially adjustable shaft bearing plug 59 whereby friction between the said plug and gear due to the said spring 53 is eliminated. By the employment of the axially adjustable end thrust bearing plug 59 the resistance offered by the spring 53 to the approach of the worm 55 toward the gear 52 may be accurately regulated.

The worm 55 meshes therebelow with a worm gear 60 which is keyed to a short transverse shaft 61. This shaft, as clearly shown in Fig. 6, is freely journaled in bearing members 62 positioned in the casing and projects through the front wall thereof where it is provided with a wire tensioning drum 63. The particular drum here shown is characterized by a frusto-conical surface 64 which terminates at its smallest point in an abrupt radially flanged portion 65. The front face of the drum is hollowed out between its outer periphery and its less projecting hub portion, and the tubular flange thus formed about the periphery of the drum is abruptly cut away to constitute means for inserting therethrough the end of the wire to be wound on the aforesaid frusto-conical portion of the drum. It will be understood from the foregoing description of this tensioning mechanism that as long as the pinion 38 is rotated by the collar 26 the drum 63 will be caused to rotate at a relatively slow speed, and that the resistance offered by the wire to the drum—when sufficient to overcome the resistance of the coil spring 53—will act through the worm gear 60 and worm 55 to shift the latter and consequently the rib 56 thereof toward the gear 52.

Referring now more particularly to Figs. 2, 3 and 7 it will be noted that a short shaft 66 is journaled in suitable bearings in the casing 10 below the shaft 43, and has keyed

thereon a gear wheel 67 which meshes with the pinion 48 of the shaft 43 thereabove. The opposite ends of the shaft 66 are provided with cams 68 and 69 which serve to actuate the cutting mechanisms later described. A radially slotted pinion 70 of the type ordinarily employed in wire-twisting machines is disposed below and forwardly of the gear 67 and in mesh with the same, whereby rotation of the pinion 48 on the shaft 43 will serve to rotate the slotted wire twisting pinion 70. This pinion 70, together with the lowermost portions of the gear 67 is located in a narrow recess between two forwardly projecting fingers 71 which slope upwardly and rearwardly to a point even with the axis of the said slotted pinion whereby to more easily feed the strands of wire into and out of the slot in the pinion.

The above mentioned cams 68 and 69, which actuate the cutting mechanisms, cooperate as best shown in Figs. 8 and 9, with cutter members 72 and 73 pivoted to the casing. Immediately in front of the points at which these members are pivoted are located upwardly and forwardly projecting fingers 74 and 75 against the upper edges of which the said cutter members are adapted to shear the wire ends held thereon. The cutter members are swung downwardly in the cutting operation by the increased radial thickness of the cams, and are returned upwardly again by means of leaf springs 76 which are adapted to bear constantly thereagainst. It will be noted that, due to the difference in the angular positions of the cams 68 and 69 on the shaft 66, the cutter 73 will be actuated to shear its wire end prior to the shearing of the wire end below the cutter 72. Both cams are so placed on the shaft 66 furthermore that the cuttings will occur immediately prior to the completion of the twisting operation.

The means for attaching one end of the wire to the machine comprises a pivoted lever arm 77 provided on its forward end with a bifurcated wire-engaging claw 78, as shown in Figs. 1 and 2. The opposite end of this lever arm is connected to a portion of the casing 10 spaced therefrom by means of a coil spring 79 which tends to hold the claw 78 normally as far away from the slotted twisting pinion 70 as possible. In order to form a loop of the wire 80 and secure the ends of the same to the machine, one end is caught in the claw 78 of the lever arm 77, passed above the projection 74 associated with the cutter member 73, through the slot of the twisting pinion, below the projection 75, around the box 14, below the projection 74, again through the slotted pinion 70, above the projection 75, and through the two lowermost kerfs in the drum 63 where it is frictionally held by being bent upon rotation of the drum. A pin 81 projects outwardly from the front face of the machine adjacent the drum 63 and bends downwardly the extreme end of the wire 80 projecting from the periphery of the drum as the said wire end is moved therepast.

While the machine of this invention is preferably intended for use with wire which has been cut into predetermined lengths, very good results are also obtained by using the machine with a continuous wire supply, since that small portion of the wire bent by the drum 63 and pin 81 is left sufficiently crooked to catch without difficulty in the claw 78 prior to the formation of the next loop.

The means for automatically operating the tensioning mechanism and thereafter the twisting mechanism when sufficient tension on the wire has been attained will now be described. As shown most clearly in Figs. 2, 4, 5 and 6 this means comprises an irregularly shaped member 82 pivoted near its bottom to the machine frame at a point between and below the shafts 15 and 51. This member is provided with an upwardly extending lever arm 83 at the upper end of which a lug 84 projects forwardly therefrom into the wide groove 35 of the collar 26. Another lever arm 85 is pivotally mounted at one end in the machine frame adjacent the pivotal mounting of the member 82, and is provided at its upper extremity with a rearwardly projecting lug 86 which extends into the wide groove of the sleeve 54 in normal contact with the rib 56 thereof. The lower end of this lever arm to one side of its pivoting axis is formed into a nose 87 which is adapted to engage with a portion 88 of the member 82, whereby, when the lug 86 is moved to the right by movement of the worm in that direction upon compression of the spring 53 due to the predetermined tension of the wire having been reached, the said nose will engage with the member 82 and cause the lug 84 to move to the left in the groove 35. The member 82 is provided, at a point opposite the portion 88 thereof, with a wedge shaped projection 89 which is adapted to cooperate with a slide 90. The end of this slide contacting with the projection 89 of the member 82 is wedge shaped, as at 91, and is pressed in the direction of said member by means of a spring 92 therebehind, the pressure exerted by said spring being adjusted by varying the position of a spring retaining screw plug 93 which bears against the opposite end of the same.

A finger 94 is rigidly secured to the under side of the member 82 and extends horizontally and then obliquely upwards to a point adjacent a face of the previously mentioned gear 67 of the twisting mechanism. At a point in this gear which becomes substantially aligned with the end of the finger 94 during each complete revolu-

tion of the same, an elongated slot 95 is cut, as shown clearly in Figs. 4 and 7, which is adapted, when the gear wheel reaches the position in its rotation wherein the said slot is in proximity to the end of the finger 94, to have projected therethrough a reciprocating bar 96 which is pivotally carried by the exteriorly disposed lever arm 77 at a point on the opposite side thereof from the wire gripping claw 78. It will be appreciated that as long as there is no tension upon the wire 80 the spring 79 of the lever arm 77 will hold the latter in a position wherein the bar 96 is projected through the gear 67 with its inner end below the adjacent tip of the finger 94, it being of course understood that the gear is under these conditions stationary since the drive collar 26 is only in operative connection with the twisting mechanism of which the gear 67 is a part when the wire has reached the predetermined tension to be imposed thereon. It will be evident however that when the wire ends are attached to the claw 78 and drum 63 of the machine as previously described, and the machine operated to tension the wire the claw 78 will be drawn to the right, thereby withdrawing the bar 96 from its position within the gear 67 below the finger 94. As soon as the tension on the wire reaches the predetermined amount the spring 53, being no longer able to resist the axial movement of the worm 55 in the direction thereof, will yield whereupon the rib 56 of the sleeve 54 by engaging the lug 86 of the lever arm 85 will throw the latter to the right serving to throw the lug 84 of the member 83 to the left against the camming resistance of the slide 90 acting on the wedge shaped projection 89. Because of the width of the groove 35 of the collar 26 in which this lug 84 rides, the said lug will not immediately contact with the left hand side of the said groove since otherwise the ratchet teeth 31 and 37 of the collars 26 and 36 would separate gradually, which is not desired. Just as the lug 84 does come in contact with the left hand side of the groove 35 the extreme tip of the wedge shaped projection 89 on the member 82 passes the extreme tip of the spring pressed slide 90, whereupon the upper beveled surface of the slide cams against the lower beveled surface of the projection 89 to shift the arm 83 quickly to the left under pressure of the spring 92, resulting in a disengagement of the ratchet teeth 31 with the ratchet teeth 35 and an immediate engagement of the ratchet teeth 30 with the ratchet teeth 50, bringing the tensioning mechanism to rest and setting the twisting mechanism in operation. In this shifting of the collar 26 to the left as described the spring pressed ball 34 is forced upwardly out of engagement with the groove 32 and into engagement with the groove 33. The positions of the member 82 and the lever arm 85 before and after the axial shifting to the right of the worm 55 are shown in Figs. 4 and 5 respectively. The gear 67 now commences to rotate in a clockwise direction as viewed from the right of the machine. Just before the completion of the twisting the cutters operate through the cams 68 and 69 to shear the excess wire at each end of the twist, thus relieving the claw 78 of the tension tending to draw the same to the right. As the claw accordingly tends to move toward the left under actuation of the spring 79 the inner end of the rod 96 is pressed against the face of the gear 67 and subsequently projected through the aperture 95 in the same to a point below the tip of the finger 94 when the said aperture in its arcuate movement becomes aligned with the rod end. The bottom of the aperture 95 then contacts with the rod 96 adjacent its end and moves the same upwardly against the end of the finger 94, causing the said finger to move upwardly also. As a result the member 82 pivots on its axis and the lug 84 is again shifted to the right. The nose 87 of the lever arm 85 will not interfere with this movement, but will on the other hand be moved upwardly thereby to shift the said lever arm 85 to the left again since the worm 55 has in the meantime been shifted to the left due to the fact that the tension on the wire end held by the drum, which served to hold the worm in its right hand position against the pressure of the spring 53, was relieved by the cutter at substantially the same time that the tension on the claw 78 was released. The ratchet teeth of the collar 26 still remain in operative driving engagement with the ratchet teeth 50 until the tip of the wedge shaped projection 89 has passed below the tip of the slide 90. The wedging action of the upper bevelled surface of the said slide upon the bevelled under surface of the said projection then serves to shift the lever arm 83, with its lug 84, to the right, breaking the connection of the drive collar 26 with the twisting mechanism and restoring its connection with the tensioning mechanism.

As the end of the rod 96 is moved upwardly by the gear 67 to trip the finger 94 a downwardly spring pressed plunger 97 tending to resist such upward movement yields. As soon, however, as the twisting mechanism, as a result of this operation, becomes unclutched from a drive collar 26 the plunger 97 moves downwardly again and by means of its engagement with the rod 96 rotates the gear 67 slightly in the reverse direction. The purpose of this reverse rotation will now be explained. In order to compensate for the resiliency in the twisted

portion of the wire tending to spring back slightly when the twisting mechanism ceases its operation thereon, the twisting mechanism purposely twists the wire a little more than necessary in order that when the wire strands assume their position of rest the portions thereof held in the pinion will be in a horizontal position permitting their ready removal. The reverse rotation mentioned of the gear 67 moves the slot in the twisting pinion back to its horizontal position after the twisting mechanism has been disconnected from the drive.

It will be noted in Fig. 8 that the wire positioning finger 74 is provided near its tip with a downwardly projecting lug 98. The purpose of this lug is to hold the adjacent portion of wire 80 therebelow in operative relation to the device while the same is still slack prior to the tensioning operation.

By the employment of slanting wire positioning fingers 74 and 75 such as here shown, which are adapted to separate the wire strands at that point, the chance of cutting both wires by accident, which is present where both wires are held in one slot, is eliminated, and the exact positioning of the upper wire on the finger, as far as accomplishing the cutting is concerned is immaterial. A further advantage of such slanting wire positioning means is that they cooperate automatically with the means for holding the wire ends to position the wire strands properly relative to the twisting mechanism.

While the machine of the present invention is here shown as being motor driven, it is, of course, obvious that the same may be provided with a crank and hand operated.

The casing 10 of this machine is spaced from the object on which it rests by three point supporting means comprising roller members 99 in the form of balls. Two of these balls are disposed on the under side of the casing near the front of the machine at the ends while the third is positioned at the rear of the machine near the middle, whereby the machine is adapted to slide readily on the object and to compensate for irregulations on the surface thereof.

I claim:

1. In a machine of the character described, the combination with wire tensioning mechanism, and wire twisting mechanism, of a drive shaft, and power transmitting means connected to said drive shaft and adapted to slidingly move into operative engagement alternately with said tensioning mechanism and said twisting mechanism.

2. In a machine of the character described, the combination with wire tensioning mechanism and wire twisting mechanism, of a drive shaft adapted for continuous one-way rotation, and power transmitting means connected to said drive shaft and adapted to slidingly move into operative engagement alternately with said tensioning mechanism and said twisting mechanism.

3. In a machine of the character described, the combination with wire tensioning mechanism and wire twisting mechanism, of a drive shaft adapted for continuous one-way rotation, and a double clutch connected to said drive shaft and adapted to move into clutched engagement alternately with said tensioning mechanism and said twisting mechanism.

4. In a machine of the character described, the combination with wire tensioning mechanism and wire twisting mechanism, of a drive shaft adapted for continuous one-way rotation, a double clutch connected to said drive shaft and adapted to move into clutched engagement alternately with said tensioning mechanism and said twisting mechanism, and means for shifting said clutch out of engagement with said tensioning mechanism and into engagement with said twisting mechanism when a predetermined amount of tension on the wire has been reached, and subsequently shifting said clutch out of engagement with said twisting mechanism when the tension on the ends of the wire has been released and the twisting completed.

5. In a machine of the character described, the combination with wire tensioning mechanism and wire twisting mechanism, of a drive shaft adapted for continuous one-way rotation, a double clutch connected to said drive shaft and adapted to move into clutched engagement alternately with said tensioning mechanism and said twisting mechanism, and means for shifting said clutch out of engagement with said tensioning mechanism and into engagement with said twisting mechanism when a predetermined amount of tension on the wire has been reached, and subsequently shifting said clutch out of engagement with said twisting mechanism and into engagement with said tensioning mechanism when the tension on the ends of the wire has been released and the twisting completed.

6. In a machine of the character described the combination with a wire tensioning drum having means for permitting the projection of a wire end from its periphery, of means for bending the wire end at the periphery of the drum, whereby to prevent withdrawal inwardly of the wire end from its projecting position.

7. In a machine of the character described the combination with a wire tensioning drum having means for permitting the projection of a wire end from its periphery, of means for bending the wire end at the periphery of the drum in a direction oppo-

site to the rotation of the drum, whereby to prevent withdrawal inwardly of the wire end from its projecting position.

8. In a machine of the character described the combination with a wire tensioning drum having means for permitting the projection of a wire end from its periphery, of means for bending the wire end at the periphery of the drum, whereby to prevent withdrawal inwardly of the wire end from its projecting position, said last mentioned means comprising a finger extending from the frame of the machine adjacent the periphery of the drum.

9. In a machine of the character described, a machine frame adapted to be positioned upon the object to be wired during the wire tensioning and wire twisting operations; anti-friction means carried on the under side of said frame to facilitate movement of the same over the surface of the box during the wire tensioning operation; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

10. In a machine of the character described, a machine frame adapted to be positioned upon the object to be wired during the wire tensioning and wire twisting operations; anti-friction rollers carried on the under side of said frame to facilitate movement of the same over the surface of the box during the wire tensioning operation; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

11. In a machine of the character described, the combination of wire positioning means including an upwardly and outwardly projecting member; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

12. In a machine of the character described, the combination of wire positioning means including an upwardly and outwardly projecting member provided at a point spaced from its base with a downwardly extending lug; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

13. In a machine of the character described, the combination of means for engaging the ends of a loop of wire adapted to draw the same toward the machine; slanting wire positioning members cooperating therewith whereby to place the wire properly for subsequent operation thereon by other mechanisms of the machine; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

14. In a machine of the character described, the combination of means for engaging the ends of a loop of wire adapted to draw the same toward the machine; upwardly and outwardly projecting wire positioning members cooperating therewith whereby to place the wire properly for subsequent operation thereon by other mechanisms of the machine; a wire tensioning means; a wire twisting means; and automatic means for alternately operating said wire tensioning and wire twisting means.

15. In a machine of the character described, the combination of wire twisting means; driving means adapted to impart a one-way rotation to said twisting means; means comprising a spring pressed plunger for imparting a reverse rotation to said wire twisting means after the same has been disconnected from the said driving means; and automatic means for tensioning the wire to a predetermined degree before the twisting operation.

16. In a machine of the character described, the combination with wire tensioning mechanism, and wire twisting mechanism, of a drive shaft, and power transmitting means connected to said drive shaft and adapted to move into operative engagement alternately with said tensioning mechanism and said twisting mechanism, the power transmitting means being out of operative engagement with one of said mechanisms when in operative engagement with the other of said mechanisms.

In testimony whereof I have hereunto subscribed my name.

WILLIAM G. MUELLER.