Sept. 17, 1929. J. T. PECK 1,728,442

WIRE WRAPPING AND TYING MACHINE

Original Filed March 15, 1926 7 Sheets-Sheet 1

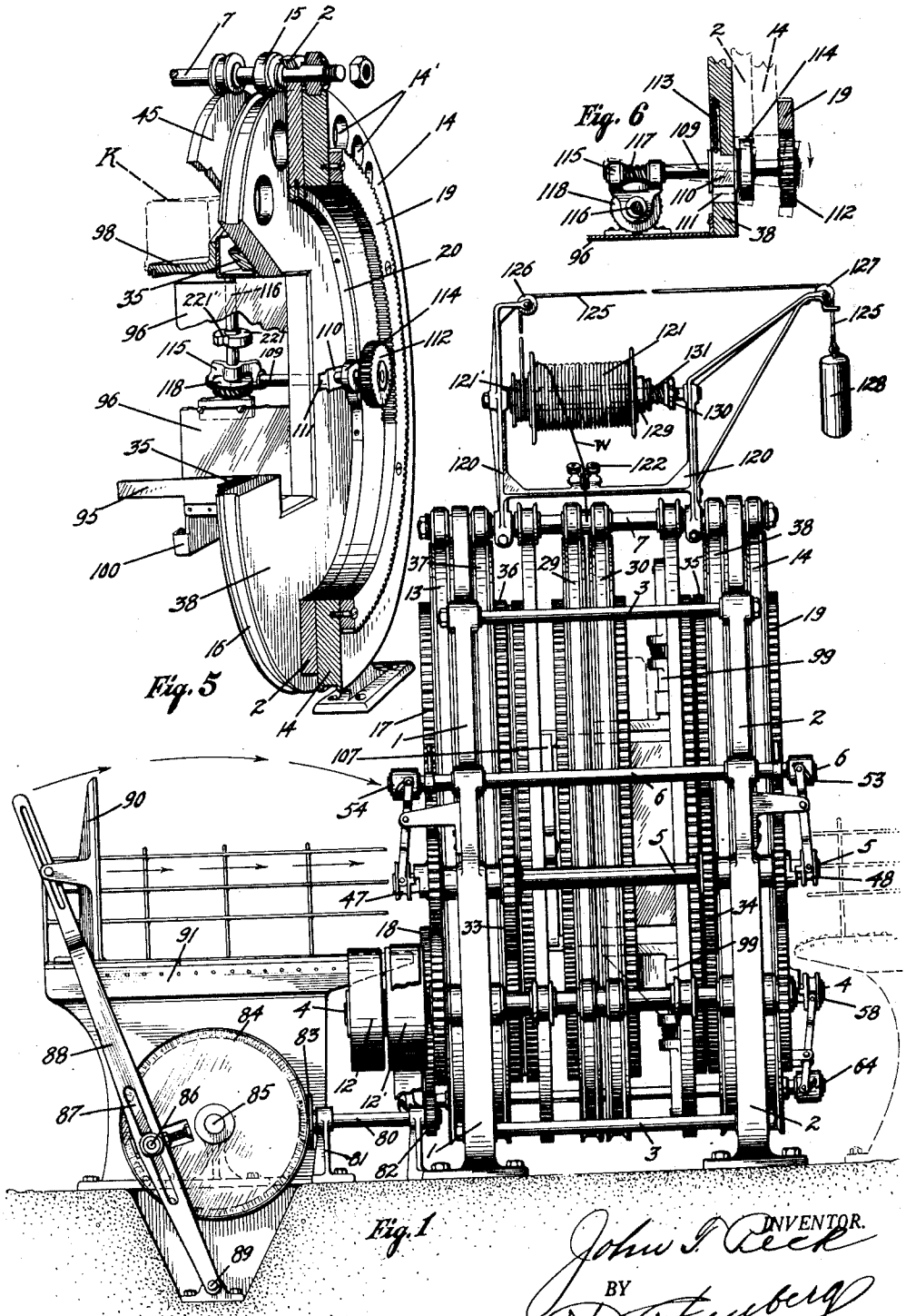


Fig. 1

Fig. 6

Fig. 5

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WIRE WRAPPING AND TYING MACHINE

Original Filed March 15, 1926 7 Sheets-Sheet 2

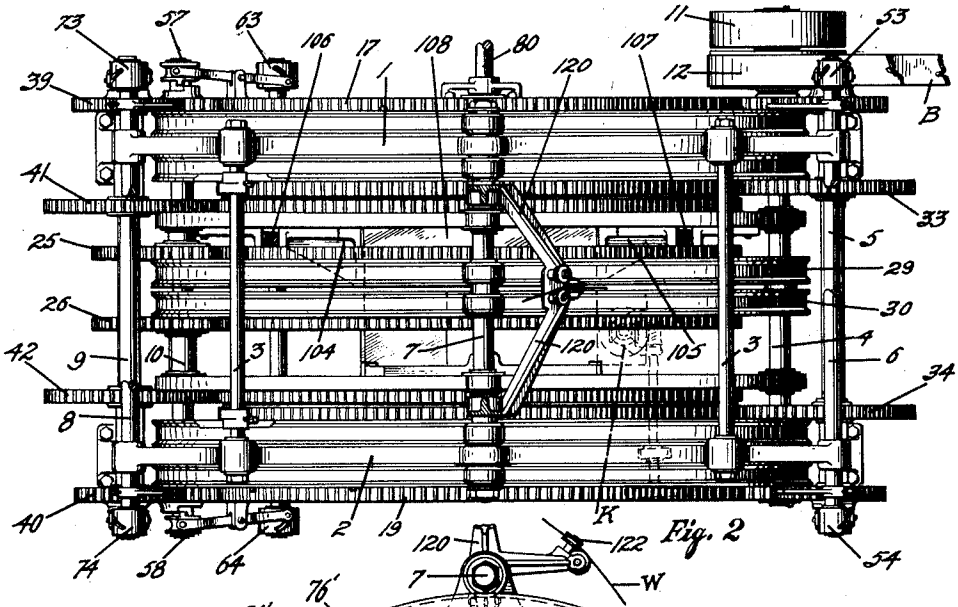


Fig. 2

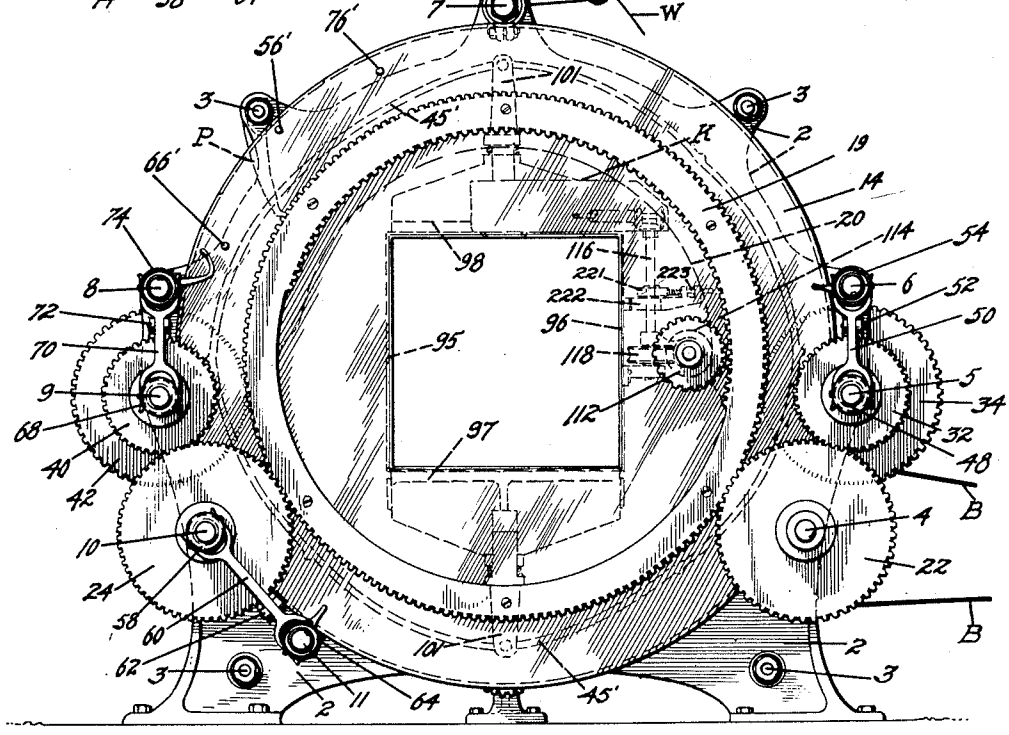


Fig. 3

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WIRE WRAPPING AND TYING MACHINE

Original Filed March 15, 1926 7 Sheets-Sheet 3

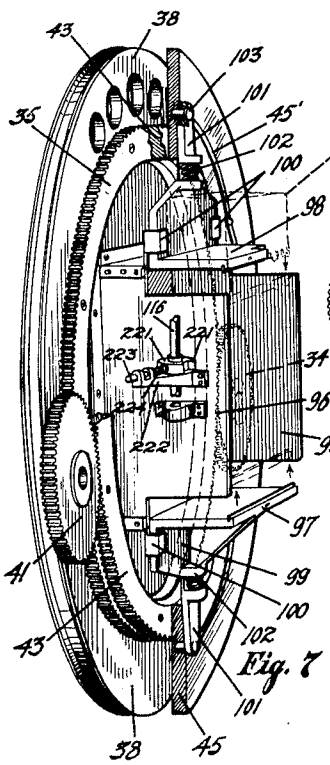


Fig. 7

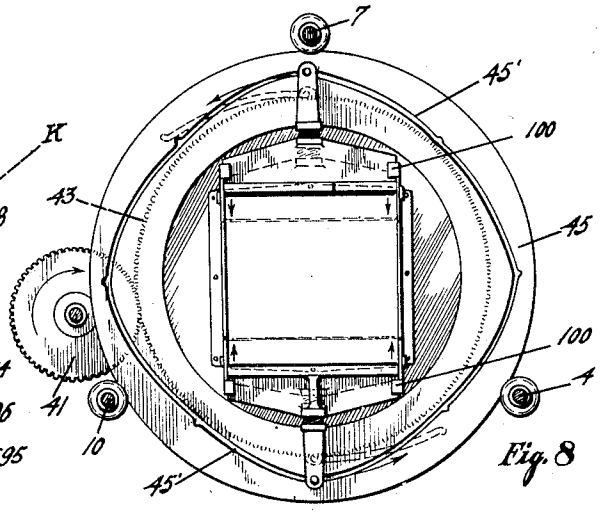


Fig. 8

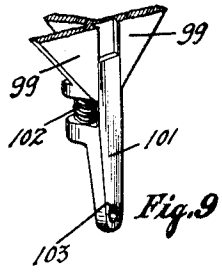


Fig. 9

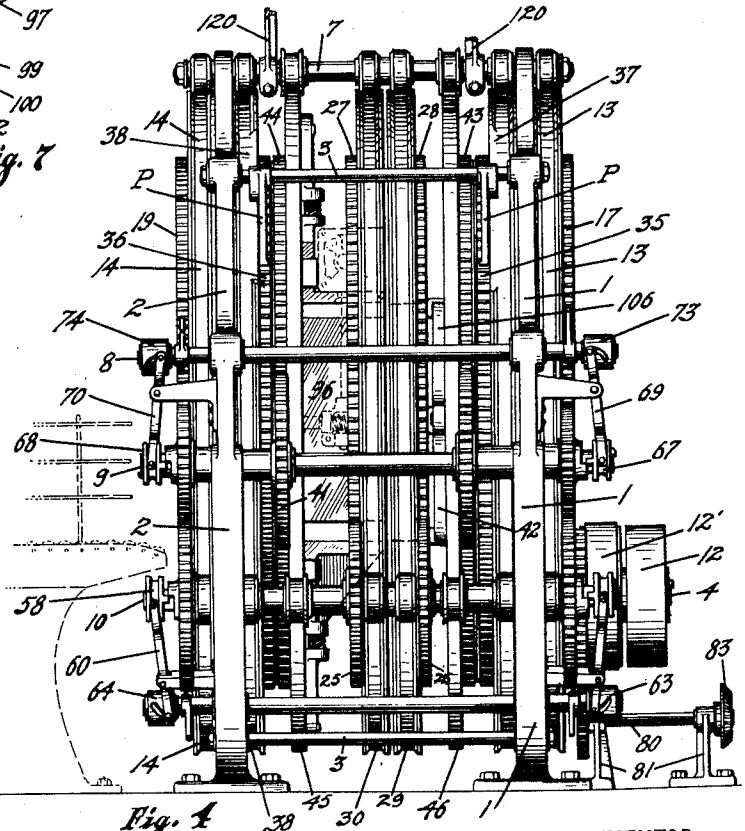


Fig. 4

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WIRE WRAPPING AND TYING MACHINE

Original Filed March 15, 1926 7 Sheets-Sheet 4

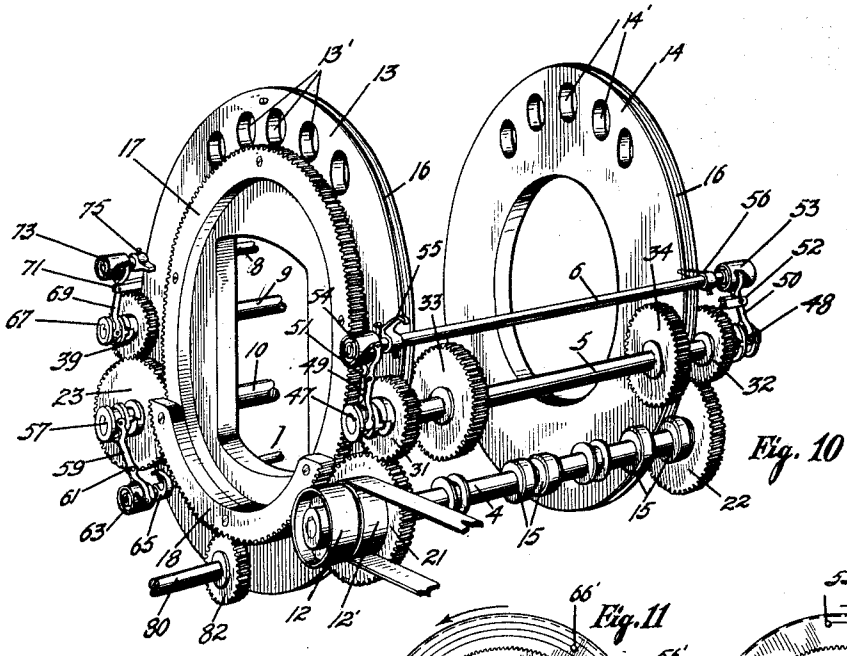


Fig. 10

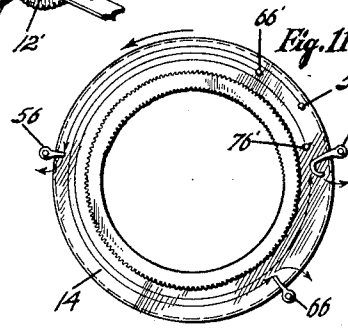


Fig. 11

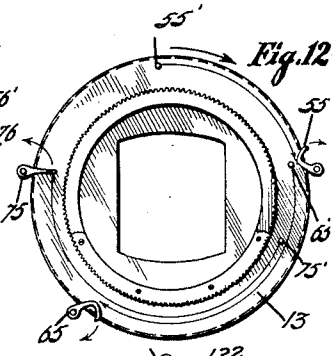


Fig. 12

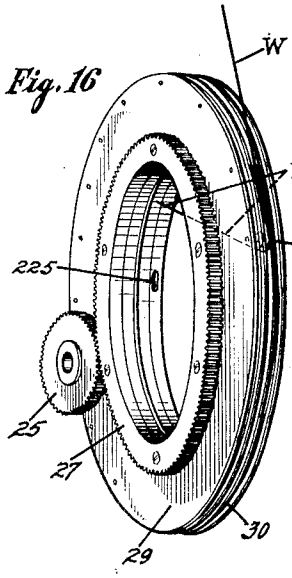


Fig. 16

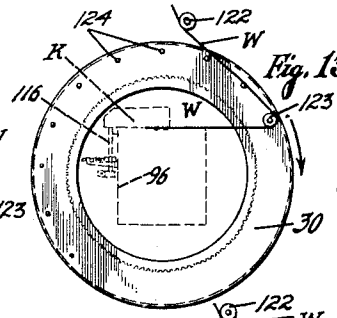


Fig. 13

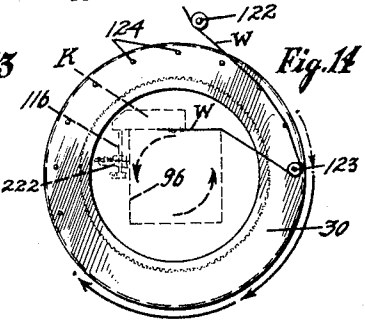


Fig. 14

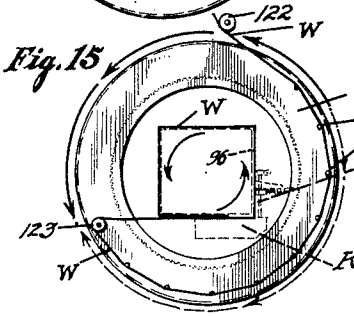


Fig. 15

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WIRE WRAPPING AND TYING MACHINE

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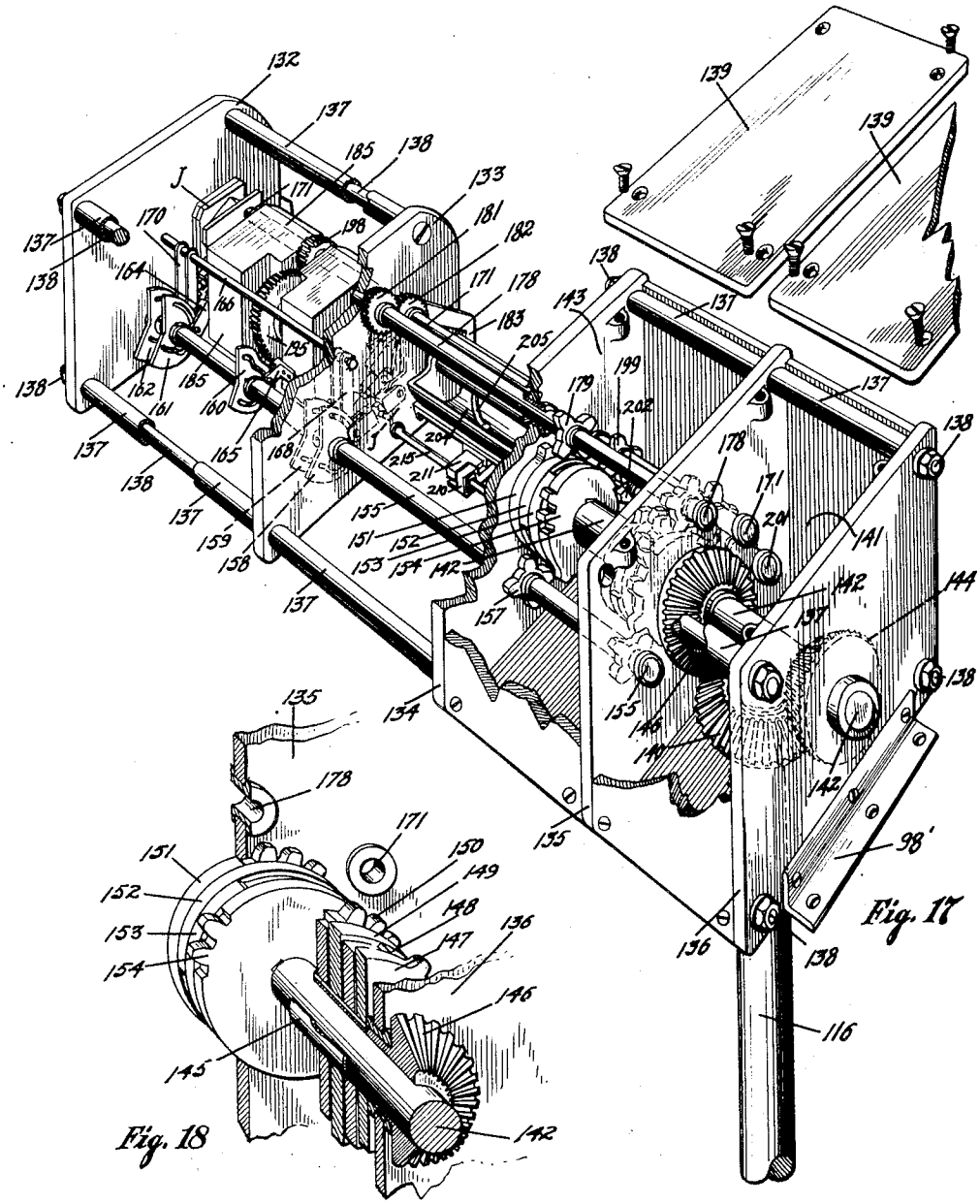


Fig. 17

Fig. 18

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Sept. 17, 1929. J. T. PECK 1,728,442

WIRE WRAPPING AND TYING MACHINE

Original Filed March 15, 1926 7 Sheets-Sheet 6

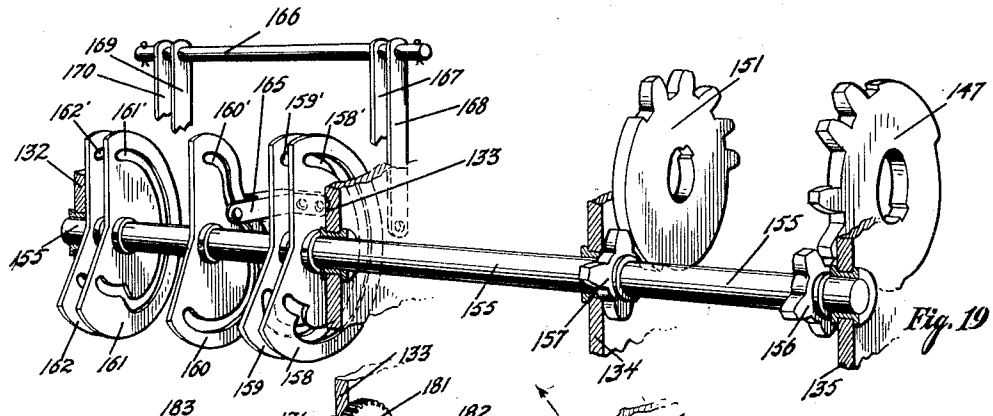


Fig. 19

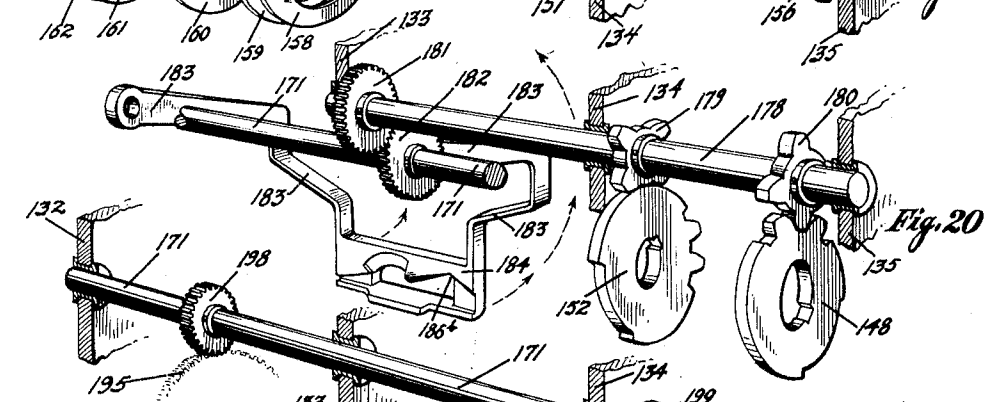


Fig. 20

Fig. 21

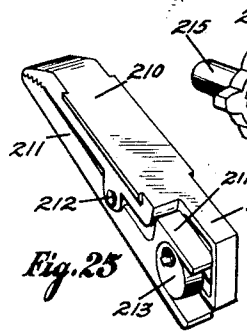


Fig. 25

Fig. 27

Fig. 22

Fig. 24

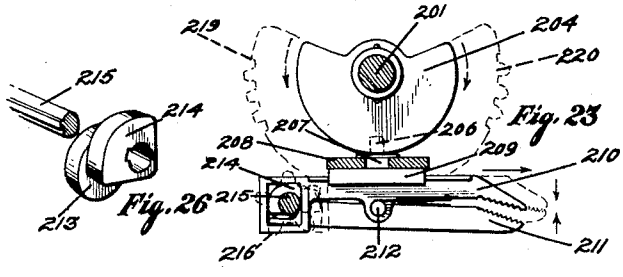


Fig. 26

Fig. 23

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Sept. 17, 1929. J. T. PECK 1,728,442

WIRE WRAPPING AND TYING MACHINE

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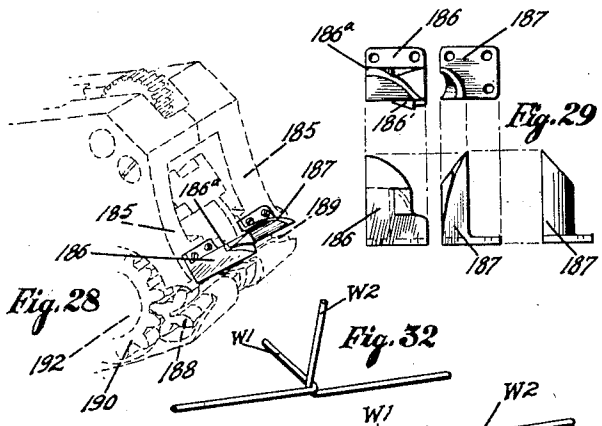


Fig. 28

Fig. 29

Fig. 32

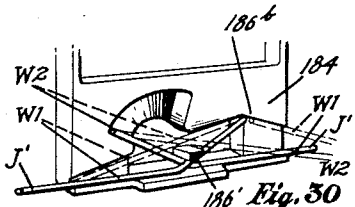


Fig. 30

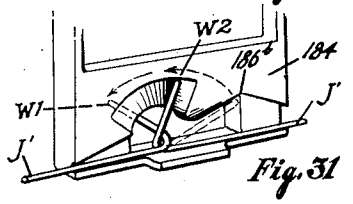


Fig. 31

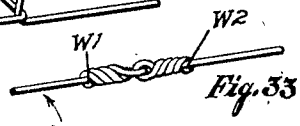


Fig. 33

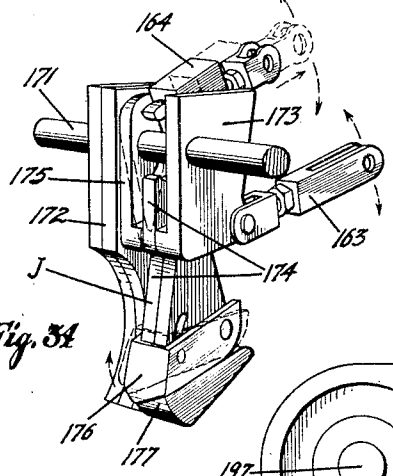


Fig. 34

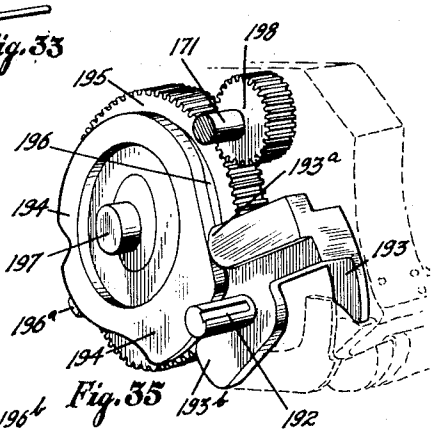


Fig. 35

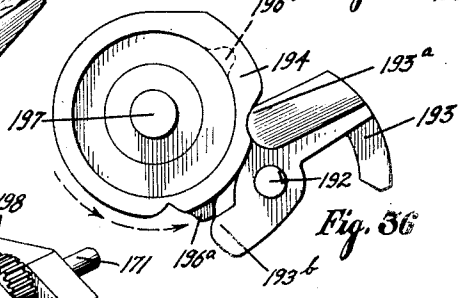


Fig. 36

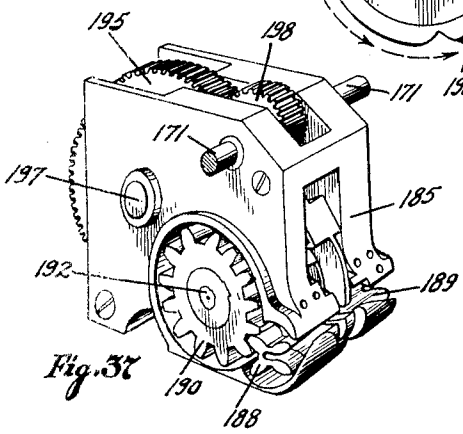


Fig. 37

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Patented Sept. 17, 1929 1,728,442

UNITED STATES PATENT OFFICE

JOHN T. PECK, OF ALTADENA, CALIFORNIA

WIRE WRAPPING AND TYING MACHINE

Application filed March 15, 1926, Serial No. 94,855. Renewed February 15, 1929.

My invention relates to a machine for wrapping wire around a box or the like and tying it with a knot which will not yield and delivering the box or other package securely tied and ready for shipment or other handling.

Among the salient objects of my invention are: to provide a machine in which the box or package as soon as delivered to the machine is clamped and held and rotated as the wire is placed around it, with means for automatically tying the wire; to provide in a machine of the character referred to, means for wrapping the wire around the box or package as it is rotated whereby to facilitate the wrapping of the wire and tying it in as quick a way as possible; to provide means for automatically feeding the box or package to be tied to the machine and for delivering the one which has been tied at the same time; to provide in a machine of the character referred to means for turning the box in one direction and for wrapping the wire around the box in the opposite direction and for tying the wire as the end thereof is brought across the body of the wire; to provide means for holding and letting out the wire and for rewinding it as it is carried forwardly and then returned to the starting position each time a box is wrapped and tied; to provide in a wrapping and tying machine a tying mechanism which revolves with the mechanism to the tying position, with means for automatically actuating it to make the tie during the partial rotation of the mechanism and the box; to provide means for automatically releasing the box during a partial rotation thereof, whereby it can be discharged from the machine and another box inserted in its place; and, in general, to provide an improved machine for automatically wrapping a wire around a box or other package, while at the same time revolving the box or package, and tying the wire during the operation, and deliver the same properly and securely tied.

Other advantages and features of invention will be disclosed during the description of one practical embodiment of the invention on the accompanying seven sheets of drawings, in which,—

Figure 1 is an edge elevation of a machine embodying my invention;

Figure 2 is a top plan view thereof;

Figure 3 is a side elevation of the same, at the right hand side of Fig. 1;

Figure 4 is an edge view from the right hand side of Fig. 3;

Figure 5 is a fragmentary, perspective view of one of the wheels or discs which carries the knot tying mechanism and showing the operating connection for the same;

Figure 6 is a sectional detail showing how the tying mechanism is thrown out of gear;

Figure 7 is a perspective view of one of the wheels or discs showing the clamps for receiving and holding the box or package to be tied;

Figure 8 is a face view thereof;

Figure 9 is a detail view of one of the clamps and its compensating spring;

Figure 10 is a perspective view of the two outside wheels or discs with their driving connections and showing the tripping means for operating the clutches;

Figure 11 is a face view of the right hand disc from the outside in Fig. 10;

Figure 12 is a face view of the other disc, showing the trip pins and cam levers;

Figure 13 is a view showing the inside face view of the central disc which carries the wire around the box, the knotter being indicated in position in light broken lines;

Figure 14 shows the same in an advanced position, the arrows indicating that the box and knotter are to turn in one direction, while the disc which carries the wire turns in the opposite direction;

Figure 15 shows the positions assumed when the complete wrapping has been accomplished and the knotter is in position to tie the knot;

Figure 16 is a perspective view of the two central discs or wheels between which the wire is held and guided around the box, this being the median line of the machine;

Figure 17 is a perspective view of the knot tying mechanism, with parts broken away;

Figure 18 is a detail showing parts some of which are in section; and

Figures 19 to 37, inclusive are perspective

views of details of the knot tying mechanism and showing the knot as it is when completed.

Referring now in detail to the drawings, the machine comprises two spaced frame members, 1 and 2, with connecting rods, 3, 3, 3, 3, and cross shafts, 4, 5, 6, 7, 8, 9, 10 and 11, shaft 4 being the main power or drive shaft, provided with loose and tight pulleys, 12 and 12′. There are four pairs of disk-like wheels having grooves in their peripheries, and spaced apart and supported and turning on rollers on the three shafts, 4, 7 and 10.

Referring to Fig. 10 in particular, the two outside disks are shown separated from the others and are designated, 13 and 14, provided with holes, 13′ and 14′, to reduce the weight on this side of said disks. The small rollers on which these several disks run on shafts, 4, 7 and 10, are all designated, 15, and run in the grooves, designated, 16. I will describe the disks separately. Disk 13, is provided with a ring gear, 17, on its outer face, and with a segmental ring gear, 18, on the ring gear, 17. Disk, 14, Fig. 5, is provided on its outer side with a ring gear, 19, which is also an internal gear for a portion of its circumference. Mounted on the inside of the frame member, 2, is a circular cam plate, 20, indicated in light broken lines in Fig. 3, and seen in Fig. 5. Disks, 13 and 14, are driven together by means of gears, 21 and 22, on drive shaft, 4, said gears meshing with the ring gears, 17 and 19, on said disks. On the opposite side, said ring gears, 17 and 19, drive similar gears, 23 and 24, on the shaft 10, which is provided with two gears 25 and 26, which mesh with ring gears, 27 and 28, on the opposite outer sides of the two center disks, 29 and 30, which are the wire wrapping members and between which the wire is guided, as will be seen in Figs. 16, and 13, 14 and 15. On shaft 5, are mounted two gears, 31 and 32, which mesh with the gears 21 and 22. On said shaft 5 are also two inside gears, 33 and 34, which mesh with ring gears, 36 and 35, on the other pair of disks, designated 37 and 38. The disks, 37 and 38, carry the box-gripping and holding means, hereinafter referred to. At the opposite side of the machine, shaft 9, is provided with two outside gears, 39 and 40, which mesh with the gears, 23 and 24. Said shaft also has two other gears, 41 and 42, Figs. 2, 3, 4 and 7, which mesh with ring gears, 43 and 44, on the sides of two slotted disk plates, 45 and 46, having the grooves, 45′ and 46′, as seen in Fig. 8. On the opposite ends of shaft 5, Fig. 10, are two clutches, 47 and 48, adapted to be thrown into and out of operation by means of two levers 49 and 50, pivoted at 51 and 52, and actuated at their opposite ends by means of slotted members, 53 and 54, on shaft 6, as seen in Fig. 10. Said shaft, 6, is also provided with trip fingers, 55 and 56, trip finger 55 operating when engaged by trip pin 55′, to throw the clutches 47 and 48, into gear, while trip finger, 56, operates when engaged by pins 56′, on plate 14, to throw said clutches out of gear. On shaft 10, are two similar clutches, 57 and 58, adapted to be operated by two levers, 59 and 60, pivoted at 61 and 62, and at their opposite ends in mesh with slotted members, 63 and 64, on shaft 11, which shaft 11 is operated by two trip fingers, 65 and 66, actuated by pins, 65′ on disc 13, and 66′ on disc 14. On shaft 9, are two end clutches, 67 and 68, operated by levers, 69 and 70, pivoted at 71 and 72, and at their opposite ends in mesh with slotted members, 73 and 74, on shaft, 8, which is operated by trip fingers, 75 and 76, on opposite ends of said shaft 9. Said trip fingers are actuated by trip pin, 75′, on disc, 13, and 76′, on disc 14. These are all clearly indicated in Figs. 10, 11 and 12.

Referring to the left hand lower corner of Fig. 1, a short shaft, 80, is mounted in standards, 81, 81, and is provided on its inner end with a gear, 82, meshing with segmental gear, 18, on the outside of ring gear, 17. At its opposite end, said shaft, 80, is provided with a beveled gear, 83, in mesh with a large beveled gear, 84, on shaft, 85. Said large gear, 84, is provided with an adjustable crank pin, 86, which works a slot, 87, in a lever, 88, pivotally connected at its lower end, as at 89, and at its upper end provided with a feed plate, 90, adapted to move back and forth, on a rack frame, 91, for feeding boxes to be wrapped into the machine. This constitutes a quick return mechanism for feeding the boxes or other packages into the machine.

I will next describe the mechanism for clamping and holding the boxes or other packages to be wrapped. These are mounted on the disc wheels, 37 and 38, and are seen in Figs. 5 and 7. It will be noted, of course, that the disc wheels are all open in their centers, forming an opening through said machine from one side to the other and through which the boxes pass in the operation. Referring first to Fig. 7, there are two fixed side wings, or members, 95 and 96, between the upper and lower ends of which are mounted two adjustable clamping wings, or members, 97 and 98, each comprising an angle member, 99, sliding in guides, 100, with a stem-like portion, 101, with a compensating spring, 102, therebetween, as indicated. The end of the stem 101, is provided with a pin, 103, operating, in each instance, in grooves, 45′ and 45′, which causes the box to be clamped between said members, 97 and 98, by a partial rotation of disc plate, 45, driven by gear 41. A similar second set of clamping members is mounted on the inner face of disc wheel, 46, indicated in Figs. 1, 2 and 4, and comprising two adjustable clamping wings, 104 and 105, with the compensating springs, 106 and 107, said adjustable clamping members working at right angles to the members,

97 and 98, and being somewhat shorter, whereby the box is clamped on all four sides. The fixed wings, 108 and 109, are at right angles to the wings, 95 and 96.

The top, longer clamping member, 98, carries the knotter, designated as a whole, K, and shown in detail in Figs. 17 to 37, inclusive. The mechanism for driving the knotter is mounted on disc wheel, 38, Figs. 5 and 7, and directly upon the fixed wing, 96, and comprises a drive shaft, 109, one end of which works in a slide bearing, 110, in a slot, 111, in said disc, 38, with a gear, 112, on its outer end, meshing with ring gear, 19, Fig. 6, and normally held in mesh by means of a spring, 113, on disc, 38. Said shaft, 109, is provided with a cam wheel, 114, adapted to be engaged intermittently by the cam ring, 20, on frame member 2, Fig. 5. The inner end of said shaft, 109, is provided with a pivoted bearing 115, on a shaft, 116, in which bearing is mounted a worm, 117, meshing with a worm gear, 118, on shaft 116, which is the knotter shaft, all being secured to said wing member, 96, as illustrated.

Mounted on the top of the machine, on a bracket mechanism, 120, is a reel of wire, 121, the wire, W, being guided between two small rollers, 122, down between the center discs, 29 and 30, to a small pulley, 123, and the spacing rolls, 124, between said discs, which are secured together with space therebetween, as illustrated in Fig. 16. The wire reel, 121, has at one end, a smaller, spool-like portion, 121′, around which is a take up cable, 125, running over a pulley, 126, to a second pulley, 127, and provided with a take-up or compensating weight, 128. The tension of the wire is controlled by a friction clutch, 129, adjustable by means of a hand wheel, 130, and spring, 131.

I will now describe the knotter, referring to Figs. 17 to 37, inclusive. Referring to Figs. 32 and 33, it will be seen that the knot as tied comprises a crossing of the ends of the wire, bending them back upon themselves, and then wrapping each end around its own body, as illustrated in Fig. 33. This particular knot will not yield and is tied by the mechanism to be described at this time.

Said knotter comprises a series of partitions, or end members, 132, 133, 134, 135, and 136, with spacing sleeves, as 137, on tie bolts, 138 the two apartments at the right hand end of Fig. 17 being tight to receive oil, in which the mechanism runs, as will be understood. The covers, 139, are shown removed. The drive shaft, 116, has been referred to in connection with the foregoing description, and is shown with its upper end provided with a beveled gear, 140, within compartment, 141. The knotter box is secured to the fixed member, 98, by means of the angle plates, 98′, there being one at each end. A shaft, 142 is mounted through compartments, 141 and 143, and is provided with a beveled gear, 144, in mesh with gear, 140. On said shaft, 142, is a sleeve, 145, on the end of which is a gear, 146, also in mesh with gear, 140.

There is also secured to said sleeve four intermittent gears 147, 148, 149 and 150. At the end of said sleeve, 145, on the shaft, 142, are mounted four other intermittent gears, 151, 152, 153 and 154, turning in the opposite direction from the sleeve 145, and its intermittent gears, 147, 148, 149 and 150. From compartment 143, a shaft, 155, extends through the knotter box, as seen, Figs. 17 and 19. On said shaft, 155, are mounted two four-teeth gears 156 and 157, meshing with the intermittent gears, 147 and 151. On the opposite end of shaft, 155, are five cam discs, 158, 159, 160, 161 and 162, having the cam slots, 158′, 159′, 160′, 161′ and 162′, with which are connected, respectively, actuating links, 163, 164, 165, and two others like 163 and 164, Fig. 34, there being another jaw member just like that shown in said Fig. 34. A cross supporting rod, 166, is shown between wall members, 132 and 133, with swinging supports, 167 and 168, attached at their lower ends to the connecting links, 163 and 164, of the jaw mechanism, designated as a whole, J, Fig. 34, and one of which is also shown at J, Fig. 17, and supports, 169 and 170, supporting another, similar jaw mechanism, as J. The cam discs, 159 and 161, operate to move the jaws, J, J, back and forward, to and from wire, while cam discs, 158 and 162, connected with the upper links, 164, of each jaw, open and close the jaws, as indicated in light dotted lines, to grip the wire. Said jaw members, of which there are two exactly alike, swing on shaft, 171, and comprise outside plate members, 172 and 173, with a middle plate, 174, constituting a toggle with plate, 175, for moving jaw member, 176, which is a part of 174, away from jaw member, 177, which is a part of 173, so that when link 163 is moved, the entire jaw swings with it on shaft 171, and when link 164, is pulled as shown in dotted lines through the toggle 174—175, opens jaw member 176, as indicated in light broken lines, to receive the wire.

Referring to Fig. 20, a shaft, 178, is mounted through partition members, 135, 134 and 133, and is provided with two four-teeth gears, 179 and 180, and a gear, 181. Said gears 179 and 180, mesh with intermittent gears, 152 and 148, also seen assembled in Fig. 18. The gear, 181, meshes with a gear, 182, on shaft, 171, on which it is loosely mounted, on which gear, 182, is one arm of a yoke, 183, the lower part of which yoke is provided with a wire bending and cutting plate or member, 184. This is swung up and down by the intermittent turning of the shaft 178, and gear 182. The form of this member is shown in Figs. 30 and 31, and it constitutes a sort of die in which the wire is bent and

cut by another member forced therethrough. Referring now to Fig. 30, the body of the wire is designated W^1, and the other end is designated W^2, as the wire is first placed across said member 184, as shown in light broken lines. The male members, Fig. 29, are bolted to the knotter frame or block, 185, and are designated, 186 and 187, as seen in Fig. 28, and when said knotter block, 185, is moved forward into the female member, 184, the wire is cut by the cutting edge, 186^a, at point 186^b, while the crossed wires are held down by the part, 186', of said male member 186. The continued movement of the male members, force the ends of the wires into the positions shown in full lines in Figs. 31 and 32. At this particular stage, the female member, 184, is swung upwardly out of the way by the turning of its carrying gear, 182, and the knotter continues to move forwardly until the main body of the wire rests in the slotted gears, 188 and 189, which are driven by the gears, 190 and 191, in said knotter block, gear 191 being on the opposite side of said knotter block, both being on shaft, 192. The two ends of the wire, as seen in Fig. 32, are placed in the knotter block and in the slotted gears in the positions shown in Fig. 32, whereupon a holding finger, 193, pivoted in said knotter block, is moved downwardly upon said crossed wires, by a cam ring, 194, on the side of gear, 195, by engagement with a shoulder, 193^a, while a cam ring, 196, having two cam lugs, 196^a and 196^b, by engagement with the end, 193^b, of said finger, raise it out of holding engagement with said crossed wires, after the ends of the wires have been twisted around the body portions by the slotted gears, 188 and 189. The knotter block is swung on shaft 171, and is moved back and forward by the cam disc, 160, on shaft, 155, Fig. 19. The gear, 195, which carries the two cam rings, 194 and 196, on one side thereof, has a bearing shaft, 197, in the sides of said knotter frame, or block.

The gear, 195, of the knotter is operated by a small gear, 198, on shaft, 171, see Fig. 21, which shaft is provided with two four-teeth gears, 199 and 200, which are intermittently operated by intermittent gears, 153 and 149, shown in assembled form in Fig. 18. I will now describe a jaw mechanism which grips the wire before it is cut and moves the end of the body of the wire out of the way while the severed wire is being tied. Referring to Fig. 22, a shaft, 201, is provided with two four-teeth gears, 202, 203, in mesh with intermittent gears, 154, and 150, by which said shaft, 201 is intermittently turned, to turn a slotted drum, 204, the slot, 205, of which receives a pin, 206, working through a straight slot, 207, in a fixed plate, 208, and under said fixed plate attached to a channel plate, 209, in which slides two hinged jaw members, 210 and 211, hinged at 212, and opened and closed by means of cam, 213, and moved forwardly and backwardly by cam 214, both of said cams being on shaft, 215, provided with four-teeth gears, 216 and 217, of ratchet form, indicated in Fig. 27, said ratchet being designated 218, whereby one operates in one direction and the other in the opposite direction, said two four-teeth ratchet gears, 216 and 217, being operated by the intermittent gears, 219 and 220.

In order to intermittently lock disks, 37 and 38, which carry the box clamping mechanisms to disks, 29 and 30, which carry the wire around the box, for the return movement of said wire carrying disks, I have provided an interlocking mechanism, comprising a cam, 221, on shaft 116, Figs. 5 and 7, with cam notch, 221', therein, adapted to operate a lock pin, 223, slidably held in a bracket, 222, and normally moved inwardly by means of a spring, 224, said lock pin is adapted to engage in a recess, 225, in disk, 30, Fig. 16, of the wire carrying members, 29—30, said pin being withdrawn from said recess, 225, as said cam notch, 221', moves into position to receive the opposite end of said lock pin. The form of said notch is such that as said cam revolves, said pin is moved out to ride around on the periphery thereof. Thus the box and the wire carrying disks are interlocked together after the wire has been carried around the box, similar to position shown in Fig. 15. The knotter mechanism, it will be remembered, operates only as the segmental, internal gear, 19, engages and operates gear, 112, which drives shaft 109, and from which shaft, 116, is driven. Consequently said cam, 221, is only intermittently driven, and operates so as to lock said disks together as they turn from the position shown in Fig. 15, to that shown in Fig. 13, which is the normal, or starting position of the wire wrapping mechanism.

As the wire carrying disks, 29 and 30, start, they are moving normally and thus pull the wire rather slowly down to the position shown in Fig. 14, at which time the box carrying members start to rotate in the opposite direction, thus increasing the speed at which the wire is placed around said box, or article.

Referring to the knot tying mechanism, Figs. 35, 36 and 37, the slotted gears, 188 and 189, which receive the ends of the wire to be twisted are always stopped with the slots outwardly, as shown in Fig. 37, by the cam 194, which is held by the shoulder, 193^a, on the lever 193. The gear 195, to which said cam is attached, or made a part thereof, is driven only a quarter turn and then reverses. This is controlled by the shaft, 171, and the elements, 199, 200, 153, and 149, and on which shaft is the small gear 198, which directly drives said large gear 195, and said cam, 194, as before described. This insures that said

wire twisting gears will be stopped in position to receive the wires for twisting.

The use and operation of my invention as here illustrated, may be briefly described as follows, to-wit:

It will be understood, of course, that any motor power can be used to drive the machine through the belt, B, running over the pulleys, 11 and 12, as shown, pulley 12 being the drive pulley and driving the main drive shaft, 4. As the segmental ring gear, 18, moves around the lower part of the machine, it engages the gear 82, on shaft, 80, and through the connections shown, operates the quick return feed member 90, to push the box or other article on the feed frame, 91, into the machine. The machine is running continuously. As soon as the box or article is delivered into the revolving members, 37 and 38, and while the feed member, 90, is being returned, the clamping members, 97 and 98, and 104 and 105, are being closed by the action of the slots or grooves, 45′ and 46′, in the plates 45 and 46, it being understood that the form of these grooves, 45′ and 46′ is such that said clamp members are quiet a part of the time said plate members are revolving, and at other times, said clamp members are being moved into clamping position, where they are held for a time, and then moved again to open position to receive another article, as will be understood from the form of the groove, seen in face view in Fig. 8. The revolving members, 37 and 38, which carry said clamping members can turn in one direction and are held against being turned in the opposite direction by a pawl, P, there being one for each wheel's ring gear, designated 35 and 36, as seen in Figs. 3 and 4, but in dotted lines only in Fig. 3. The slotted plates, or grooved plates, 45 and 46, have the ring gears, 43 and 44, and are turned by the gears 41 and 42, on shaft, 9, for the purpose of closing the clamping members, and this action is set up by the closing of the clutches, 67 and 68, which are actuated by the slotted members 73 and 74, on the shaft, 8, which is turned by the trip fingers, 75 and 76, engaged by the trip pins, 75′ and 76′, there being trip pins to move said slotted members 73 and 74 first in one direction and then in the opposite direction to first close and then open said clutches. As said clutches are closed and opened, said grooved plates are intermittently moved in one direction to open and close the clamping members.

The middle disc-like wheel members, 29—30, which carry the wire, as seen in Figs. 16, and also 13, 14 and 15, are driven a half revolution by the gears, 25 and 26, in mesh with the ring gears, 27 and 28, said gears 25 and 26, on shaft, 10, are set in operation by closing of clutches, 57 and 58, which are actuated by the trip members, 65 and 66, and trip pins, 65′ and 66′, similar to the trip mechanism above described. When tripped, said wire carrying members make a half revolution, carrying the wire in the manner indicated in Figs. 13, 14 and 15. As the wire carrying members revolve to the positions indicated in Fig. 14, the members which carry the box and clamping members, are started to revolve in the opposite direction by the actuation of clutches, 47 and 48, and this continues for a half of a revolution, carrying the clamping members and box, and the knotter, K, indicated in dotted lines, therewith, to the position indicated in Fig. 15. In this position, the wire carrying members, 29—30, are released and their direction reversed and all of said members continue to turn upwardly from the position shown in Fig. 15, until the knotter and box are returned to position indicated in Fig. 13, thus completing one complete revolution for the box and clamping members, and a partial revolution of the wire carrying members in one direction, opposite to the direction of the box, and a return revolution of said wire carrying members, said wire carrying members and the wire being drawn back to normal, or starting position by the weight, 128, operating on the wire reel, 121, as seen in Fig. 1. While in the position indicated in Fig. 15, the crossed wires, W, are fed into the knotter, as indicated in Fig. 30, said wire being gripped and moved by the jaw members, 210 and 211, Fig. 23, previously described, this jaw mechanism holding the body of the wire after the wire has been cut therefrom, while the two ends of the wire cut from the body of wire are gripped by the jaws, 176 and 177, there being two such pairs of jaws, J, J, indicated in Fig. 17, and one of said jaws being shown clearly in Fig. 34. Said jaws grip the two ends of the wire, at J′, J′, at opposite sides of the cutting plate or member, 184, as seen in Figs. 30 and 31, while the knotter block, 185, moves into the same, as before described, to force the wires into the positions shown in full lines in Figs. 30 and 31, that is, as said knotter block moves into the member 184, the wire is cut at 186^b, and the continued movement of said knotter block bends the wires into the full line positions, whereupon the member, 184, swings back as indicated by the arrows, Fig. 20, leaving the wires in the positions shown in Fig. 32, with the knotter block 185, continuing to advance until the wires are lodged in the slotted gears, 188 and 189, and are there held in place by the finger, 193, which is actuated down upon the crossed wires, as before described. The revolving of the slotted gears, 188 and 189, twist the opposite ends of said wires in the same direction, around their own body portions, as shown in Fig. 33. The holding jaws are released, the box is ejected by the feeding of another box into the machine, while the holding jaws, 210—211, Fig. 23, moves the end of the body of the

wire forwardly in the manner described until it is gripped by one of the jaw mechanisms shown in Fig. 34, whereupon the wrapping mechanism is again operated and another turn of the wire is placed around the next box.

I am aware that many changes can be made in the details of the invention as here shown and described and I do not, therefore, limit the invention to the particular form or embodiment of the invention used for descriptive purposes, except as I may be limited by the hereto appended claims. I am aware also that other forms of knot tying mechanisms may be used and while I have not intended to show every detail of the knot tying mechanism, I have shown enough to include generally a tying mechanism and have shown the kind of knot tied. In my pending application, Serial No. 559,903, filed May 10, 1922, I have shown and described another tying mechanism and while the one shown and described herein ties the same kind of a knot, which is new in the art of automatic wire tying devices, I do not limit my invention to the particular knot tying mechanism here shown or to that shown in said pending application, except as I may be limited by the claims made therefor.

I claim:

1. In a wire wrapping and tying mechanism, means to receive and hold a box, said means being operable mechanically to clamp said box, means to rotate the same one revolution, means for carrying a wire around said box, said means moving in a direction opposite to the direction of rotation of said box, and means for tying the wire automatically during the last part of the revolution of said box.

2. In a wire wrapping and tying mechanism, rotatable means for receiving and clamping a box to be tied, means operating to automatically rotate said box a complete rotation, means for carrying a wire around said box in the opposite direction until said wire overlaps itself, and tying means for automatically tying said overlapped wire.

3. In a wire wrapping and tying mechanism, rotatable means having an open center to receive a box to be tied, clamping means with means for automatically operating the same to clamp said box in the center of said mechanism, means for intermittently rotating said clamping means and said box a complete rotation, means for automatically carrying a wire around said box in the opposite direction until said wire overlaps itself, and a tying mechanism carried by said mechanism and rotating therewith, said tying mechanism being adapted to automatically tie the overlapped ends of said wire.

4. In a wire wrapping and tying mechanism, in combination, a frame, rotating members adapted to receive and hold a box to be tied, means for rotating the same, other rotating members adapted to be rotated in the opposite direction, means for rotating the same, means on said other rotating members for carrying a wire around said box, and a tying mechanism carried by some of said rotating members and adapted to receive said wire, and means for automatically operating said tying mechanism to tie said wire during the rotation of said box.

5. In a wire wrapping and tying mechanism, in combination, a frame, a plurality of revoluble members mounted to be revolved therein, means for rotating said members in one direction, said members having open centers to receive a box to be wrapped and tied, means for feeding a box thereto, means revolving therewith for clamping said box, means carried by one of said revoluble members for carrying a wire around said box, and tying mechanism adapted to automatically tie said wire during the revolving movement of said box.

6. In a wire wrapping and tying mechanism, in combination, a frame, a plurality of pairs of revoluble members mounted in said frame, means for intermittently revolving said members in pairs in opposite directions, clamping means in some of said members to receive and hold an article to be tied, means on others of said revoluble members to carry a wire around said box to overlap itself, and a tying mechanism adapted to be actuated to automatically tie said wire at its overlapped ends, in the manner illustrated.

7. A wire wrapping and tying mechanism including in combination a frame, pairs of revoluble members mounted therein and having open centers for passing an article through during the wrapping and tying operation, means for feeding an article thereto, means for clamping and holding said article, said means being automatically operated intermittently to grip and hold said article, means for rotating said article, means for holding and feeding wire to said article, means revolving in the opposite direction for carrying said wire around said article as it is revolved, a tying mechanism carried by said article holder and adapted to be automatically operated intermittently to cut and tie said wire about said article.

8. A wire wrapping and tying mechanism including in combination a frame, spaced pairs of revoluble article holding members, wire wrapping members, and reversing members, means on said revoluble article holding members for automatically clamping and holding an article, driving connections for revolving said article holding members and said article, driving connections for revolving said wire wrapping members in the opposite direction, whereby to wrap a wire around said article as said article is revolved in the opposite direction, control mechanism

for automatically reversing said members, and wire tying mechanism for automatically tying said wire as said wire wrapping members are returned to normal positions, substantially as described.

9. In a wire wrapping and tying mechanism, revoluble members having open centers through which an article can be passed, clamping means on some of said members with means for automatically operating the same to clamp and hold an article to turn therewith, wire carrying means on others of said members, means for revolving said article holding members in one direction, means for revolving said wire carrying members in the opposite direction, means for reversing the same to return them to normal positions, wire tying means carried thereby and adapted to be operated automatically during the return movements of said members to tie said wire around said article.

10. In a wire wrapping and tying mechanism, a revoluble member provided with means for holding an article to be tied, means for revolving the same intermittently, a revoluble wire carrying member, means for revolving the same in an opposite direction intermittently, means for reversing said wire carrying member to return it to normal position, a wire tying mechanism carried by said member and said article holding means, and means for automatically operating said tying mechanism during its movement to normal position for tying said wire about said article, said means including wire cutting members.

11. In a wire wrapping and tying mechanism, means for receiving and holding an article to be tied, means for revolving said article a complete revolution, co-operating means, moving simultaneously in the opposite direction, for carrying a wire around said box, and means for automatically tying said wire at their crossed portions.

12. In wire wrapping and tying mechanism, in combination, means for receiving and holding an article to be tied, means for revolving said article in one direction, co-operating means, moving in the opposite direction, for carrying a wire around said box, said wire carrying mechanism being adapted to be operated during the movement of said article to save time, means for returning said wire carrying mechanism after it has made a partial revolution, and knot tying mechanism moving with said mechanism for tying said wire.

13. In a wire wrapping and tying mechanism, means for clamping an article to be tied, means for revolving said article a complete revolution, a wire carrying device for carrying a wire around said article in the opposite direction, said wire carrying device being adapted to move a partial revolution and then to return with the rotation of said article to the starting place, means for tying said wire at its crossed position, said tying means being operable automatically during the return movement of the wire carrying device and article to the starting position, and means for holding the wire for the next article.

14. In a wire wrapping and tying mechanism, in combination, revoluble members having open centers, means carried thereby for receiving and clamping an article to be tied, means for operating said clamping means automatically and intermittently during the revolving action of said members, other revolving members for carrying a wire around said article, said other members having open centers and revolving in the opposite direction, means for revolving said other members a partial revolution to carry wire around said article part way, means for returning them with the revolving article carrying members, and knot tying mechanism carried by said members and means for automatically operating it to tie said wire, substantially as described.

Signed at Los Angeles, Los Angeles County, California, this 8th day of March, 1926.

JOHN T. PECK.