P. WRIGHT.

HAND OPERATED WIRE TYING MACHINE.

APPLICATION FILED DEC. 1, 1919.

1,401,025.

Patented Dec. 20, 1921.

4 SHEETS—SHEET 1.

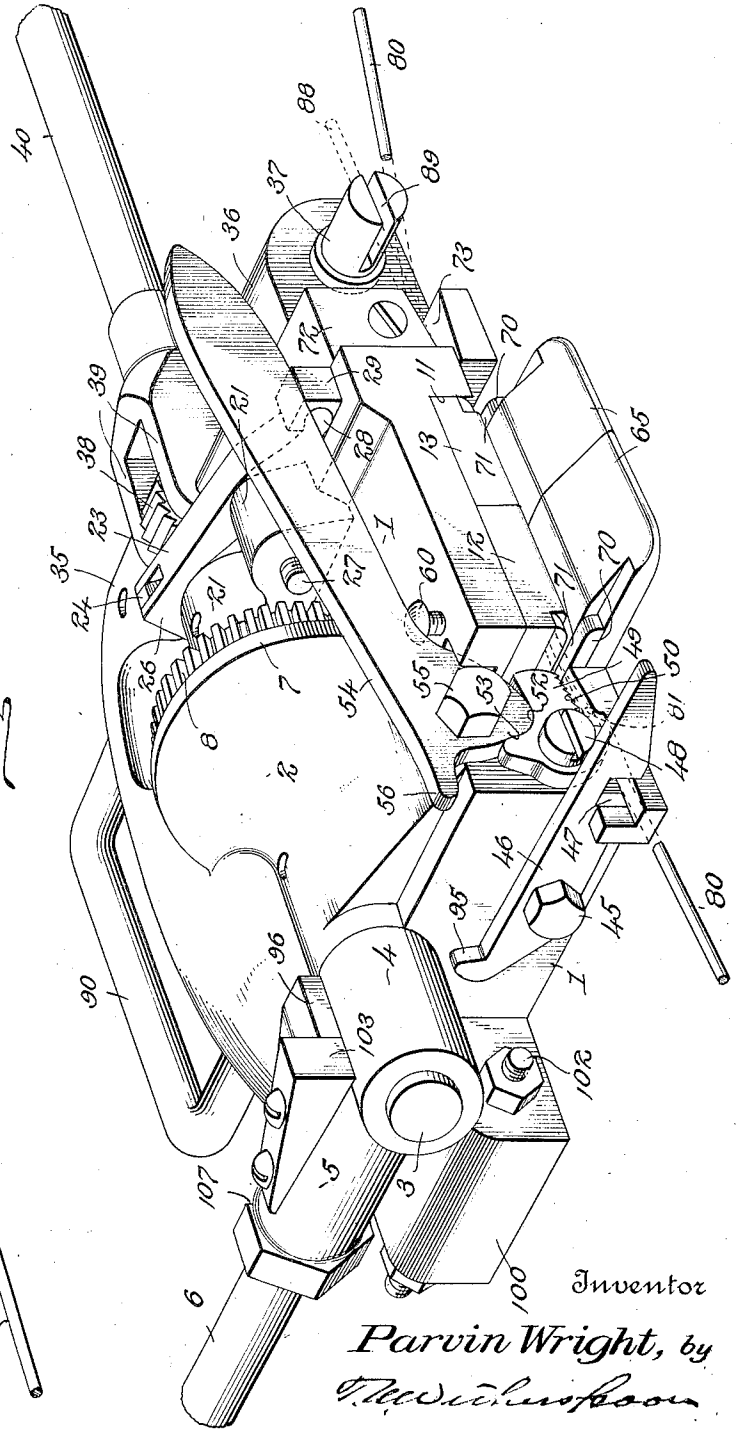


Fig. 1

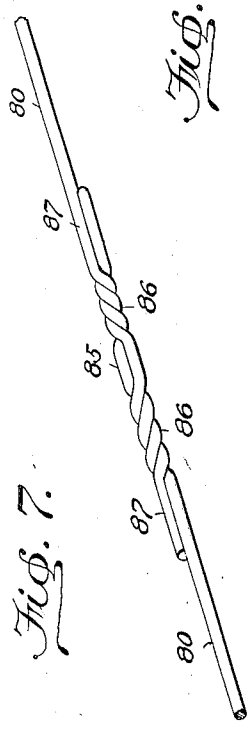


Fig. 7.

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4 SHEETS—SHEET 2.

Fig. 2.

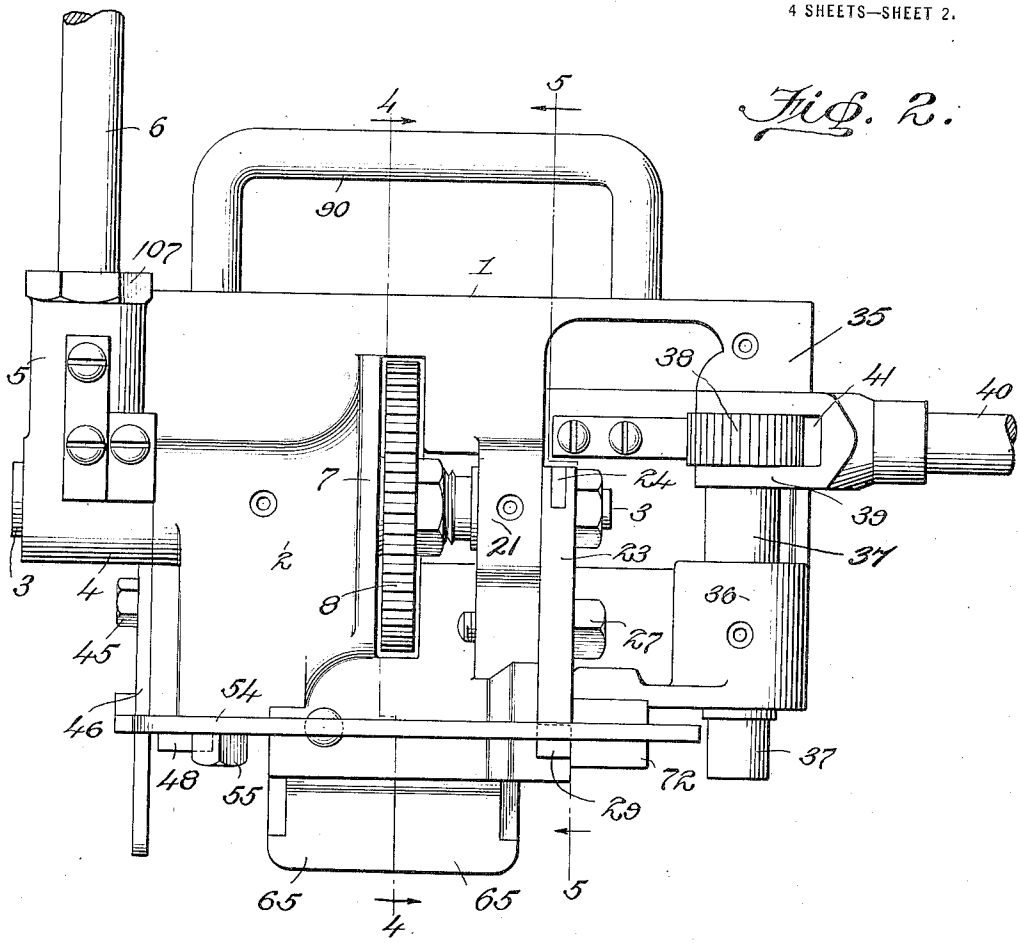
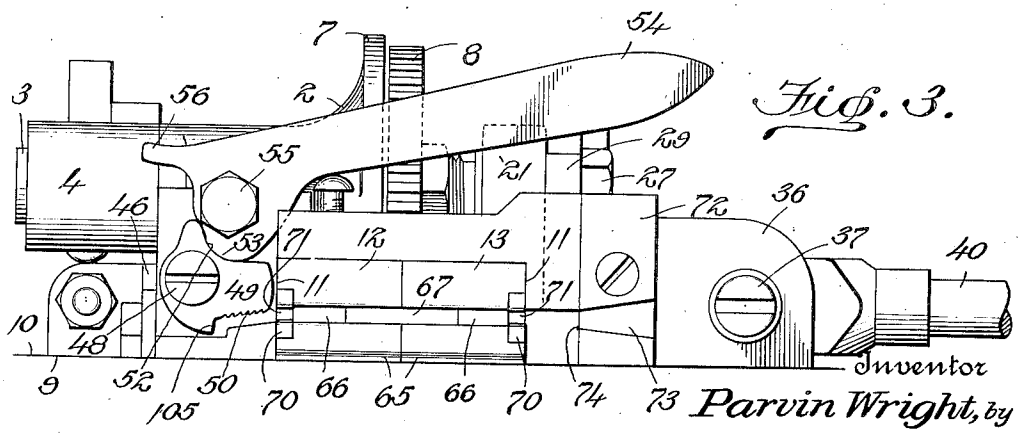


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

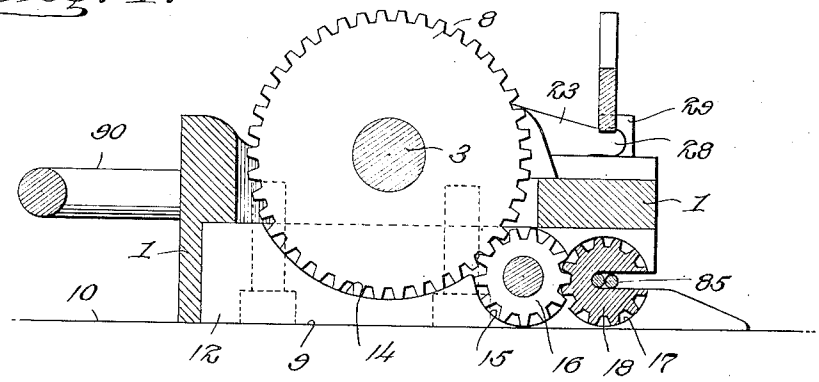


Fig. 5.

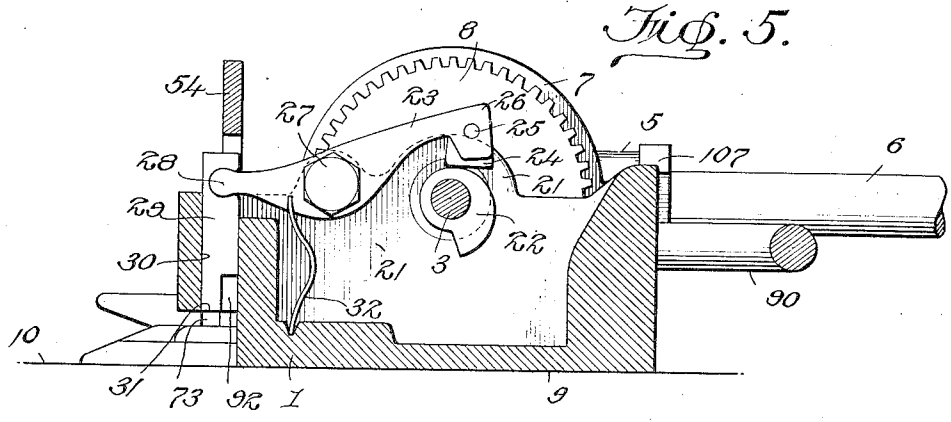
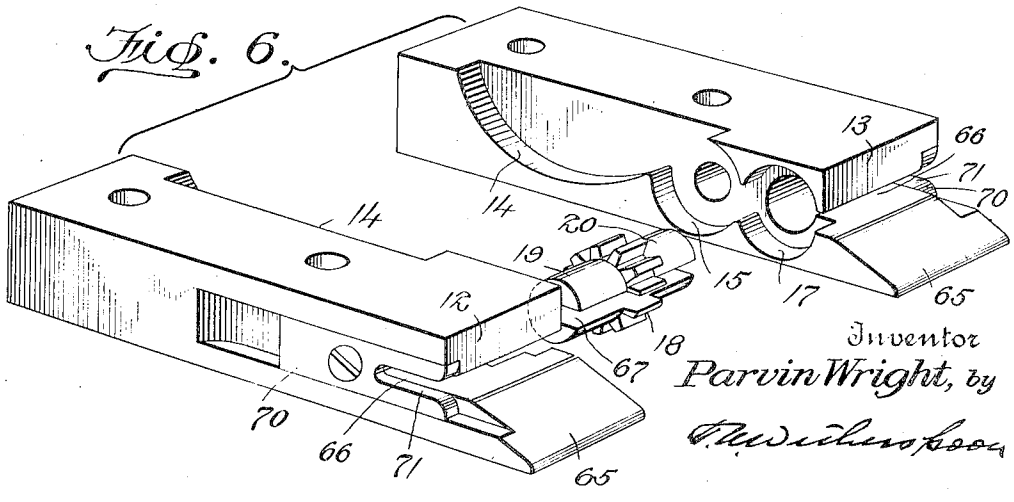


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 8.

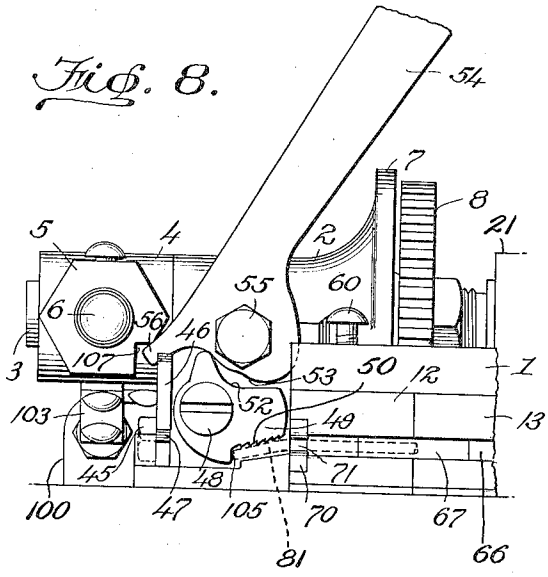


Fig. 12.

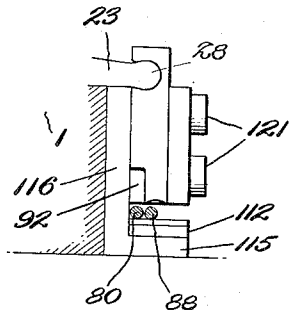


Fig. 9.

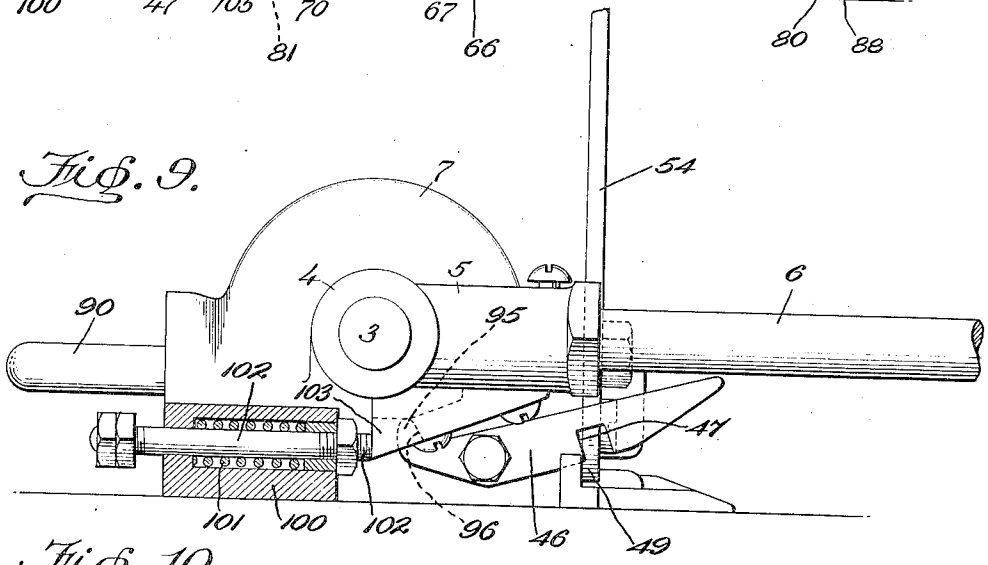


Fig. 10.

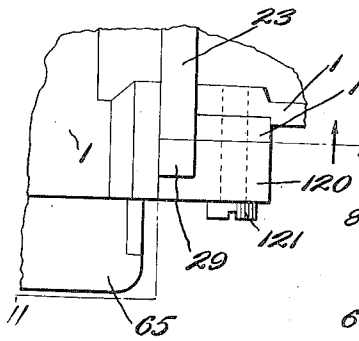
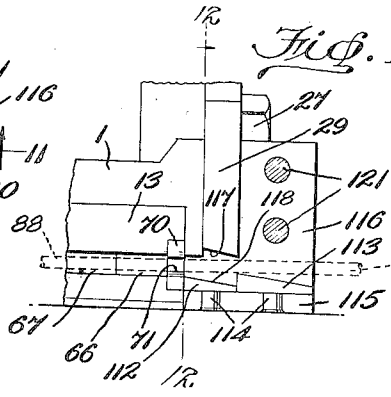


Fig. 11.



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UNITED STATES PATENT OFFICE.

PARVIN WRIGHT, OF CHICAGO, ILLINOIS, ASSIGNOR TO ALEC J. GERRARD, OF CHICAGO, ILLINOIS.

HAND-OPERATED WIRE-TYING MACHINE.

1,401,025. Specification of Letters Patent. Patented Dec. 20, 1921.

Application filed December 1, 1919. Serial No. 341,605.

To all whom it may concern:

Be it known that I, PARVIN WRIGHT, 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 Hand-Operated Wire-Tying Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in hand operated wire tying machines, and has for its object to provide a mechanism of this character which will be comparatively inexpensive to manufacture and more efficient in operation than those heretofore proposed.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings, forming a part of this specification, in which like numerals designate like parts in all the views—

Figure 1 is a perspective view of a machine made in accordance with this invention;

Fig. 2 is a plan view of the parts shown in Fig. 1;

Fig. 3 is a front elevational view of the parts shown in Fig. 2;

Fig 4 is a sectional view on the line 4—4 of Fig. 2, looking in the direction of the arrow;

Fig. 5 is a sectional view on the line 5—5 of Fig. 2, looking in the direction of the arrow;

Fig. 6 is a detail perspective view illustrating the wire twisting pinion and its associated parts;

Fig. 7 represents the twisted wire joint formed by this invention;

Fig. 8 shows the wire clamping mechanism after it has been automatically released;

Fig. 9 is an end elevational view of the parts shown in Fig. 8;

Fig. 10 is a plan view of a modified form of cutter mechanism;

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 10; and

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

1 indicates a cast or forged framework provided with an enlarged portion 2 through which passes the main-operating shaft 3. Mounted on the shaft 3 and turning therewith is the sleeve 4, provided with the tubular extension 5 adapted to receive the hand operated lever 6. The enlargement 2 is provided with a circular flat protecting member 7 associated with which is the main operating gear 8 carried by the shaft 3. Said framework 1 is provided with a flat bottom 9, adapted to rest on the flat top or side 10 of the box or package to be wired, and said bottom 9 is recessed or cutaway as at 11 to receive the slotted wire holding members 12 and 13, as will be clear from Figs. 1, 3 and 6. Each of said bottom wire holding members 12 and 13 are cutaway as at 14 to accommodate the gear 8, and are also cut away as indicated at 15, to accommodate the pinion 16 with which said gear 8 meshes. Said bottom members 12 and 13 are further cutaway as at 17 to accommodate the wire twisting pinion 18, meshing with the pinion 16 and provided with the cylindrical bearings 19 and 20, as best shown in Figs. 4 and 6.

Beyond the gear 8, and parallel with the member 7, the framework is provided with a supporting member 21, through which the reduced free end of the shaft 3 passes; and mounted on said free end is the cam 22, adapted to operate the lever 23 through the dog 24 pivoted as at 25 in one end 26 of said lever 23.

Said lever 23 is pivotel, as at 27, to said supporting member 21, and its other end 28 is suitably jointed to the reciprocating cutter bar 29, having a cutting edge 31 and moving between the guides 30 with which the framework 1 is provided.

A spring 32 normally maintains said cutting edge 31 in its elevated position, as best shown in Fig. 5.

Said framework 1 is still further provided with a pair of bosses 35 and 36 forming journals for a wire tightening shaft 37 carrying a ratchet 38, and accommodating the jaws 39 of a lever 40 carrying a pawl

41 (see Fig. 2) for operating said ratchet 38 and shaft 37. Pivoted on one end of the machine as at 45, is a wire holding latch like lever 46, having a wire receiving recess 47, as best shown in Fig. 1, which holds the bights 80 and 81 of the wire snugly in the twisting slots as the machine moves or crawls over the package during the twisting operation, and thus insures a perfect knot.

Also pivoted to the frame-work as at 48 is a holding dog 49 having a serrated edge 50 adapted to engage one end of the wire as will appear more fully below. Said dog 49 is provided with a cam surface 52 engaged by a cam 53 carried by the lever 54, pivoted as at 55 to the frame 1. Said lever 54 is also provided with an extension or toe 56 for a purpose that will presently appear. A stop 60 limits the movement of lever 54 in one direction.

The bottom members 12 and 13 are provided with beveled extensions 65 and with registering slots 66 adapted to receive two overlapping portions of a wire. Said slots 66 further are adapted, when lever 6 is in its normal position, to register with a slot 67 with which the wire twisting pinion 18 and its extensions 19 and 20 are provided.

70 represents a pair of strips as will be best understood from Fig. 6, which are provided with slots 71 registering with the slots 66, and conveniently secured to the bottom members 12 and 13. The slots 71 are not so deep as are the slots 66, as will appear hereinafter. 72 represents a member provided with outwardly tapering slot 73 and shearing edge 74, coacting with the cutter edge 31 as will be more fully described below.

The operation of this machine is as follows:—Supposing the numeral 10 in the various figures to represent the top surface of a box or other package around which it is desired to secure a wire, while the latter is under tension, or after it has been drawn tight. The machine or frame-work 1 is placed with its bottom 9 resting upon said surface 10 as indicated in the various figures, whereupon one end 81 of wire 80 is brought beneath the serrated edges 50 of the holding dog 49 and the succeeding portion of the wire is slid in to the slots 71 of the strips 70, the slots 66 of the members 12 and 13, and the slot 67 of the pinion 18 and extensions 19 and 20. The lever 54 is brought into its lowest position, as shown in Fig. 1, whereupon its cam 53 engages the surface 52 of the dog 49 and firmly clamps the extreme end 81 of the wire 80 in position.

The said wire is also slid into the tapering slot 73 carried by the member 72, it is then further carried beneath the shaft 37, as indicated in dotted lines in Fig. 1, over the top surface of the box 10, down around the side and under the bottom thereof (not shown), and up the other side into the recess 47 of the lever 46. The lever 46 is conveniently raised for this purpose whereupon it is then lowered so that the said recess 47 will hold the bight 80 of the wire firmly in place.

The bight of the wire will now pass parallel to the extreme end 81 thereof, and outside of said end into the first slot 71 of the strip 70 carried by the bottom member 12. This said slot 71 is only of sufficient dimensions to accommodate the two bights of the wire when the latter lay flat, or in the same horizontal position. The other slot 66, however, of the bottom member 12 is of sufficient depth to permit the wire to be twisted around itself, so that said bights could lie in the same vertical plane, as well as in the same horizontal plane.

The next slot 67 of the pinion 18, and extensions 19 and 20, is only of sufficient depth to accommodate the two bights of the wire when lying flatwise or in the same horizontal plane, while the next slot 66 of the bottom member 13 is of sufficient depth, like its companion slot 66 in the bottom member 12, to permit the wire to be twisted. The succeeding slot 71 of the strip 70, carried by the bottom member 13, is like its companion slot 71, carried by the member 12 of only sufficient depth to accommodate the two bights of the wire when lying flat or in the same horizontal plane.

It results from this construction that those portions 87 of the bights of the wire which occupy the two slots 71 of the strip 70 are held firmly in a flatwise or horizontal position, while those portions 86 of the bights of the wire occupying the two slots 66 may be readily twisted. On the other hand, the slot 67 associated with the pinion 18 extends diametrically of said pinion, but is terminated at such a distance from the center of said pinion that the two bights 85 of the two wires (see Fig. 4) are symmetrically placed as regards the axis of said pinion so that when said pinion is rotated, said bights 85 of the wire will remain in their flatwise relative positions. Nevertheless the said bights 85 will rotate around the axis of said pinion 18 while those portions of the wire which occupy the slots 66 will be twisted together and in opposite directions, as illustrated in Fig. 7.

On the other hand, the two bights 87 of the wire will remain in their flatwise relation since they occupy the narrower slots 71 as above explained. The extreme end 88 of the wire, after having been brought into the positions above mentioned, and after leaving the slot 71, associated with the bottom member 13, is carried underneath the cutter edge 31 into the tapered slots 73 and into the slot 89 of the shaft 37 as indicated in dotted lines in Fig. 1. The first bight or

end 81 of the wire having been firmly clamped by the dog 49, in the manner above disclosed, and the bight 80 of the wire having been passed around the package and the other end 88 of the wire having been passed into the slot 89 of the shaft 37, all as above disclosed, the machine may be conveniently grasped by the handle 90 and the lever 40 operated to turn the ratchet 38 so as to rotate the shaft 37 and thus wind up the end 88 of the wire bight 80 thereon. This winding action will cause the machine to move over the top of the package while putting a tension on the wire and by this means the wire may be drawn as tightly as desired.

When a sufficient tension has been thus brought upon the wire, the lever 6, normally lying in the position shown in Fig. 1, may now be thrown over toward the wire 80 which will rotate the gear 8, the pinion 16, and the twisting pinion 18, whereupon the wire will be twisted in the above manner and into the shape indicated in Fig. 7. In the meantime, the bights 87 of the twisted wire having been firmly held in their horizontal plane, and the end 88 of the wire having been passed under the cutting edge 31 of the cutter, the rotation of the shaft 3, by the lever 6, in a manner above disclosed will rotate the cam 22, which will raise the end 26 of the lever 23, and lower the end 28 thereof, so that the cutting edge 31 will sever only the end 88 of the wire. In other words, the tapered slot 73 is only of a sufficient depth to permit the two bights of the wire to occupy the same, in a horizontal plane, and this limitation of the said depth causes the extreme end 88 of the wire 80 to occupy a position in the path of the cutting edge 31.

In order that the cutter 29 may pass the other bight of the wire 80, it is provided with a slot 92 as best shown in Fig. 5. The end 88 of the wire has now been severed and the wire twisted into the shape shown in Fig. 7, all by a single stroke of the lever 6, and after the finished tie has been removed from the slot. Said lever 6, when it reached its extreme forward motion contacted with the toe 95 of the lever 46, by means of its dog or member 96, and thus swung the said lever 46 on its pivot 45 and raised the recess 47 out of contact with the wire 80. The lever 54 will now be swung automatically into an almost vertical position as will appear below, whereupon its cam 53 will raise the dog 49 out of contact with the extreme end 81 of the wire, and the machine having a smooth bottom may be slid bodily away from the wire 80 which will be found to be firmly attached to the box. The tapered portions 65 of the members 12 and 13 facilitate the removal of the machine from the wire.

It is an important feature of this invention that the operations of twisting the wire and severing its end are all reduced to a single movement of the main operating lever 6.

This advantage may be still further enhanced by the provision of a shock absorbing, or recoil mechanism or buffer 100, comprising a recoil spring 101, and a rod or piston like member 102, adapted to be struck by the lug 103, carried by the tubular member 5, just before the end of the throw of lever 6. In other words, the operator may throw lever 6 quickly and with energy, whereupon the member 96 will contact with member 95 to release the wire retaining hook 46, as above stated, while at the same time the shock will be absorbed by the rod 102, and the spring 101 being compressed will permit the slotted pinion 18 to be carried beyond its normal position in register with the slots 66 and 71, and thus sufficiently overtwist the bights 86 and 87 of the wire to allow for its natural resiliency, or tendency to untwist. The wire being thus overtwisted will return said pinion to its normal position and not have a tendency to force said pinion out of register with said other slots 66 and 71 as would otherwise be the case.

Another useful feature of this invention resides in the stop lug 105 carried by the dog 49 for it enables the end 81 of the wire to be spaced and quickly threaded into place and clamped by the teeth 50, all as will be clear from Figs. 1 and 8. Still another useful feature of my invention resides in the fact that the parts are so proportioned and disposed that when the lever 6 is thrown over to perform the twisting operation, just after the lug 96 contacts with the lug 95, the part 107 of the tubular portion 5 contacts with the toe 56 of the cam lever 54, swings said lever on its pivot 55 and thus operates the dog 49 to release automatically the end 81 of the wire 80.

In the somewhat modified form of wire cutting mechanism shown in Figs. 10, 11 and 12, I provide readily detachable plates 112 and 113 having stems 114 fitting holes in the flange 115 of the supporting angle plate or member 116, and I preferably incline the extreme lower face 117 of the cutter 29 to correspond with the inclined face 118 of anvil plate 112. The cutter 29 is guidingly held between the members 116 and 120 by the bolts 121 which pass through said plates 116 and 120, and into the frame work 1, as shown.

By this construction I am enabled to readily change the plates 112 and 113, as well as the cutter 29, and further, I am enabled to firmly hold the end of the severed wire between the inclined surfaces 117 and 118 during the last instants of the twisting operation.

This holding of the severed wire is facili-

tated by the pivoted member 24 carried by the cutter actuating lever 23 which turns on its pivot 25 and dwells on the cam 22 during the severing operation, thus retaining the heel or inclined surface, 117, of the cutter 29 in a clamping position against the said severed wire.

It will thus be seen that while the wire is under tension by a single throw of lever 6, I twist the bights of the wire together as illustrated in Fig. 7, I sever the end 88 only of the wire and thus release it at one side of the machine, and I automatically lift the lever 46 as well as the dog 49, and thus release said wire at the other side of the machine.

It will also be clear that the lever 46 constitutes a wire retaining or latch like member, or a movable member for holding the bight 80 of the wire in close proximity to the end, or bight 81, of said wire during the twisting operation; and that the slotted strips 70 constitute means for holding said two portions, or bights of the wire against a turning movement during said twisting operation.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, and therefore, I do not wish to be limited to the above disclosure except as may be required by the claims.

What I claim is:—

1. In a wire tying machine the combination of a frame capable of crawling over the package during the tying operation; means comprising a movable latch member for holding the wire in a predetermined position in said frame; means comprising a pinion having a slot for twisting the wire between its ends while so held; and means for cutting the held wire at the end of the twisting operation, substantially as described.

2. In a wire tying machine the combination of a frame capable of crawling over the package during the tying operation; means comprising a movable latch member for holding two portions of the wire in a predetermined position in said frame; means comprising a pinion having a slot and driven gear and connections for twisting the said portions of the wire between its ends while so held; and means comprising a cam and connections for cutting the held wire during the twisting operation, substantially as described.

3. In a wire tying machine the combination of a frame capable of crawling over the package during the tying operation; and having a smooth bottom; movable latch means for holding a wire in a predetermined position; means for tensioning said wire while so held; means for twisting two bights of said wire together while under tension; and means for cutting one of said bights after the twisting operation, substantially as described.

4. In a wire tying machine capable of crawling over the package during the tying operation the combination of latch like means movable with the machine for holding a wire in a predetermined position; means for tightening said wire while so held; means comprising a shaft and a gear for twisting parts of said wire together while under tension; and means operated by said shaft for cutting the wire during the twisting operation, substantially as described.

5. In a wire tying machine capable of crawling over the package during the tying operation the combination of latch like means movable with the machine for holding a wire in a predetermined position; means for tightening said wire while so held; means comprising a lever, a shaft and gear connections operated by said lever for twisting parts of said wire together while under tension; and means comprising a cam carried by said shaft for cutting the wire during the twisting operation, substantially as described.

6. In a wire tying machine the combination of a frame having a smooth bottom capable of crawling over the package during the tying operation and provided with a dog; wire holding members having slots for holding two portions of a wire against a turning movement; a latch like lever for holding the wire in said slots; a cutter carried by said frame; a wire tensioning means also carried by said frame; a wire twisting means; an operating lever; and connections whereby when said lever is operated said two portions of said wire will be twisted together and one of said portions cut in two, substantially as described.

7. In a wire tying machine the combination of a frame capable of crawling over the package during the tying operation and provided with a dog and slots for holding two portions of a wire in a predetermined position; a latch for holding said wire in said slots; a cutter carried by said frame; a wire tensioning means also carried by said frame; a gear train comprising a slotted wire twisting member; an operating lever; and connections between said cutter and said lever, and between said gear train and said lever, whereby when said lever is operated said two portions of said wires will be twisted together and one of said portions cut in two, substantially as described.

8. In a wire tying machine the combination of means comprising a lever for twisting two parts of a wire together; a wire retaining member; a shock absorbing means permitting an overtwist of the wire; and means carried by said lever for operating

said wire retaining and said shock absorbing means, substantially as described.

9. In a wire tying machine the combination of means comprising a lever, a train of gears operated by said lever for twisting two parts of a wire together; a wire retaining member; a shock absorbing means; and means carried by said lever for operating said wire retaining and said shock absorbing means simultaneously, substantially as described.

10. In a wire tying machine the combination of a frame having a smooth bottom and capable of crawling over the package during the tying operation; means comprising a pinion having a single slot for twisting two parts of a wire together; means comprising open ended slots for holding two bights of the wire in position while being twisted together; movable means for holding said bights in said open ended slots; means for tensioning said wire before said bights are twisted; and means for cutting one of said bights at the end of the twisting operation, substantially as described.

11. In a wire tying machine having a smooth bottom and adapted to crawl over the package being wired during the twisting operation, the combination of means for twisting two parts of the wire together; means movable with the machine during the crawling operation for retaining said two parts of the wire in place during the twisting and crawling operations; means for tensioning said wire before said parts are twisted together; means for releasing said retaining means; and means for cutting one of said parts at the end of the twisting operation, substantially as described.

12. In a wire tying machine the combination of a wire clamping device comprising a dog, provided with a stop lug against which one end of the wire is adapted to impinge; and means for actuating said dog, substantially as described.

13. In a wire tying machine the combination of a wire clamping device comprising a dog provided with a cam surface and a stop lug against which one end of the wire is adapted to impinge; and means comprising a cam lever for actuating said dog, substantially as described.

14. In a wire tying machine the combination of a wire clamping device comprising a dog and a cam lever to operate said dog; a wire retaining means comprising a lever having a lug; a wire twisting means: and an operating lever and connections adapted in a single throw of said lever to operate said twisting means, said cam lever and dog and said wire retaining lever, substantially as described.

15. In a wire tying machine the combination of a wire twisting means; a wire clamping means; a wire retaining means; and a single operating lever for actuating at a single throw said wire twisting, wire clamping and wire retaining means, substantially as described.

16. In a wire tying machine adapted to crawl over the package to be wired during the tying operation; the combination of latch like means capable of moving with the machine for holding two bights of the wire in a predetermined position during said tying operation; means for twisting a portion of said two bights together; and means for automatically cutting off one of said bights at the end of the twisting operation, substantially as described.

17. In a wire tying machine provided with a smooth bottom and adapted to move over the package being wired during the twisting operation; the combination of latch like means capable of holding two bights of the wire in a predetermined position during said twisting and moving operations; means for twisting said two bights together; and means for automatically cutting off one of said bights at the end of the twisting operation, substantially as described.

18. In a wire tying machine the combination of a twisting means; a cutting means; a supporting plate for said cutting means; a removable anvil carried by said plate; and means for detachably attaching said plate and cutting means to the frame of the machine, substantially as described.

19. In a wire tying machine the combination of a frame having a smooth bottom; a wire cutting means carried by said frame; a wire twisting means comprising a pinion having a single wire receiving slot; and means for holding said cutting means in a position to hold the severed wire until the twisting operation is completed, substantially as described.

20. In a wire tying device, in combination a base adapted to crawl over the package during the tying operation having a slot for the reception side-by-side of the wire ends, said slot having at its ends means for holding the wires against twisting, a latch capable of moving with the machine for holding said end in said slot, a wire tester, engaging the wires at the central part of said slot, twister operating means including a shaft journaled upon said base, a cutter adapted to engage and cut one of the wires just outside of the wire receiving slot, a cam upon said shaft and a lever carrying said cutter and actuated by said cam to cut the wire at the completion of the wire twisting movement.

21. In a wire tying mechanism, in combination, a wire twisting mechanism adapted to crawl over the package during the twisting operation, wire holders located along the wire in each direction from the twister and adapted to prevent twisting of the wire

ends about each other, a latch movable with the machine for confining said wires in said holders, a wire clamp located just without one of these holders and engaging only the tip of one end of the wire, a cutter located just outside of the other holder and adapted to engage with the other end of the wire only, a wire tightening clamp located beyond the cutter from the twister and means for connecting the twister and the cutter to operate the cutter at the completion of the twisting operation.

In testimony whereof I affix my signature.

PARVIN WRIGHT.