

May 8, 1928.

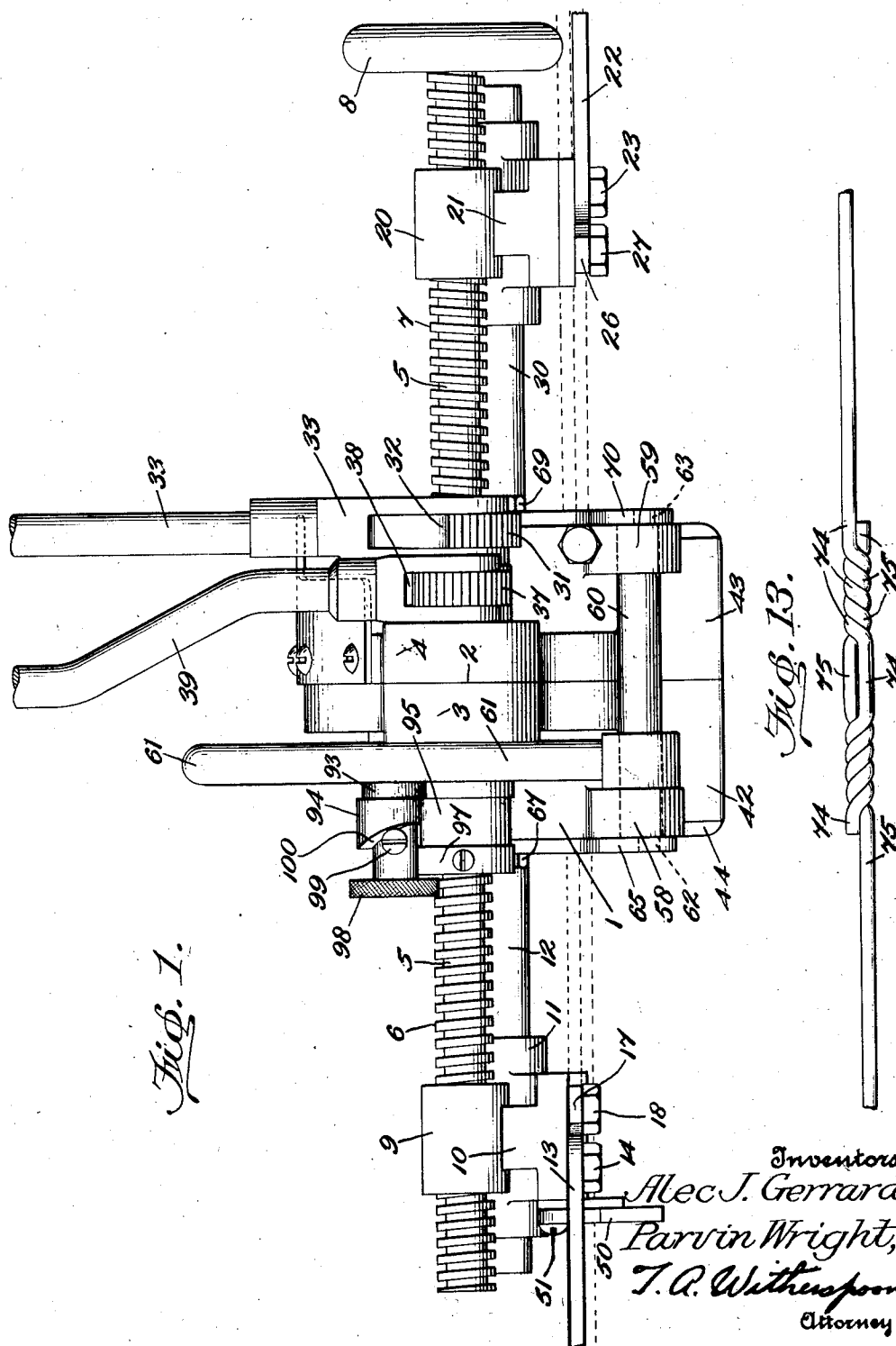
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A. J. GERRARD ET AL

WIRE TYING MACHINE

Filed Jan. 2, 1920

4 Sheets-Sheet 1



May 8, 1928.

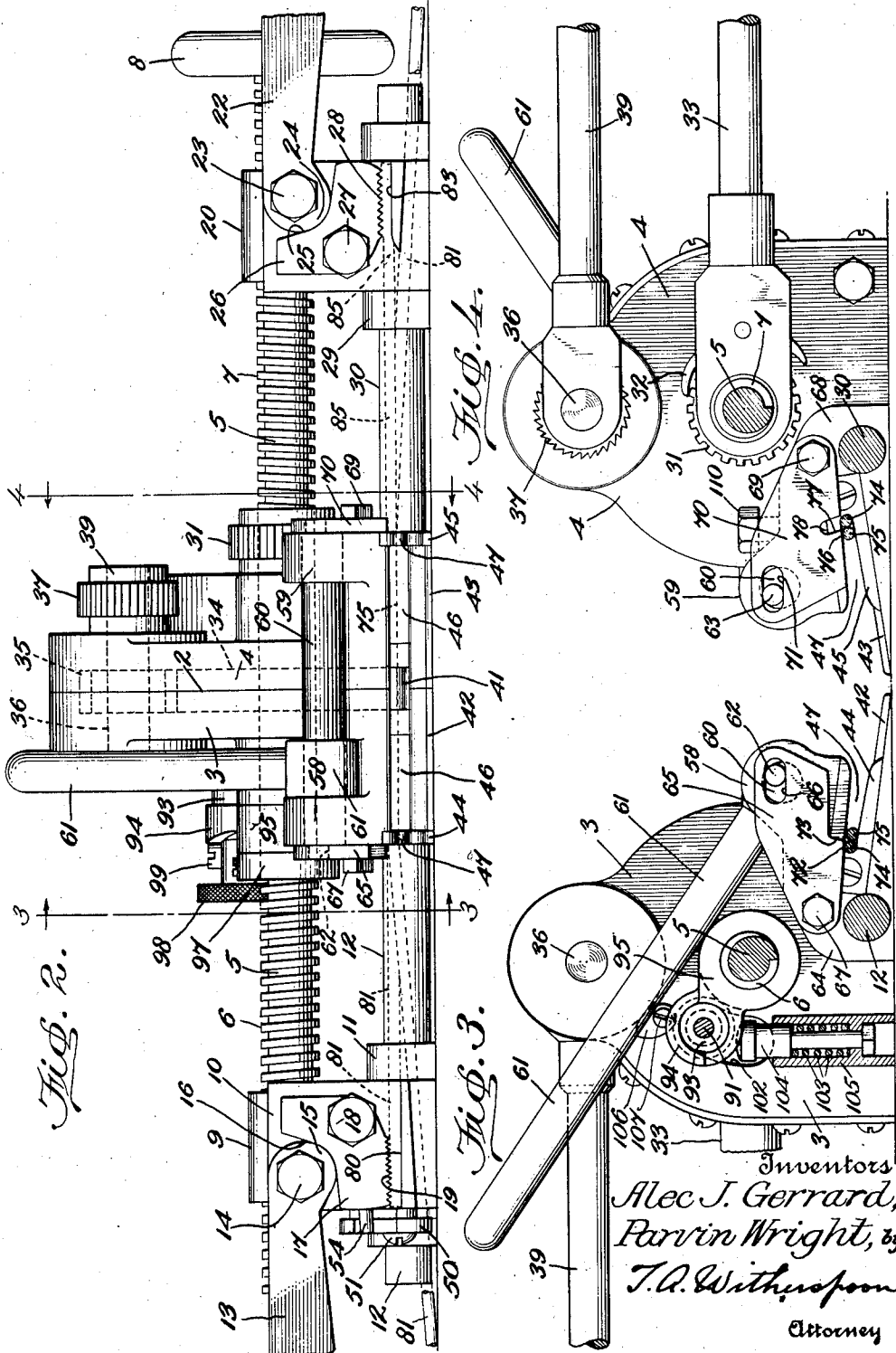
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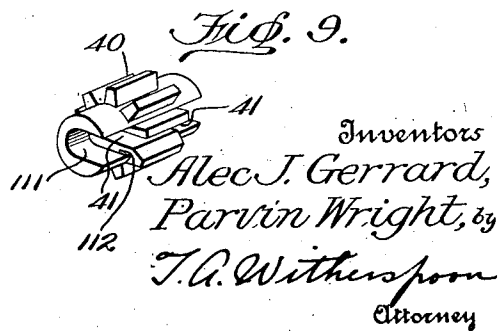
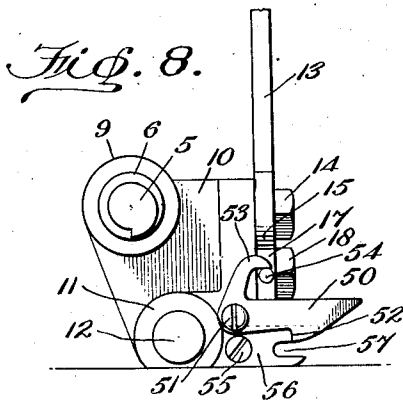
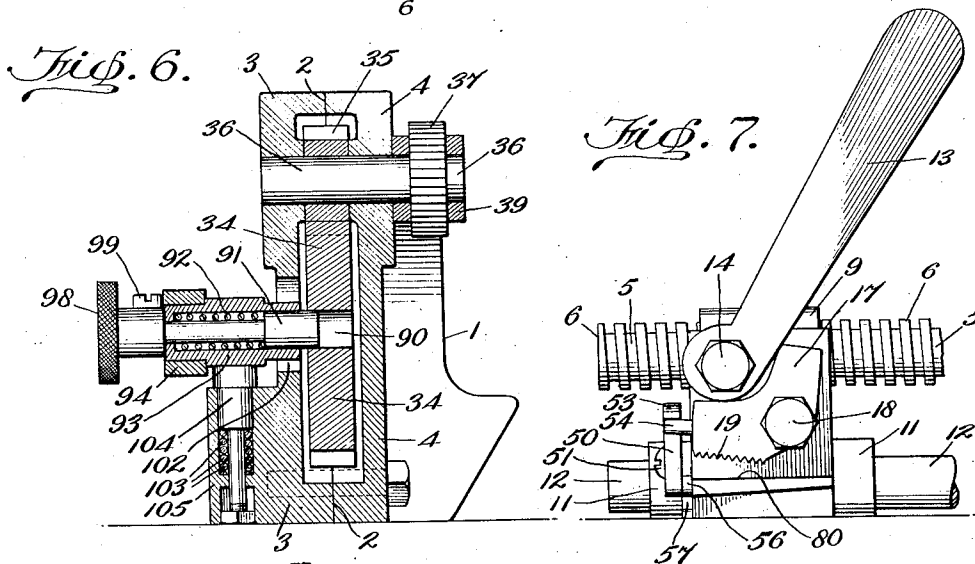
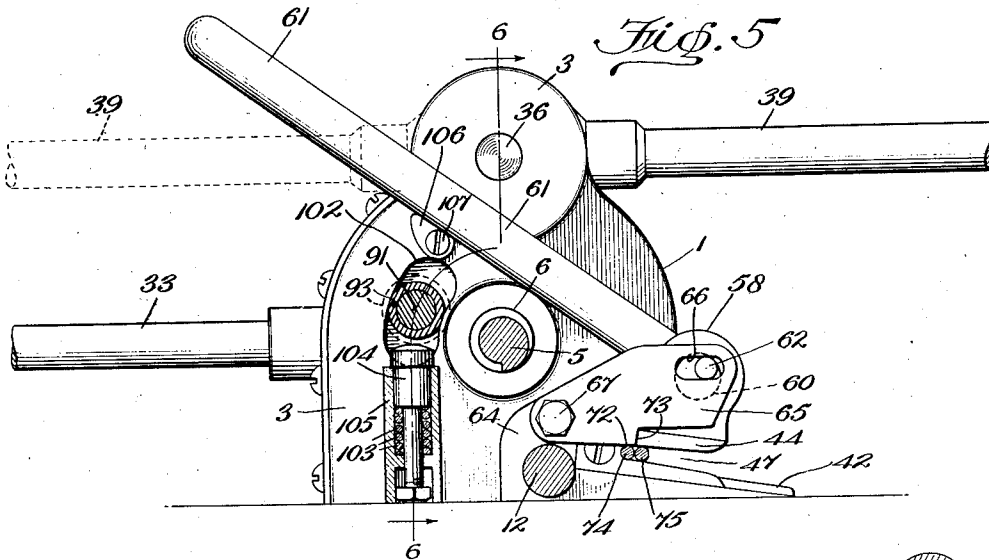
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WIRE TYING MACHINE

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4 Sheets-Sheet 3



Inventors
Alec J. Gerrard,
Parvin Wright, by
J. A. Witherspoon
Attorney

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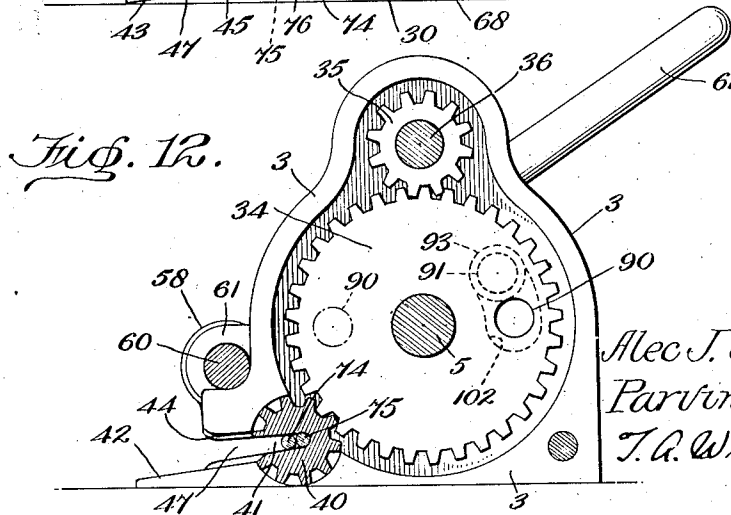
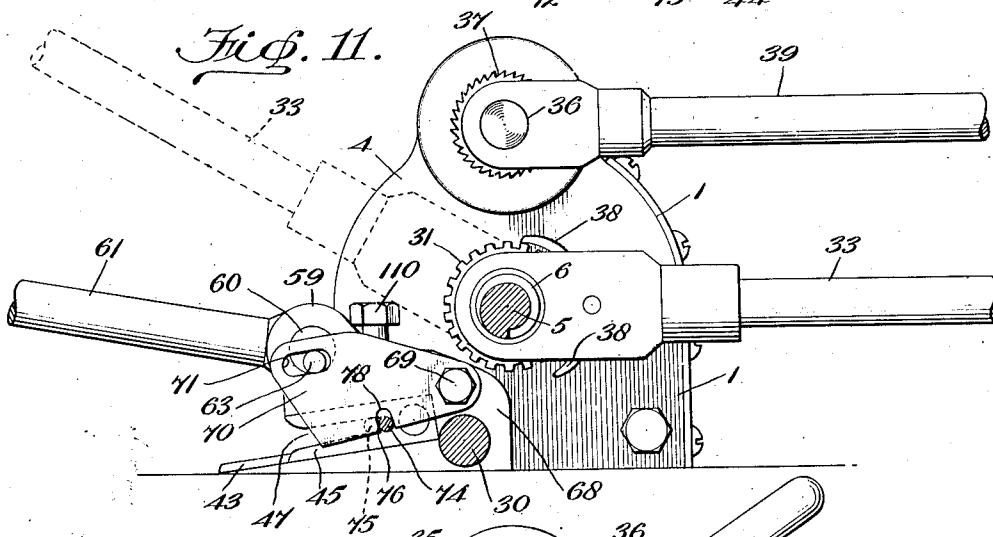
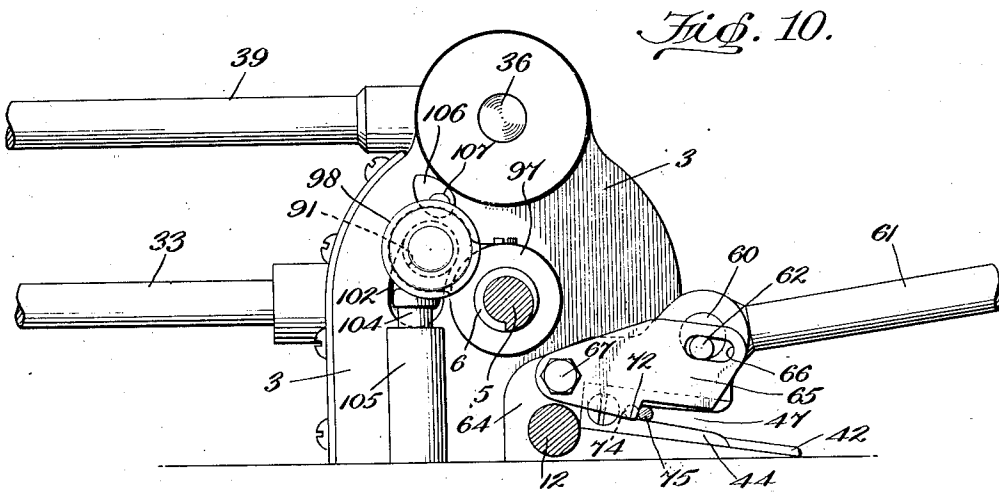
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WIRE TYING MACHINE

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4 Sheets-Sheet 4



Inventors
Alec J. Gerrard,
Parvin Wright, by
T. A. Witherspoon
Attorney

UNITED STATES PATENT OFFICE.

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

WIRE-TYING MACHINE.

Application filed January 2, 1920. Serial No. 348,794.

This invention relates to wire tying machines, and has for its object to provide an apparatus which will be comparatively inexpensive to manufacture and more efficient and certain 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 top plan view of a machine made in accordance with this invention;

Figure 2 is a side elevational view of the parts shown in Figure 1;

Figure 3 is a view taken on the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a view taken on the line 4—4 of Figure 2, looking in the direction of the arrows;

Figure 5 is a view similar to Figure 3, but showing the parts in a different position;

Figure 6 is a sectional view taken on the line 6—6 of Figure 5;

Figure 7 is an enlarged side elevational view of one of the wire gripping mechanisms;

Figure 8 is an end elevational view of the parts shown in Figure 7;

Figure 9 is a perspective view of the slotted wire twisting pinion;

Figure 10 is a view similar to Figures 3 and 5, showing the parts in a still different position;

Figure 11 is a view similar to Figure 4, but showing the parts in a different position;

Figure 12 is a sectional detail view illustrating the wire twisting mechanism; and

Figure 13 is a view of a portion of the twisted wire.

1 indicates any suitable forging or casting constituting the main frame, which is conveniently divided on the line 2, into the halves 3 and 4. Passing through the halves or parts 3 and 4 is the main operating shaft 5, provided with the right and left handed screw threads 6 and 7 and the hand operated knob or member 8. Carried by the

screw thread 6 is the sleeve like nut 9, carrying the body portion 10, carrying the sleeve 11 slidably mounted on the guide rod 12. Also mounted on the body portion is the lever 13 pivoted at 14, and provided with the operating cam 15 taking against the cam like surface 16 carried by the wire gripping jaw 17 pivoted at 18, and provided with the serrations or teeth 19.

Carried by the screw thread 7 is another sleeve like nut 20 provided with a body portion 21 carrying the lever 22 pivoted at 23, and having the cam 24 taking against the cam surface 25 carried by the gripping jaw 26 pivoted at 27 and having the teeth or serrations 28 as shown. Also carried by the body portion 21 is the guide sleeve 29 mounted to slide on the guide rod 30.

The right and left hand screw threads 6 and 7 as well as the operating rod or shaft 5 are turned by means of a ratchet 31, actuated by a pawl 32, carried by the operating lever 33.

On the inside of the halves 3 and 4 and mounted on the rod 5, is the main twisting gear wheel 34, with which meshes the operating pinion 35, mounted on the short shaft 36, carrying the ratchet 37 operated by the pawl 38 carried by the lever 39. Also meshing with the main gear 34, is the wire twisting pinion 40 provided with the wire twisting outwardly tapered slot 41 as shown.

Extending from the main half or portion 3 is the tapered apron like member 42, and extending from the portion 4 of the frame is the similar member 43.

Secured to the member 42, is the strip like member 44, and secured to the member 43 is the similar strip like member 45. Between each of the members 42 and 43 and the main half members 3 and 4 are the slots 46 which have a height sufficient to permit a double strand of the wire to rotate therein during the twisting operation, while each of the members 44 and 45 are provided with an inclined tapered slot 47 which will accommodate a pair of wire strands when in a horizontal position, but will not permit said strands to rotate therein.

The slot 41 of the pinion 40 is likewise so narrow that a double strand of wire cannot rotate therein independently of the slot.

Secured to the body portion 10 is the hook or lever 50 pivoted at 51. Said lever 50 is provided with the wire holding catch

portion 52, and the hook portion 53 operated by the pin 54 carried by the jaw member 17, as best illustrated in Figure 8. Also secured to the said body portion 10, as by the screw 55 is the member 56, having the slot 57. Passing through the bosses 58 and 59, of the portions 3 and 4 of the main frame is the shaft 60 to which is attached the operating lever 61, and carried by one end of said shaft 60 is the eccentrically disposed pin 62, while the other end thereof carries a similarly disposed eccentric pin 63, all as will be clear from Figures 3 and 4.

Mounted on an enlargement 64 of the portion 3 of the main frame, is the cutter jaw 65, pivoted as at 67 and provided with the slot 66 in which the eccentrically disposed pin 62 works. In like manner mounted on the enlargement 68 of the portion 4 of the main frame is pivoted as at 69 the cutter jaw 70 having the slot 71 in which operates the eccentrically disposed pin 63. The cutter jaw 65 is provided with the cutting edge 72 terminating at the vertical portion or edge 73, so that said cutting edge will only sever the inner bight 74 of the wire, while said vertical edge 73 will slide downward on the side of the companion bight 75 of the wire, all as will appear more fully hereinafter. In a like manner the cutting jaw 70 is provided with a cutting edge 76 terminated by the vertical edge 77 of the slot 78 with which said jaw 70 is provided, so that only the bight 75 of the wire will be severed, while the bight 74 will enter said slot 78 and escape the cutting action for a purpose also to be explained below.

The operation of the mechanism so far disclosed is as follows:—The machine is located on top of the box or container to be wired, one end of the wire 81 is placed beneath the gripping jaw 17, the lever 13 is thrown into the position indicated in Figure 2, and said wire is firmly clamped by the serrations 19 against the anvil 80 which is formed by an angular extension of the body portion 10. The bight 74 of said wire 81 is now passed well back into the two slots 47 and 46, as well as into the slot 41. Said wire 81 is then passed under the gripping jaw 26 and anvil 83 as indicated in dotted lines on the right hand side of Figure 2, whence it passes down one side, under the bottom, and up the other side of the box to be wired, whereupon said wire 81 is brought back to the lever 50, into the slot 57 and is there held by the hook 52. The bight 75 of said wire 81 is now passed well back into the two slots 47 and 46 as well as into the piston slot 41, so that the two bights 74 and 75 lie close along side each other, as indicated.

The other end 85 of said wire 81 which is in prolongation of the bight 75, is now

passed between the gripping jaw 26 and anvil 83, whereupon the lever 22 is thrown into the position shown in Figure 2, and the serrations 28 firmly hold said end 85 in position. The lever 33 is now operated, whereupon the right and left hand screws 6 and 7 cause the gripping jaws 17 and 26 to separate and the wire 81 to be tightened around the box. In beginning this operation the gripping jaws and their associated slides should first be brought in close to the frame members 3 and 4, of the machine, and the wire may then be tightened to any desired degree. The bights 74 and 75 of the wire will lie close together and on each side of the center of the twisting pinion 40, as best shown in Figure 12. The wire having been thus tightened the lever 39 is now operated to revolve the pinion 35, gear 34, and twisting pinion 40, whereupon the bights 74 and 75 are twisted together as indicated in Figure 13.

After the twisting operation has been thus completed it is evident that the bights 74 and 75 will still be held in their horizontal positions in the slots 47, and therefore, the lever 61 may be operated to cause the cutter 65 to sever the bight 74 only, and the cutter 70 to sever the bight 75 only, in the manner above explained, whereupon the twisted joint will appear as in Figure 13. It is important that the slots 46 are wide enough to permit the two bights 74 and 75 to rotate therein during the twisting operation, while the slots 41 and 47 are so narrow that said bights are prevented from rotating therein, for otherwise the twisted tie or joint could not be formed. After the severing operation the reversal of the lever 13 from the position shown in Figure 2, to the position shown in Figure 7, will release one of the severed ends of the wire 81, and a similar reversal of the lever 22 from its position shown in Figure 2 will likewise release the other end of said wire. Further, by reversing the motion of the lever 33, its double pawl 32 will bring the gripping jaws 17 and 26, and their associated slides back to their original positions ready for a new operation.

In twisting the wire, however, it is important to provide for a suitable number of turns between the bights 74 and 75, to insure a strong joint, and this number may vary with the wire used, the character of the box to be wired, and the hard usage to which it will be subjected during shipment. It is also important to insure the slot 41, of the pinion 40, always being stopped at the end of the twisting operation in register with the slots 46 and 47.

To accomplish these ends we make the main timing gear 34 very much larger than the pinion 40, and thus provide for a num-

ber of complete revolutions of said pinion, with a corresponding number of twists in the bights 74 and 75, for given angular motion of the gear 34, so that by limiting or
 5 varying said angular motion of said gear, we are enabled to limit or vary the twists in the joint. We limit or vary said angular motion of said gear 34 and insure the registry of the slot 41 with the slots 46 and
 10 47, as follows:—

The gear 34 is provided with a hole or recess 90 near its periphery, and a plunger or pin 91 controlled by the spring 92, is carried in the barrel 93, mounted in the barrel
 15 94 rigid with the sleeve 95 encircling the screw thread 6 as best shown in Figure 1.

A collar 97 holds the sleeve 95 and its coacting parts in position. The plunger 91 is provided with the hand operated knurled
 20 knob 98 and with a projection 99 coacting with the cam surface 100 with which the barrel 94 is provided.

Supposing an angular travel of 180° of the periphery of gear 34 will produce the
 25 desired number of turns, of the pinion 40, the hole 90 of said gear will be set somewhat less than 180° ahead of the plunger 91, see dotted lines Figure 12, when said plunger is in its extreme upper position, as is indicated in dotted lines in Figure 10.

When said hole 90 has completed its less than 180° of travel, it will register with said
 30 plunger, which latter will snap into said hole and the gear 34 and slot 41 will be carried beyond the end of their normal travel with said plunger by an angular distance which will be limited by the lower position of the plunger. This lower position may be determined by the end of the slot 102 with
 40 which the housing member 3 is provided, or it may be limited by the compression of the shock absorbing spring 103 which controls the movements of the head 104 with which the cushioning device or shock absorber 105
 45 is provided.

The spring 103 being thus compressed and the plunger 91 having reached the end of its wire twisting stroke, the operator will release his grip, whereupon the spring 103 will
 50 return the plunger 91 and gears 34 and 40 to their normal positions. That is to say at the same time, the motion of gear 34, pinion 40, and the slot 41 is reversed, and the latter will be brought back and held in
 55 register with the slots 46, and 47, as the timing plunger 91 again reaches its extreme upper position. The bights 74 and 75 of the wire 81 are now severed in the manner above disclosed, when the machine may be slid
 60 out from beneath the twisted and finished wire joint.

To set the machine for twisting the bights of another wire, the knurled knob 98 may be pulled out straight or it may be turned so
 65 that the pin 99 will traverse the cam 100 in

either of which cases the plunger 91 will leave the hole 90 and free the gear 34.

It is desirable to adjust the extreme upper position of the plunger 91 which is normally determined by the upper end of the
 70 slot 102. To effect this adjustment the cam member 106 pivoted at 107 is provided, and it may be swung on its pivot across the slot 102, and thus limit the upward movement of the member 93 carrying the plunger 91. 75

It follows that the upper and lower limits of travel of the plunger 91 being thus readily determined, and the movements of the lever 39 being stopped by the end of the said travel of the plunger 91, it is a simple matter to first adjust the angular position of
 80 the hole 90 in the gear 34, to such a position as will cause the pinion 40 to give any desired number of twists to the bights 74 and 75 of the wire 81. 85

Referring more particularly to Figure 9, it is preferred to provide the wire twisting pinion 40 with a slot 111, which is as wide as the slots 46, and therefore, of dimensions
 90 sufficient to permit the bights 74 and 75 to rotate therein independently of the pinion. Into this slot 111 we may next secure the U-shaped yoke member 112 provided with the narrow slot 41, or we may cut both the
 95 pinion 40 and the U-shaped member 112 out of a single piece of metal. In either case the pinion is provided with the relatively long and wider slot 111, and the shorter and narrower slot 41 parallel to said wider slot. 100

It will now be clear that this machine comprises the pair of wire tensioning slides, having the body portions 10 and 21 carrying the wire gripping jaws 17 and 26, and
 105 which slides are operated by the ratchet lever 33 through the right and left hand screws 6 and 7. That 52 represents a hook to hold the wire in the guiding yoke 57; that the hole 90 and plunger 91 and its associated parts constitutes a readily adjustable
 110 timing device, for determining the number of twists that are to be put into the wire and for insuring the registry of the slot 41 with the slots 46 and 47; and that the frame members 3 and 4 constitute a housing for
 115 the twisting gear train.

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

What we claim is:—

1. In a wire tying machine the combination of means to grip each end of the wire; means comprising a screw to move said wire gripping means relatively to each other to tension said wire; means comprising a hook
 125 to hold the wire in position for twisting 130

while being tensioned; and twisting means for twisting two parts of the wire together while under tension, substantially as described.

5 2. In a wire tying machine the combination of means comprising tension slides to grip each end of the wire; means to move
said slides and wire gripping means relatively to each other to tension said wire;
10 means to hold the wire in position for twisting while being tensioned; and twisting means comprising a gear and a slotted pinion meshing with said gear for twisting two
parts of the wire together while under tension, substantially as described.

3. In a wire tying machine the combination of a pair of slidable tension devices adapted to grip the two ends of the wire;
screw means for separating said tension devices to put the wire under tension; means
20 to twist two bights of the wire while in parallel relation under tension; and means to hold the wire in position during the twisting operation, substantially as described.

4. In a wire tying machine the combination of a pair of slidable tension devices adapted to grip the two ends of the wire;
screw means for separating said tension devices to put the wire under tension; means
30 comprising a gear and a slotted pinion associated with said screw means adapted to twist two bights of the wire while under tension; and means comprising a hook to hold the wire in position during the twisting
operation, substantially as described.

5. In a wire twisting machine the combination of a main operating shaft provided with screw threads; wire tension slides adapted to be separated by said shaft; a
40 gear mounted on said shaft; a slotted wire twisting pinion meshing with said gear; and means coacting with said gear to stop its motion when the slot in said pinion has traveled a predetermined angular distance,
substantially as described.

6. In a wire twisting machine the combination of a main operating shaft provided with screw threads; wire tension slides adapted to be separated by said shaft; a
50 gear mounted on said shaft; a slotted wire twisting pinion meshing with said gear; and means comprising a stop plunger and a shock absorbing means coacting with said gear to stop its motion when the slot in said
pinion has traveled a predetermined angular distance, substantially as described.

7. In a wire tying machine the combination of a pair of wire tensioning slides; a screw shaft to move said slides relatively to
60 each other; means comprising a pawl and ratchet means for operating said screw shaft; means for twisting together two bights of the wire while under tension; and additional hand operated means for facili-

tating the return of said slides to their normal positions, substantially as described.

8. In a wire tying machine the combination of a pair of wire tensioning slides, each comprising a wire gripping jaw and a lever
for operating said jaw; a screw means for
70 moving said slides relatively to each other; means for twisting two portions of the tensioned wire; means for holding the parts against rotation and in parallel relation during the twisting operation; and hand operated
means for actuating said screw means, substantially as described.

9. In a wire tying machine the combination of a pair of wire tensioning slides each comprising a wire gripping pivoted jaw
80 and a pivoted lever for operating said jaw; a screw means for moving said slides relatively to each other; means for twisting together two bights of the tensioned wire; and hand operated pawl and ratchet means for actuating said screw means, substantially
as described.

10. In a wire tying machine a wire tensioning means comprising a pivoted gripping jaw; a pivoted lever provided with a cam;
90 connections between said jaw and cam whereby said jaw may be both opened and closed by the movements of said lever, and means for twisting together two bights of the tensioned wire; substantially as described.

11. In a wire tying machine a wire tensioning means comprising a pivoted gripping jaw; an anvil coacting with said jaw;
100 a support for said jaw rigid with said anvil; a pivoted lever provided with a cam; and connections between said jaw and cam whereby said jaw may be both opened and closed by the movements of said lever, and means for twisting together two bights of the
tensioned wire; substantially as described.

12. In a wire tying machine the combination of a supporting frame; a wire tensioning screw shaft supported by said frame; a
110 train of gears supported by said shaft; a slotted wire twisting pinion actuated by said train of gears; means for tensioning the wire carried by said shaft; and means supported by said frame for cutting the wire after the actuation of said slotted pinion,
substantially as described.

13. In a wire tying machine the combination of a supporting frame; a wire tensioning screw shaft supported by said frame; a
120 train of gears supported by said shaft; a slotted wire twisting pinion actuated by said train of gears; slidable means for tensioning the wire carried by said shaft; pivoted means supported by said frame for cutting the wire after the actuation of said
slotted pinion; and an operating lever for actuating said last named means, substantially as described.

14. In a wire tying machine the combination of a pair of wire tension slides; a screw shaft for actuating said slides; guides for said slides; a gear carried by said shaft; a slotted wire twisting pinion meshing with said gear; and means for controlling the angular movements of said gear and pinion comprising a shock absorbing means for returning the slot of said pinion to a predetermined position, substantially as described.

15. In a wire tying machine the combination of a pair of wire tension slides; a screw shaft for actuating said slides; guides for said slides; a gear carried by said shaft; a slotted wire twisting pinion meshing with said gear; means for controlling the angular movements of said gear and pinion comprising a shock absorbing means for returning the slot of said pinion to a predetermined position; and a pair of cutters for severing different bights of the twisted wires, substantially as described.

16. In a wire tying machine the combination of means comprising a train of gears for twisting a plurality of bights of the wire together; operating means for said train of gears; and additional means for readily changing the number of twists given said bights under the action of said operating means, substantially as described.

17. In a wire tying machine the combination of means for tensioning the wire; means comprising a train of gears for twisting a plurality of bights of the wire together while under tension; operating means for said gear train; and additional means for readily changing the number of twists given said bights without changing said gear train, substantially as described.

18. In a wire tying machine the combination of means comprising a train of gears for twisting a plurality of bights of the wire together; and means comprising a slot, a spring pressed plunger and a cushioning device for readily changing the number of twists given said bights without changing said gear train, substantially as described.

19. In a wire tying machine the combination of means comprising a train of gears for twisting a plurality of bights of the wire together; and means comprising a slot, means to adjust the length of said slot, and a spring controlled plunger for readily changing the number of twists given said bights without changing said gear train, substantially as described.

20. In a wire tying machine the combination of a wire tensioning means; means for twisting together a plurality of bights of said wire; a shaft provided with eccentrics; wire cutters provided with means for severing a predetermined bight only adapted to be actuated by said eccentrics; and means for operating said shaft and eccentrics, substantially as described.

21. In a wire tying machine the combination of means to hold the wire; means to tension the wire; means to twist a plurality of bights of the wire together while under tension; operating means for said twisting means; and additional means to readily change the number of twists that are to be given said bights; substantially as described.

22. In a wire tying machine the combination of means for twisting together a plurality of bights of a wire; stationary members located a predetermined distance apart and having slots adapted to receive said bights; and movable cutters disposed a predetermined distance apart for severing said bights, substantially as described.

23. In a wire tying machine the combination of a wire twisting means comprising a movable wire twisting slot and a stationary holding slot; operating means adapted to move said twisting slot slightly past said stationary slot; and automatic means for causing said wire twisting slot to be brought back in register with said wire holding slot, substantially as described.

24. In a wire tying machine the combination with a frame adapted to crawl over the package during the wire tying operation, of means for holding two bights of the wire in parallel relation; a wire tensioning means; means for twisting said bights together while under tension; a wire cutting means comprising a plurality of cutters; and levers adapted to successively operate each of said means, substantially as described.

25. A wire hoop making device comprising means for holding a wire end alongside of the body of the wire which is to form the other end of the hoop, two separated means for holding said hoop ends to prevent their being twisted, a twister engaging both wires between said holding means to twist them; a cutter bar acting complementally with one of said holding means to cut one wire at substantially one end of the twisted section, and means for actuating said cutter to cut said wire at the end of the twist forming movement.

26. In a package binding implement, tensioning means including a plurality of movable members for retaining a wire binder and operating means for shifting said members relatively to each other for increasing or decreasing the interval separating said members whereby a wire binder is placed under tension subsequent to the take up of slack therein by a pull in two directions on said wire binder, in combination with twisting means constituting a unit of the implement and positioned intermediate said members for twisting together crossing end portions of the wire binder.

27. In a package binding implement, tensioning means including a plurality of heads with connecting means therefor and oper-

ating means for shifting said heads relatively one to the other so as to vary the interval separating said heads and thereby place tension upon a wire binder subsequently to taking up slack therein, in combination with a twister-head positioned in a non-shiftable relation to said tensioning heads and intermediate the same, and twisting means carried by said twister head and operable at will upon crossing portions of said wire binder for twisting the same while the latter is under tension by the action of said tensioning heads, said twisting action upon the binder while under tension operating to place increased tension upon said binder.

28. In a package binding implement, tensioning means including a plurality of gripper heads with means for imparting movement conjointly thereto for placing tension upon a binder by pulling end portions thereof in opposite directions simultaneously, in combination with twisting means constituting a unit of said implement, said twisting means being positioned intermediate said gripper heads and operable subsequently to the tensioning means for twisting directly together the crossing end portions of a binder and further tensioning the latter while the latter is held under tension by the action of said tensioning means.

29. In a package binding implement, binder-tensioning means including a plurality of gripper heads with a connecting member and operating means for imparting movement conjointly to said gripper heads, in combination with binder twisting and additional tensioning means positioned intermediate said gripper heads, said twisting means including a head held in a non-movable position by said connecting member and a train of gears mounted in said head, one of said gears and said head being slotted for the reception of the crossing ends of a binder for uniting the latter while the binder

is under tension by the action of said tensioning means.

30. In a wire tying machine, the combination with gripping devices spaced apart from each other and respectively movable towards and away from each other, said gripping devices respectively adapted to receive and grip portions of the wire disposed in substantially parallel relation and extending in respectively opposite directions, of means to move said gripping devices in opposite directions to tension the wire, and means disposed between said gripping devices to engage the parallel portions of the wire and twist them together while under tension.

31. In a wire tying machine the combination with means to grip and hold oppositely extending portions of the binder wire in substantially parallel relation to each other, of means interposed between said gripping means to engage and twist together the parallel portions of the wire, and movable cutters disposed at opposite sides of the twisting means, and operating to sever the oppositely extending portions of the wire, each cutter having a blank portion in its cutting edge whereby only one of the two parallel portions of the wire is severed by one cutter and the other of said parallel portions is severed by the other cutter.

32. In a wire tying machine, the combination with means to twist together substantially parallel portions of a binder wire disposed in oppositely disposed directions with respect to each other, of movably actuated cutters disposed at opposite sides of the twisting means, one of said cutters constructed to sever only one of said wire portions and the other constructed to sever only the other of said wire portions.

In testimony whereof we affix our signatures.

ALEC JOHN GERRARD.
PARVIN WRIGHT.