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WIRE TENSIONING AND TWISTING MACHINE.

APPLICATION FILED OCT. 22, 1920.

1,425,850.

Patented Aug. 15, 1922.

3 SHEETS—SHEET 1.

Fig. 6.

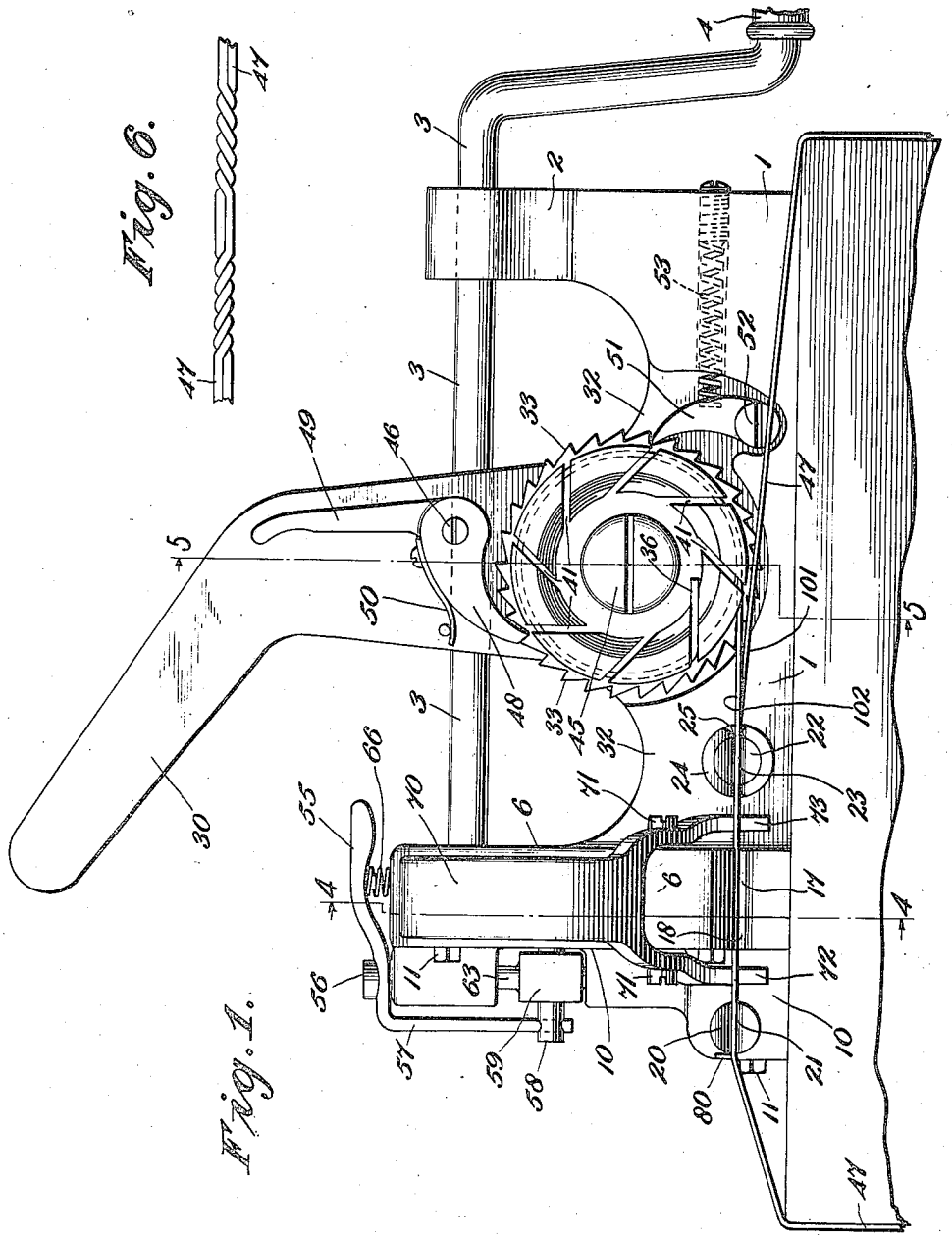


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 3.

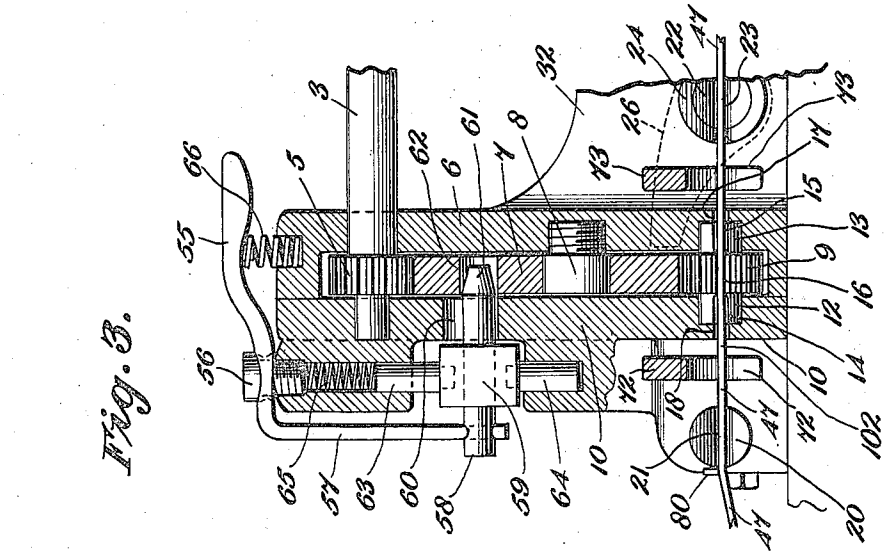
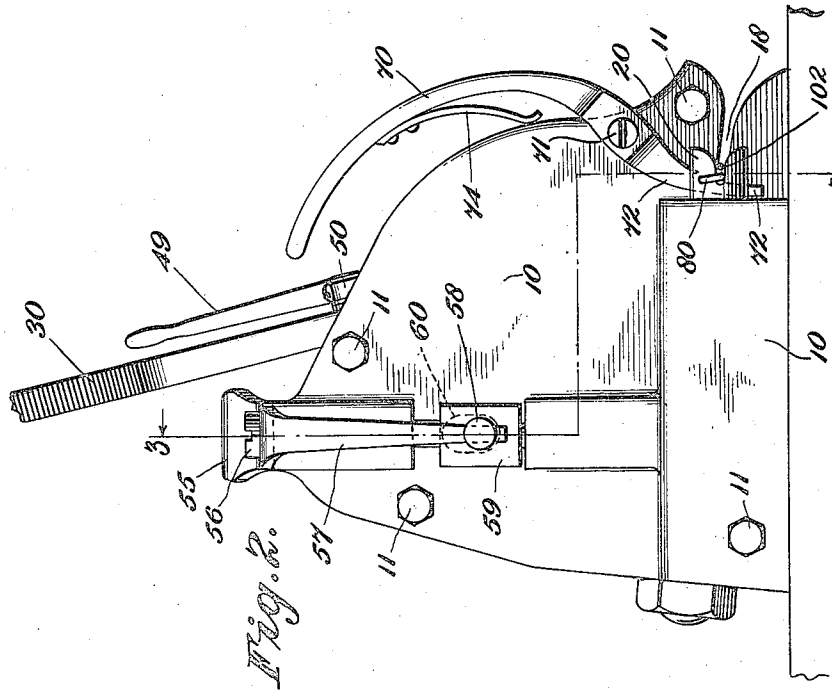


Fig. 2.



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3 SHEETS—SHEET 3.

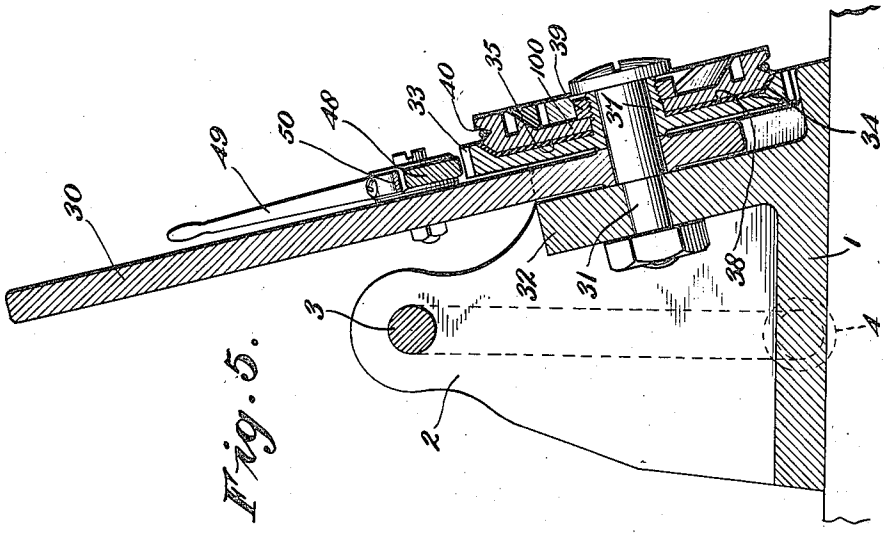


Fig. 5.

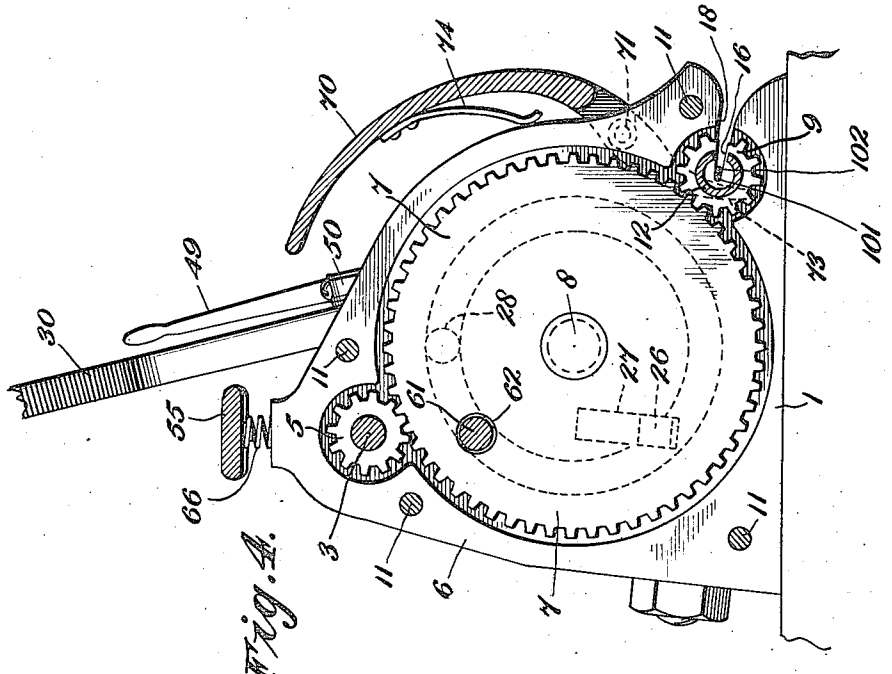


Fig. 4.

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UNITED STATES PATENT OFFICE.

ALEC J. GERRARD AND PARVIN WRIGHT, OF CHICAGO, ILLINOIS.

WIRE TENSIONING AND TWISTING MACHINE.

1,425,850. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed October 22, 1920. Serial No. 418,634.

To all whom it may concern:

Be it known that we, ALEC J. GERRARD and PARVIN WRIGHT, respectively a subject of the King of Great Britain and a citizen of the United States, each residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Wire Tensioning and Twisting Machines; and we 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 wire tensioning and twisting machines, and has for its object to provide a machine of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in action 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 diagrammatic front elevational view of a machine made in accordance with this invention;

Figure 2 is an end elevational view of the parts shown in Figure 1, as seen from the left of said figure;

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

Figure 4 is a transverse sectional view taken approximately on the line 4—4 of Figure 1, looking in the direction of the arrows;

Figure 5 is a transverse sectional view taken approximately on the line 5—5 of Figure 1, looking in the direction of the arrows; and

Figure 6 is a diagrammatic plan view of the wire tie formed by this machine.

In our prior U. S. application, #391,678, filed June 25, 1920, and entitled "Automatic wire tensioning and tying machines," we have disclosed one form of wire tying machine provided with an automatic tensioning device for placing the wire or band under a predetermined tension before commencing the twisting operation. The present invention is somewhat similar to that disclosed in this said prior application, but we have here shown an improved form of tensioning means, another form of stop means for insuring that the slot in the wire twisting pinion will always register with the wire retaining slots in the frame work at the end of the twisting operation, and we have also disclosed means for ejecting the wire from the twisting pinion upon the completion of the twisting operation.

1 indicates any suitable base provided at one end with an upright extension 2, in which is journalled a shaft 3 provided at one end with the crank handle 4 and carrying upon its other end a suitable pinion 5 (see Figures 1 and 3.) The base 1 at the end opposite the extension 2 is provided with an integral upright housing 6 constituting the casing for the twisting gear train comprising the pinion 5, the intermediate gear 7, which is rotatably mounted on the stud 8 carried in the said housing 6, and the twisting pinion 9, as will be clear from the drawings.

An end plate or member 10 conforming substantially in shape with that of the housing 6 is secured to the base member 1 and to said housing by means of suitable bolts 11 and together with the said housing forms a journal for the hubs or extensions 12 and 13, with which the twisting pinion 9 is provided.

The said hubs or extensions 12 and 13, as is usual in this type of twisting mechanism, are provided with slots 14 and 15 respectively, of a width of at least twice the diameter of the wire which is to be employed in the machine. These slots are connected by the slot 16 in the pinion 9 which slot is of reduced width, preferably only exceeding the diameter of the wire sufficiently to permit its ready insertion and withdrawal. The housing 6 as well as the end member 10 are also provided with slots 17 and 18 respectively, of a width equal to at least twice the diameter of the wire.

The member 10 is provided with the rigid post 20 having a horizontal slot 21 therein, adapted to receive the wire, and the member 1 is likewise provided with the rigid post

22 also having a horizontal slot 23 to receive the wire. The said post 22 may be surrounded by the oscillating sleeve 24 having a cutting edge 25 adapted to sever one strand of the wire and the said cutting sleeve 24 may be actuated in any suitable manner, as, for example, by the finger 26, rigid with the said sleeve, and which projects through a slot 27 in the housing 1, in the path of a pin or roller 28 carried by the intermediate gear 7. The construction and operation of this said cutting means is or may be substantially the same as that disclosed in our said copending application #391678, and since no specific claim is laid thereto in the present application, it will not be further described in detail. Any suitable form of cutting mechanism may, of course, be employed.

Referring more especially to Figures 1 and 5, the wire tensioning means which form an essential part of this present invention comprise a hand lever 30 pivoted upon the stud or bolt 31 secured in the upright web 32 of the frame 1. Also mounted upon the said stud 31 adjacent the lever 30 is a ratchet wheel 33 cut away as at 34 to form a clutch face which is adapted to coact with the companion clutch face 35 formed on a plate or disk 100 rotatably mounted upon the hub 37 with which the ratchet wheel 33 is provided. If desired, a disk or sheet of suitable friction material 38 may be interposed between the adjoining faces of the clutch members 34 and 35. The frictional resistance between these said two members may be readily controlled by the adjustment of the nut 39 threaded upon the hub 37 of the ratchet wheel 33 and taking against the member 36, as will be readily apparent from Figure 5.

Associated with the rim of the disk member 100 is a wire gripping V-shaped groove 40 having the tangentially disposed recesses 41 adapted to receive the end 36 of the wire.

The hand lever 30 has pivotally secured thereto as at 46 a dog 48 provided with a finger extension 49 and also having associated therewith a suitable spring 50 adapted to normally maintain said dog in contact with the teeth of the ratchet wheel 33. A suitable detent 51 may be pivoted as at 52 to the web 32 of the frame 1 and controlled by a helical or other suitable spring 53 for the purpose of preventing reverse motion of the ratchet wheel 33 and its associated parts.

The mechanism employed in the present invention for insuring the alinement of the slots 14, 15 and 16 of the twister pinion 9 with the slots 17 and 18 of the housing 6 and end member 10 at the end of the twisting operation comprises a lever 55 pivotally secured to the upper portion of the end member 10 by the stud 56. One end of the said lever 55 is bent downwardly as at 57 and passes through a hole at one end of the pin 58 slidably mounted in a block 59 and extending through an elongated slot 60 in the end plate 10. The end 61 of the said pin 58 is preferably beveled as shown in Figure 3, and is adapted to enter a recess or hole 62 in the large intermediate gear 7 as will be clear from the drawings.

The block 59 above referred to is provided with the vertical pins 63 and 64 slidably mounted in the bosses integral with the end plate 10, and the said pin 63 may have associated with it a suitable compression spring 65 for the purpose of maintaining the block 59 in a predetermined position by means of a suitable spiral spring 66, (see Figure 3.)

Upon the completion of the twisting operation it is frequently found difficult to extract the wire tie from the slots of the twister pinion by hand and it is an important feature of the present invention to provide a mechanical means for assisting in this. This said means as here shown comprises a curved lever member 70 bifurcated at its lower end and pivoted as at 71 to the housing and the end member 10, as will be clear from Figures 1 and 2. The lower extremities of this said lever 72 and 73, normally project down behind the bights of the wire 47 as shown in Figure 2, and said lever is maintained in this position by means of a suitable spring 74 as shown.

The operation of this machine will be clear from the foregoing, but it may be briefly summarized as follows:—The machine is placed upon the top surface of the box or other package around which the wire is to be fastened, one end 80 of the wire 47 being introduced into the slot 21 carried by the pin or post 20 and bent slightly upwardly as shown in Figure 1 in order to hold the same. The bight 101 of the wire is then inserted in the slots 18, 14, 16, 15 and 17 of the frame and twisting element, and also in the slot 23 of the holding post or pin 22. Said wire is now passed around the box or package when the bight 102 is brought up through the slot 21, the slots 18, 14, 16, 15, 17 and 23 and the other end portion of said wire is then wrapped around the V-shaped groove 40 in the rim of the tension disk 100 while its extreme other end 36 is bent into one of the slots 41 of said disk as best shown in Figure 1.

In the construction of this machine the plane of the groove 40 carried by the disk 100 is preferably located somewhat to the rear of the holding slot in the pin or post 22 so that the pull of the bight 102, as the said disk 100 turns, serves to cause said bight 102 to move toward the left as seen in Figure 4, and to thus crowd the bight 101 well into the slots of said post 22 and of

the twisting pinion 9. It results from this action that the bights 101 and 102 are automatically, firmly held in place during the twisting operation, and there is no tendency for said bights to become separated from each other, which, should it happen, would make an imperfect knot and keep the machine from functioning properly.

In the same way, the bottom of the slot 21 of the post 20 is preferably located somewhat to the rear of the bottom of the slot in the pinion 9, and therefore, as the wire 47 is anchored in the package being wired, the bight 102 of said wire tends to hold the extreme end 80 and bight 101 of said wire in said slot 21 and thus the positions of the two bights 101 and 102, in the slot of pinion 9, are still further assured.

The wire 47 and its two bights 101 and 102 being disposed as above described, the operator places his left hand upon the left hand portion of the machine, as seen in Figure 1, in order to steady the same, and the extreme end 36 of the bight 102 having been disposed of as illustrated, his right hand remains free to operate the lever 30.

This he does until the clutch face of the disk 100 slips past the clutch face of the ratchet disk 33, whereupon the wire will be tensioned to a degree corresponding to the tightness with which the nut 39 has been set up. The left hand is now placed on the L-shaped lever 55 which is depressed, and which rests above the stud 56, whereupon its angularly disposed member 57 will withdraw the end 51 of the pinion 58 from the hole 62 in the intermediate gear 7, thereby permitting the rotation of the gear train.

The crank 4 is now rotated and this, through the shaft 3, the pinion 5 and the gear 7, will cause the rotation of the wire twisting pinion 9 in the well known manner. The gears 57 and 9 may be so proportioned that a certain predetermined number of revolutions of the crank 4 will be required to produce the desired number of twists in the bights 101 and 102, which proportions of course, may be varied within a wide limit to meet different conditions. As soon as the rotation of the crank 4 is begun the L-shaped lever 55 may be released whereupon under the influence of its spring 66, it will attempt to return to the position shown in Figure 1. The hole 62 in the gear 7, however, will move out of alinement with the pin 58, and the inner face of said pin will therefore contact with the outer face of said gear until the twisting cycle is completed whereupon the hole 62 will again register with the pin 58 which latter, under the influence of spring 66, above mentioned, will enter the hole 62 and stop the rotation of the wire twisting mechanism at a predetermined point. This point will, of course, be so chosen that the slots 14, 15, and 16 will always register with the slots 17 and 18 of the stationary framework so that the twisted wire may be readily withdrawn from the mechanism.

It will now be clear that the amount of tension imparted to the wire may be readily controlled by merely adjusting the nut 39 on the stud 31, thereby increasing or decreasing the friction between the clutch members 34 and 35. Should the lever 30 be operated after the tension on the wire is sufficient to overcome the friction between these members, the clutch will merely slip, the ratchet wheel 33 running free on the pin 31.

As above stated, it is frequently found difficult to withdraw the twisted wire from the twisting mechanism, but with the present invention, this may be readily accomplished by merely pressing upon the bifurcated lever 70, whereupon the lower extremities 72 and 73 thereof will be moved toward the right, as seen in Figure 2, thereby forcing the twisted bights of the wire 47 out of the slots 14, 15, 16, 17 and 18 as will be readily apparent.

It might be stated in this connection that at a predetermined point just before the end of the twisting operation, the cutting mechanism, here illustrated as an oscillating sleeve 24, will be actuated as for example by the pin 28 striking against the end of the finger 26 and moving the same in the manner disclosed in our said copending application #391678, whereupon the one bight 102 of the wire only will be severed in the usual manner, thereby permitting the ready removal of the wire from the twisting pinion.

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, we do not wish to be limited to the above disclosure except as may be required by the claims.

What we claim is:

1. In a wire tying machine the combination of means comprising a rotating member for exerting a tension on the wire; means for twisting said wire while under tension; and pivoted means adapted to positively disengage the twisted wire from said twisting means upon the completion of the twisting operation, substantially as described.

2. In a wire tying machine the combination of means comprising a rotating member for exerting a tension on the wire; means for twisting said wire while under tension; means adapted to sever said wire; and pivoted means adapted to positively disengage the twisted wire from said twisting means upon the completion of the twisting operation, substantially as described.

3. In a wire tying machine the combination of means adapted to exert a tension on the wire; means adapted to twist said

wire while under tension; automatic means adapted to sever a bight of said wire; and pivoted manually operated means adapted to positively disengage the twisted wire from said twisting means upon the completion of the twisting operation, substantially as described.

4. In a wire tying machine the combination of a frame provided with a plurality of wire receiving slots; rotatable slotted means carried by said frame adapted to twist the wire; means comprising a reciprocating member adapted to insure the alinement of the slots of said twisting means with the slots of said frame at the completion of the twisting operation; and pivoted means adapted to positively disengage the twisted wire from all of said slots, substantially as described.

5. In a wire tying machine the combination of a frame provided with a plurality of wire receiving slots; friction means adapted to exert a predetermined tension on the wire; rotatable slotted means carried by said frame adapted to twist the wire; means adapted to insure the alinement of the slots of said twisting means with the slots of said frame at the completion of the twisting operation; and means adapted to positively disengage the twisted wire from all of said slots, substantially as described.

6. In a wire tying machine the combination of a frame provided with a plurality of wire receiving slots; friction means adapted to exert a predetermined tension on the wire; rotatable slotted means carried by said frame adapted to twist the wire; means adapted to insure the alinement of the slots of said twisting means with the slots of said frame at the completion of the twisting operation; automatic means adapted to sever the wire; and means adapted to positively disengage the twisted wire from all of said slots, substantially as described.

7. In a wire tying machine the combination of a frame; means carried by said frame adapted to receive and hold one end of a wire; rotatable twisting means carried by said frame provided with a recess adapted to receive a plurality of bights of said wire; a ratchet wheel provided with a clutch member, pivotally mounted on said frame; a companion clutch member associated with said first clutch member; means adapted to control the frictional engagement of said clutch members; and means to rotate said ratchet wheel, substantially as described.

8. In a wire tying machine the combination of a frame; means carried by said frame adapted to receive and hold one end of a wire; rotatable means carried by said frame adapted to twist said wire; means for rotating said twisting means; a ratchet wheel provided with a clutch member pivotally mounted on said frame; and a disk provided with a companion clutch member and with wire holding means associated with said ratchet wheel; substantially as described.

9. In a wire tying machine the combination of a slotted frame; means carried by said frame adapted to receive and hold one end of a wire; rotatable slotted means carried by said frame adapted to receive and twist together two bights of said wire; means for rotating said twisting means; means adapted to insure the alinement of the slots of said twisting means with the slots of said frame at the completion of the twisting operation; a ratchet wheel provided with a clutch member pivotally mounted on said frame; a disk provided with a companion clutch member and with means for tensioning one of said bights before the twisting operation, said last named means being so disposed as to cause said tensioned bight to hold the other bight in said rotatable slotted means; and means to rotate said ratchet wheel, substantially as described.

10. In a wire tying machine the combination of a slotted frame; means carried by said frame adapted to receive and hold one end of a wire; rotatable slotted means carried by said frame adapted to twist together two bights of said wire; means for rotating said twisting means; a ratchet wheel provided with a clutch member, pivotally mounted on said frame; a disk provided with a companion clutch member adapted to tension one of said bights and to cause the tensioned bight to hold the other bight in said twisting means; automatic means adapted to sever one bight of the wire; and means adapted to positively disengage the twisted wire from the twisting means, substantially as described.

11. In a wire tying machine the combination of a wire holding means; a wire twisting means; and a tensioning means comprising a pair of friction clutch members, substantially as described.

12. In a wire tying machine the combination of a wire twisting means and a tensioning means comprising a driven ratchet; means to operate said ratchet and a pair of friction clutch members driven by said ratchet, substantially as described.

13. In a wire tying machine the combination of a wire holding means; a twisting means adapted to twist two bights of a wire together; friction means comprising a clutch to put one of said bights under tension; and means to operate said clutch, substantially as described.

14. In a wire tying machine the combination of a twisting means adapted to twist two bights of a wire together; means comprising a friction clutch to put one of said

bights under tension and to hold the other bight in said twisting means; and means comprising a pawl and ratchet to operate said clutch, substantially as described.

15. In a wire tying machine the combination of means adapted to hold two bights of a wire in parallel relation to each other; friction means to automatically tension one of said bights while so held; means to regulate the tension to be applied to said last named bight; and means to twist together said bights while so held, substantially as described.

16. In a wire tying machine the combination of means adapted to hold two bights of a wire in parallel relation; means to twist said bights together while so held; and pivoted means to forcibly remove the twisted bights from the machine, substantially as described.

17. In a wire tying machine the combination of means adapted to hold two bights of a wire in parallel relation; friction means to automatically tension one of said bights to a predetermined degree while so held; means to twist said bights together after the tensioning operation and while so held; and means to forcibly remove the twisted bights from the machine, substantially as described.

In testimony whereof we affix our signatures.

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