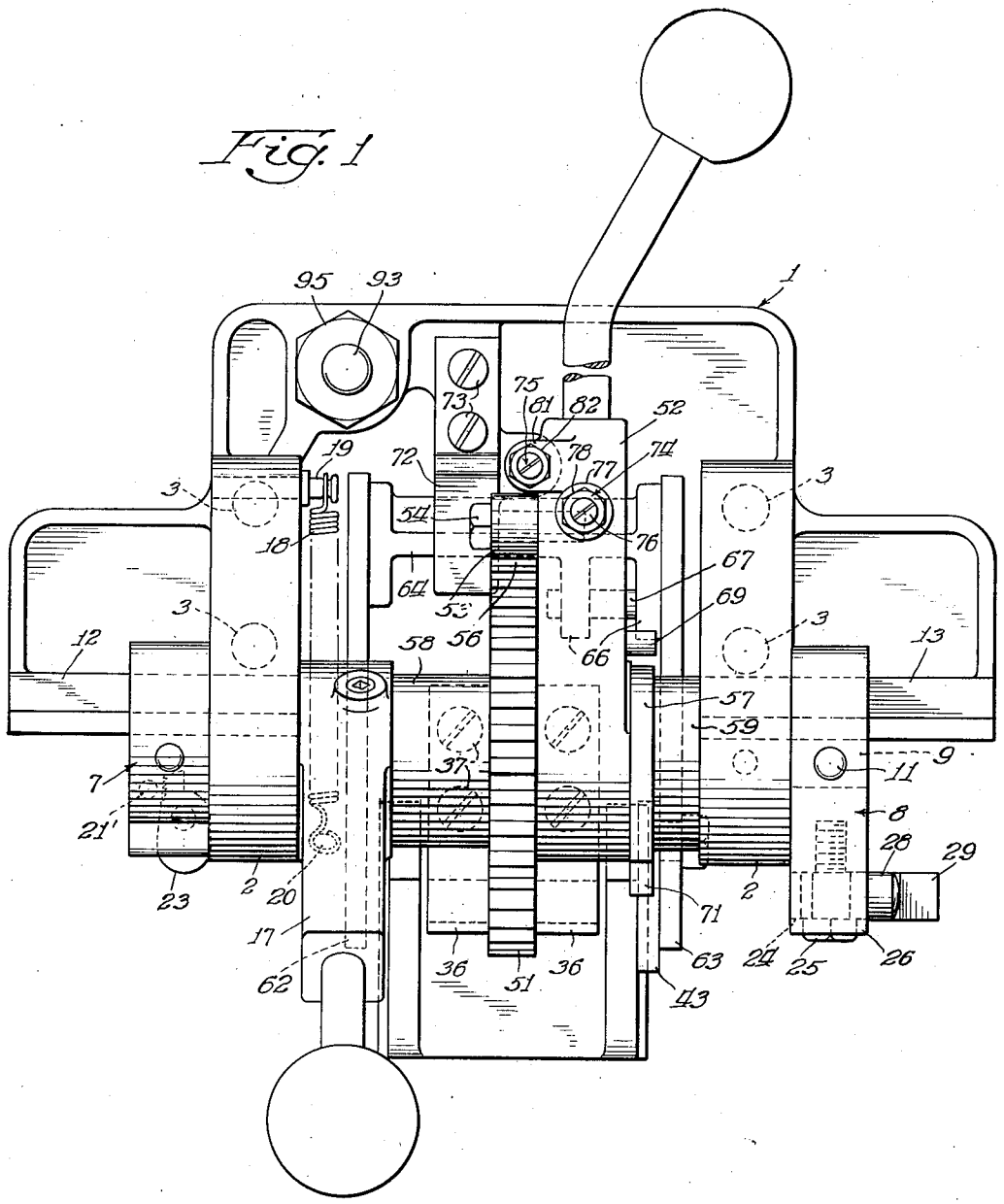
July 1, 1941. J. M. GERRARD 2,247,776

WIRE TWISTING DEVICE

Filed Dec. 14, 1940 4 Sheets-Sheet 1

Fig. 1



Witness:
V. Sigander

Inventor:
John M. Gerrard
By: Lee & Lee
Attys.

July 1, 1941. J. M. GERRARD 2,247,776

WIRE TWISTING DEVICE

Filed Dec. 14, 1940 4 Sheets-Sheet 2

Fig. 2

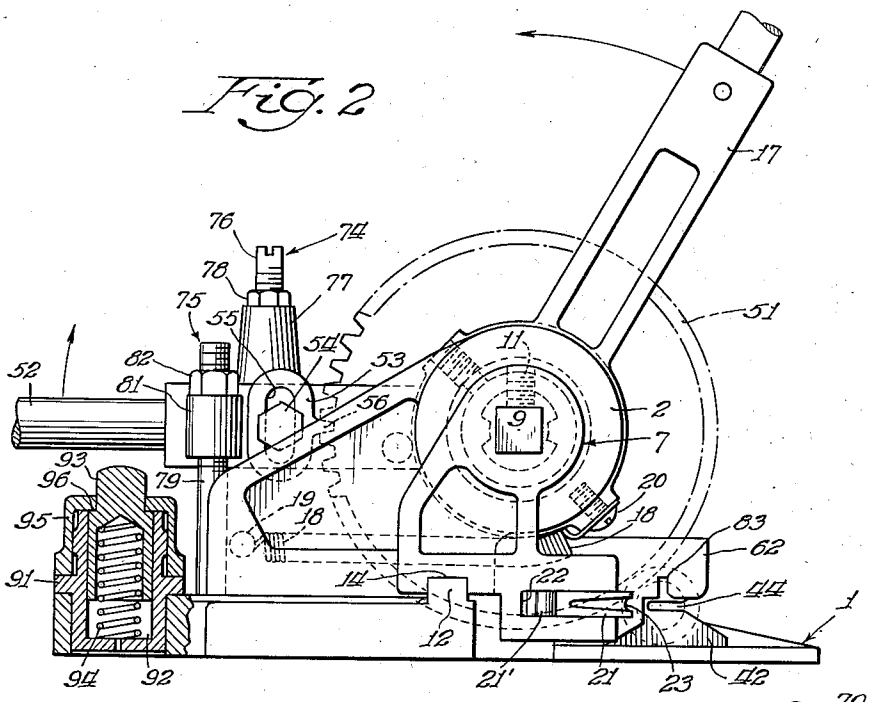


Fig. 5

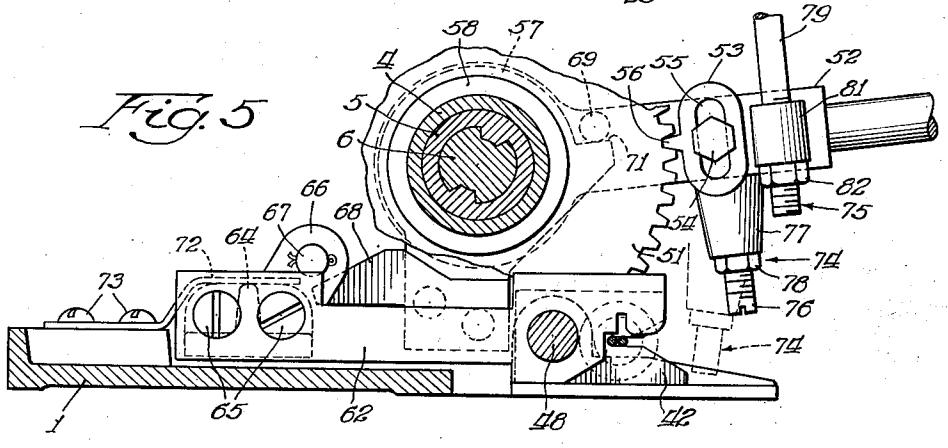
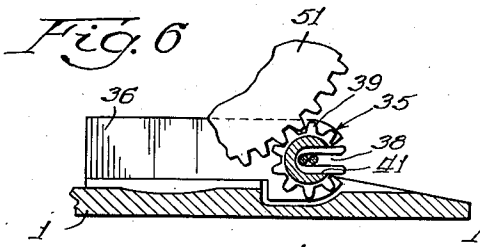


Fig. 6



Witness:
V. Silfander

Inventor:
John M. Gerrard

By: J. Lee & J. Lee Attys.

July 1, 1941. J. M. GERRARD 2,247,776

WIRE TWISTING DEVICE

Filed Dec. 14, 1940 4 Sheets-Sheet 3

Fig. 3

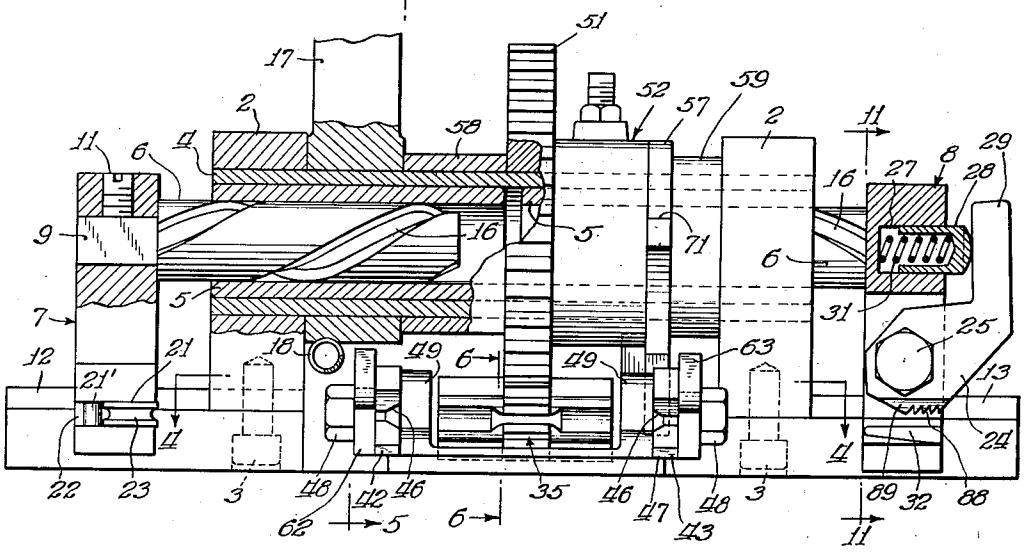
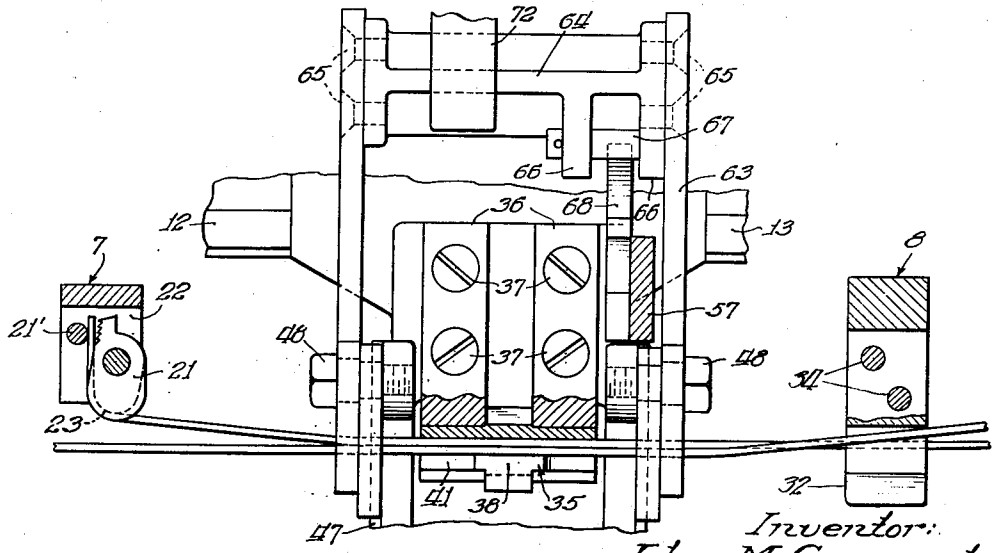


Fig. 4



Witness:
V. Sifgander

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July 1, 1941. J. M. GERRARD 2,247,776

WIRE TWISTING DEVICE

Filed Dec. 14, 1940 4 Sheets-Sheet 4

Fig. 7

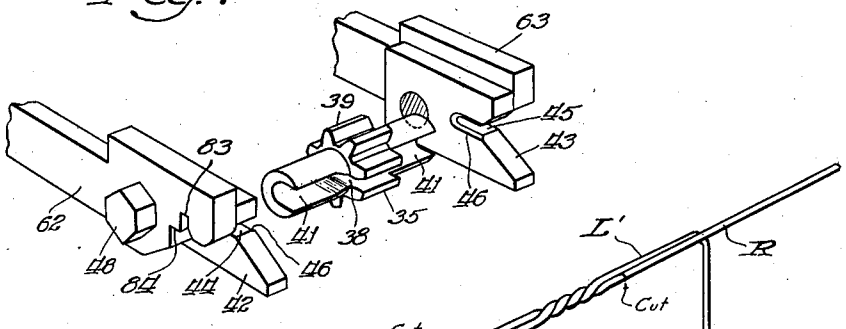


Fig. 8

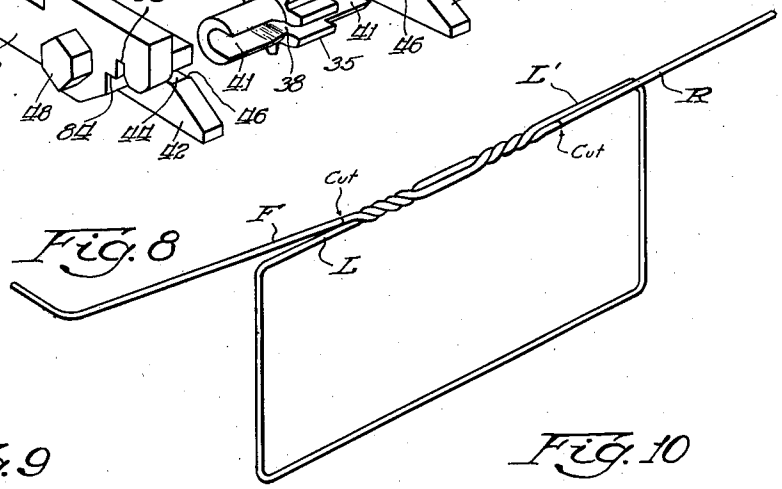


Fig. 9

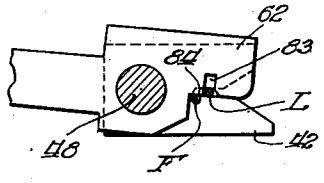


Fig. 10

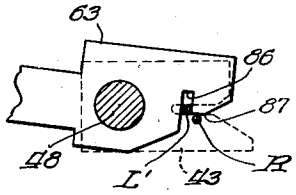


Fig. 11

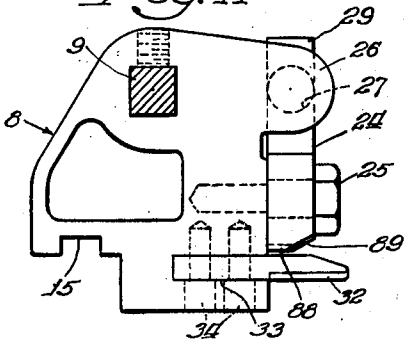
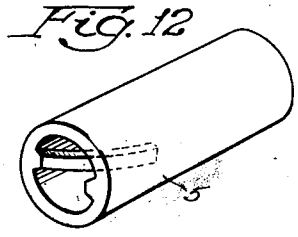


Fig. 12



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Patented July 1, 1941 2,247,776

UNITED STATES PATENT OFFICE

2,247,776

WIRE TWISTING DEVICE

John M. Gerrard, Chicago, Ill.

Application December 14, 1940, Serial No. 370,151

9 Claims. (Cl. 140—93)

The invention relates generally to a machine for securing two overlapping bights of wire, or the like, together and more particularly to a combined tensioning and wire fastening device of novel construction for use in forming bundles or packages, etc.

The invention has among its objects the production of such a device which is simple and efficient in operation and durable in construction.

A further object of the invention is the production of such a device which will efficiently tension a wire around a bundle and twist the overlapping ends together to form a splice or a knot and in the same operative give the wires an additional or overtwist, severing the ends of the wire during the overtwisting operation so that the ends of the finished splice or knot will be positioned substantially below the upper surface of the wire.

A further object of the invention is the production of such a tensioning fastening device in which the number of twists formed in the wire and the amount of overtwist may be varied to meet the particular need, the adjustments to accomplish this result being easily and quickly made.

Another object of the invention is the production of such a device which is so constructed that upon completion of the overtwisting and cutting operation the twister pinion will be automatically returned to a position permitting the easy removal of the machine from the binding result.

A further object of the invention is the production of such a device having resilient cushioning means for the tensioning lever when the tension ends of the wires have been severed.

A further object of the invention is the production of such a device having novel means for holding one end of the wire during the tensioning operation, whereby the wire may be easily and quickly inserted therein.

Many other objects and advantages in the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawings wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a top plan view of a machine embodying the present invention;

Fig. 2 is a side elevational view of the same with the tension lever cushioning means shown in sections;

Fig. 3 is a front elevational view of the machine with a portion thereof broken away to illustrate details of the tensioning mechanism;

Fig. 4 is a plan view of the cutting mechanism with the twister pinion construction shown in section;

Fig. 5 is a sectional view taken substantially on the line 5—5 of Fig. 3;

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

Fig. 7 is a perspective view of the twisting pinion and cutter members showing the relationship between the parts;

Fig. 8 is a perspective view illustrating the manner in which the ends of the wire are twisted together and severed;

Fig. 9 is a side elevational view of the left-hand cutter assembly illustrated in Fig. 7;

Fig. 10 is a similar side elevational view of the right-hand cutter bar with the slotted wire holding yoke or member shown in dotted lines;

Fig. 11 is a sectional view taken substantially on the line 11—11 of Fig. 3 showing the details of the right-hand gripper assembly; and

Fig. 12 is a perspective view of the left-hand spiral nut for actuating the tension screw.

As illustrated in the drawings, the device comprises a base designated generally by the numeral 1 having a pair of spaced bearing supports 2 extending upwardly therefrom, the latter in the present instance being rigidly secured to the base 1 by suitable bolts 3. The bearing supports 2, however, could be secured to the base in any suitable manner, or if desired could be integrally formed therewith. Journaled in the bearing supports is a tubular sleeve 4, and positioned in the same at opposite ends thereof, and rigidly carried thereby are a pair of spiral nuts 5, the latter, as illustrated being firmly secured to the sleeve by means of a press fit. Threaded into the respective nuts 5 are spiral tension screws 6, the latter being secured at their outer ends to wire gripper assemblies comprising movable members designated generally by the numerals 7 and 8, respectively, the screws 6 in the present instance each being provided with a square shank 9 positioned in a corresponding hole in the respective members 7 and 8, the screws and members being locked to one another by any suitable means such as set screws 11. The members 7 and 8 ride on rails 12 and 13, respectively, integrally formed in the present instance with the base 1, the member 7 being formed with a channel 14 of a size to receive the rail 12 and the member 8 with a corresponding channel 15, as clearly illustrated in Fig. 11. One of the screws 6 is provided with right-handed grooves 16 and the other screw with left-handed grooves, so that rotation of the sleeve 4 and nuts 5 will cause the screws 6 and members 7 and 8 to travel in opposite directions along the rails 12 and 13, respectively. Secured to the sleeve 4 by any suitable means is an operating lever or handle 17 positioned adjacent the left-

hand bearing member 2. Thus, when the lever 17 is moved from a more or less vertical position, as shown in Fig. 2, towards the rear of the machine in the direction of the arrow, the members 7 and 8 will move outwardly in opposite directions and when the handle is returned to its original position the members 7 and 8 will be drawn towards the bearing members 2. A coil spring 18 secured at one end to the anchor pin 19 and at the opposite end by screw 20 to the lever 17, is operated to return the lever to the position illustrated in Fig. 2.

This general construction is similar to that described in the Bruninghaus Patent No. 1,963,691, dated June 19, 1934.

Pivotally carried by the left-hand member 7 is a dog 21 adapted to grip an end of the wire between the toothed portion of the dog and a pin 21', the dog and pin in the present instance being positioned in a slot 22 in the member 7. The dog 21 as illustrated in Figs. 2, 3 and 4, is provided with a suitable groove 23 which is of a size to receive the wire. The member 8 is, likewise, provided with a dog 24, pivotally secured to the member by a bolt 25. As illustrated in Figs. 3 and 11, the member 8 is provided with an upwardly extending portion 26 having a bore 27 therein, of a size to receive a plunger 28, the outer end of which is engageable with the upwardly extending projection 29 of the dog. A spring 31 urges the plunger 28 into engagement with the arm 29 of the dog, thus, tending to rotate the latter in a clockwise direction about the bolt 25. Extending outwardly directly below the dog 24 is a plate 32 cooperable with the dog to grip the wire therebetween, the plate 32, in the present instance, being formed separately from the member 8 and positioned in a slot 33 formed in the member, bolts 34 firmly securing the plate to the member. Positioned intermediate the members 7 and 8 is a twister pinion 35, the latter being journaled in blocks 36 secured to the base 1 by screws 37. The pinion 35 is provided with a slot 38 of slightly larger width than the diameter of the wire to be twisted, the slot 38 enlarging on each side of the toothed portion 39, as shown at 41. Positioned on opposite sides of the blocks 36 in alignment with the axis of the pinion 35 are slotted wire holding yokes or members 42 and 43, respectively, the slots 44 and 45 being of slightly larger width than the wire to be twisted. As illustrated in Figs. 3 and 7, it will be noted that the opposed edges of the slots 44 and 45 are beveled as shown at 46, the outer edges being square. The yokes 42 and 43 seat on shoulders 47 formed on the base 1 and are rigidly secured thereto by bolts 48 which also form bearings for the cutter bars as will hereinafter be described, the ends of the bolts 48 passing into lugs 49 formed on the base.

In operation the two wires to be twisted together are positioned in the slots 44 and 45 of the yokes 42 and 43 and through the slot 38 in the twister pinion 35. The slots 44 and 45 hold the wires in position while the portions intermediate the yokes are being twisted by the pinion 35 to form a splice or knot as illustrated in Fig. 8.

Freely carried on the sleeve 4 is a driving gear 51, the latter being meshed with the pinion 35 to drive the same. Also, carried by the sleeve 4 is an operating lever or handle designated generally by the numeral 52, this lever like the gear 51 being freely rotatable on the sleeve. The gear 51 and lever 52 are operatively connected to one another by a locking member 53 carried by the handle 52 and secured thereto by a bolt 54 passing through an elongated slot 55 in the locking member. Extending from the latter is a tooth 56 engageable with the teeth on the driving gear 51 whereby the gear and the lever are efficiently locked together. Thus, movement of the lever about the sleeve 4 will rotate the gear 51 which in turn will drive the twister pinion 35. Also, rotatably carried by the sleeve 4 is a cutter actuating cam member 57 positioned adjacent the right-hand side of the twisting lever 52. Spacer collars 58 and 59, respectively, prevent movement of the gear 51, lever 52, and cam 57 longitudinally along the sleeve 4.

Pivotally carried by the bolts 48 are cutter bars 62 and 63 positioned adjacent the slotted wire holding yokes 42 and 43, respectively. The bars 62 and 63 extend rearwardly beyond the blocks 36 and are rigidly connected to one another by the cross-member 64, the latter being secured to the respective cutting bars by screws 65. Extending upwardly and forwardly from the cross-member 64, as clearly shown in Figs. 4 and 5, are a pair of spaced ears 66 which carry a pin 67 therebetween. The cutter operating cam 57 is provided with a rearwardly extending projection having a cam edge 68 engageable with the pin 67 when the member 57 is rotated on the sleeve 4. Rotation of the member 57 is accomplished by means of the twisting lever 52 which is provided with a laterally extending pin 69 engageable with the lug 71 of the cam member 57, as illustrated in Fig. 5. Thus, continued downward movement of the handle 52 from the position shown in Fig. 5 will rotate the cam member 57 with the handle due to the engagement of the pin 69 with the lug 71. Rotation of the member 57 will cause engagement of the cam edge thereof with the pin 67, raising the latter to rotate the cutter bars about the bolts 48 and actuate the cutters. A flat spring 72 is secured at one end to the base 1 by screws 73, the free end of the spring engaging the spacer member 64 to normally maintain the cutter assembly in the position illustrated in Fig. 5. The spring 72 acting through the cutter assembly will also cause the cutter operating member 57 to assume its normal position, thereby bringing the handle 52, driving gear 51 and twister pinion 35 into the position illustrated in Fig. 5.

The handle 52 is also provided with a pair of stop members, designated generally by the numerals 74 and 75, respectively. The stop 74, in the present instance, is in the form of a stud 76 threaded into the projection 77 of the handle and locked in place by the lock nut 78. The stop 74 is engageable with the base 1, as shown in dotted lines in Fig. 5, to limit the movement of the twisting lever 52, while the stop 75, comprising the stud 79 threaded into a lateral projecting portion 81 of the lever 52 and locked in place by the lock nut 82, engageable with the base 1, as shown in Fig. 2, to limit the return movement of the lever 52 and by means of which the initial or starting position of the lever may be adjusted and controlled. When an adjustment of the member 53 has been made to change the number of twists made in the wire, the stop 75 provides a means of adjusting the initial position of the handle 52 to bring the twister pinion to an open position when the handle is in such initial position.

As previously mentioned the two wires to be twisted together are positioned side by side in the slots 44 and 45 of the members 42 and 43, respectively, and the slot 38 of the twister pinion 35. As noted in Figs. 4 and 8 the free end F of the wire is positioned adjacent the closed end of the slot 44, while the corresponding free end R at the opposite side of the splice or knot is positioned adjacent the open end of the slot 45 with the adjacent loop portions L and L' of the wire being at the open and closed ends of the slots 44 and 45, respectively. As shown in Fig. 9 cutter bar 62 is provided with a slot 83 of a size to receive the loop portion L of the wire so that the cutter bar will not sever the same. The latter is also provided with a shearing edge 84 positioned to engage the end F of the wire and cooperate with the adjacent edge of the slot 44 to sever the free end F of the wire closely adjacent to the knot or splice as clearly shown in Fig. 8. It will be noted that the cutter bar 62 is provided with a beveled edge 85 adjacent the portion L of the wire, operable to guide the wire into the slot 83 should the wire not be properly aligned therewith.

As shown in Fig. 10 the cutter bar 63 is provided with a slot 86 adapted to receive the opposite side L' of the looped portion of the wire and also provided with a shearing edge 87 cooperable with the adjacent edge of the slot 45 to sever the other free end R of the wire. Thus, the cutter bars 62 and 63 will sever the ends of the wire without affecting the looped portion thereof.

The operation of the device is as follows:

The machine is placed upon the bundle to be tied and the free end of the wire, which may be drawn from a roll or the like, is secured to the gripper 7 by inserting the end of the wire between the pin 21' and the teeth of the dog 21, as clearly shown in Fig. 4. The wire is then positioned in the slots 44, 38, and 45 passing below the plate 32, as shown in Fig. 4, around the bundle after which it is again inserted in the slots 44, 38 and 45, and then engaged between the dog 24 and plate 32. It will be noted from reference to Fig. 11 that the outer edge of the dog 24 adjacent the teeth 88 thereon is chamfered, as shown at 89, so that the end R of the wire may be readily engaged with the dog without manually actuating the latter, the wire merely being positioned adjacent the chamfered edge 89 of the dog and pulled laterally in the direction of the dog so that the wire will engage the chamfered edge 89, raising the dog and permitting the wire to engage the teeth 88. The tensioning lever 17 is then rotated from its position illustrated in Fig. 2, in the direction of the arrow, rotating the sleeve 4 and spiral nuts 5 therewith, and causing the screws 6 to move outwardly carrying with them the gripping members 7 and 8, to tension the wire around the bundle. When the wire has been sufficiently tensioned the handle 17 is held in position and the twisting lever 52 rotated from its initial position, shown in Fig. 2, in the direction of the arrow to the position shown in Fig. 5, thereby rotating the driving gear 51 and twister pinion 35 thus twisting the two bights together. Continued movement of the lever 52 will then cause engagement of the pin 69 on the lever and the lug 71 on the cam member 57 and thus begin to operate the cutter bars as has been previously described. Simultaneously therewith the driving gear 51 will continue to rotate the twister pinion 35 to give the wire an additional or overtwist, the stop 74 limiting the movement of the lever 52 to permit only a given amount of overtwist and it will be apparent that by adjusting the stop 74, the final position of the lever 52 may be controlled. Upon releasing the twisting lever 52 subsequent to the completion of the cutting and twisting operation, the spring 72 will return the cutters and lever 52 to position illustrated in Fig. 5, in which position the twister pinion slot 38 is in aligned position with the slots 44 and 45 to permit removal of the binding result from the machine.

The application of the overtwist to the wire relieves the tension that would otherwise be present in the knot, due to the resiliency of the wire which would cause the completed splice to turn and engage the side walls of the slot 38 in the twister pinion, preventing easy removal of the machine from the completed binding result. However, by applying a sufficient overtwist to the same such action is prevented so that upon return of the lever 52 to its releasing position illustrated in Fig. 5, the machine may be readily removed from the binding result without any tendency to stick or bind. Likewise, by cutting the wires during the overtwisting operation the ends of the wire are positioned below the top surface of the wire.

As the tensioning lever 17 has been manually held in position to maintain the wires in tensioned relationship during the twisting operation there is a tendency for the lever 17 to move rearwardly as soon as the tensioned ends of the wire have been severed, due to the applied force on the lever 17 and the release of the tension thereon. To cushion this movement of the lever 17 a resilient bumper is provided, comprising a substantially cylindrical housing member 91 threaded into the base 1 and provided with a bore 92. Slidable in the bore is a plunger 93 which is urged upwardly by a spring 94. A threaded cap 95 completes the structure, the plunger 93 having an annular shoulder 96 engageable with the cap 95, whereby the plunger is retained in the housing. As shown in Fig. 1, the plunger is positioned in the path of the lever 17 so that it will be engaged by the latter at the end of its rearward travel, thus, cushioning the same and preventing the lever from striking the base.

It will be noted that the relationship of the lever 52 with the driving gear 51 and pinion 35 may be varied by sliding the gear locking member along the slot 55 to vary the position of the tooth 56 with respect thereto, and likewise, the stop 75 may be adjusted to shorten or lengthen the travel of the arm 52. By means of such adjustments the movement of the twister pinion and the amount of twist put in the wires may be varied to fit the actual requirements. Similarly by adjusting the stop 74, the amount of overtwist applied to the wire may be controlled for different types of wire etc.

It will be apparent from the above description that I have provided a machine of the kind described which is very flexible and efficient in operation, in which an overtwist is applied to the wire and the free ends of the same severed in one continuous operation. Also, that I have provided a novel cutting assembly which will sever both ends of the wire closely adjacent to the knot or splice providing a finished binding result that is strong and durable.

Having thus described my invention, it is obvious that various immaterial modifications may

be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a wire tying machine, the combination of a pair of spring returnable selective tensioning members movable in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights of wire, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, and a straddle cutter operable at the completion of the twisting operation to cut the tensioned ends of the wire and permit the machine to be released from its binding result.

2. In a wire tying machine, the combination of a base member, a pair of spring returnable manually selective tensioning members carried by the base member and movable in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a U-shaped cutter member pivotally carried by the base member and operable to simultaneously cut the tensioned ends of the wire, a lever for actuating said twister pinion and means operatively connecting said lever and cutter for actuating the latter.

3. In a wire tying machine, the combination of a pair of spring returnable manually selective tensioning members movable in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a U-shaped cutter member having a pair of spaced shearing edges positioned at opposite sides of said twisting pinion, a member positioned adjacent each cutting edge and cooperable therewith for cutting the tensioned ends of the wire, one of said cutting edges having a notch formed therein to receive the adjacent bight of wire to prevent severance of the same, the other cutting edge having a similar notch formed therein to receive the other bight of wire, whereby said cutter is operable to sever only the tensioned ends of the wire.

4. In a wire tying machine, the combination of a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a U-shaped cutter member having a pair of spaced shearing edges positioned at opposite sides of said twisting pinion, a member positioned adjacent each cutting edge and cooperable therewith for cutting the tensioned ends of the wire, one of said cutting edges having a notch formed therein to receive the adjacent bight of wire to prevent severance of the same, one of the walls of said notch being chamfered to divert the bight into the notch, the other cutting edge having a similar notch formed therein to receive the other bight of wire, whereby said cutter is operable to sever only the tensioned ends of the wire.

5. In a wire tying machine, the combination of a slotted wire twisting pinion for twisting a pair of overlapping bights of wire together, a toothed driving member engageable with said pinion, a lever for actuating said member, a lug carried by said lever engageable with the teeth on said member by means of which said member and lever may be secured in a plurality of positions relative one another, and means for varying the initial position of said lever to compensate for changes between said lever and driving member and align the twister slot in open position at the initial position of the lever.

6. In a wire tying machine, the combination of a pair of spring returnable selective tensioning members movable in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights of wire, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a toothed driving member engageable with said pinion, a lever operatively connected to said driving member for actuating the same, and an adjustable stop carried by said lever engageable with a portion of the machine to limit the travel of said lever, and define the point at which the twisting operation shall cease.

7. In a wire tying machine, the combination of a slotted wire twisting pinion for twisting a pair of overlapping bights of wire together, a toothed driving member engageable with said pinion, a lever for actuating said member, means for connecting said member and lever in a plurality of positions relative one another, and an adjustable stop for varying the initial position of the member to align the twister slot in open position.

8. In a wire tying machine, the combination of a pair of spring returnable selective tensioning members movable in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights of wire, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a toothed driving member engageable with said pinion, a lever operatively connected to said driving member for actuating the same, and cooperating means on said lever and member for selectively varying the relationship therebetween to increase or reduce the number of twists made in said bights by the twister pinion.

9. In a wire tying machine, the combination of a pair of spring returnable selective tensioning members movable relative one another in opposite directions, means on the respective members for holding the respective ends of a pair of overlapping bights of wire, a slotted wire twisting pinion for twisting said overlapping bights of wire together while under tension, a toothed driving member engageable with said pinion, a lever operatively connected to said driving member for actuating the same, and rotating said pinion, the slot in the latter being in open position at the beginning and end of its main twisting operation for the insertion of the wire therein and withdrawal therefrom, continued movement of said lever after completion of the twisting operation operative to rotate said pinion and provide an overtwist, cutting means at opposite sides of said pinion actuated by such continued movement of said lever for severing the tensioned ends of the wire, and resilient means for returning said pinion subsequent to the overtwisting, to its open position at the end of the main twisting operation.

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