

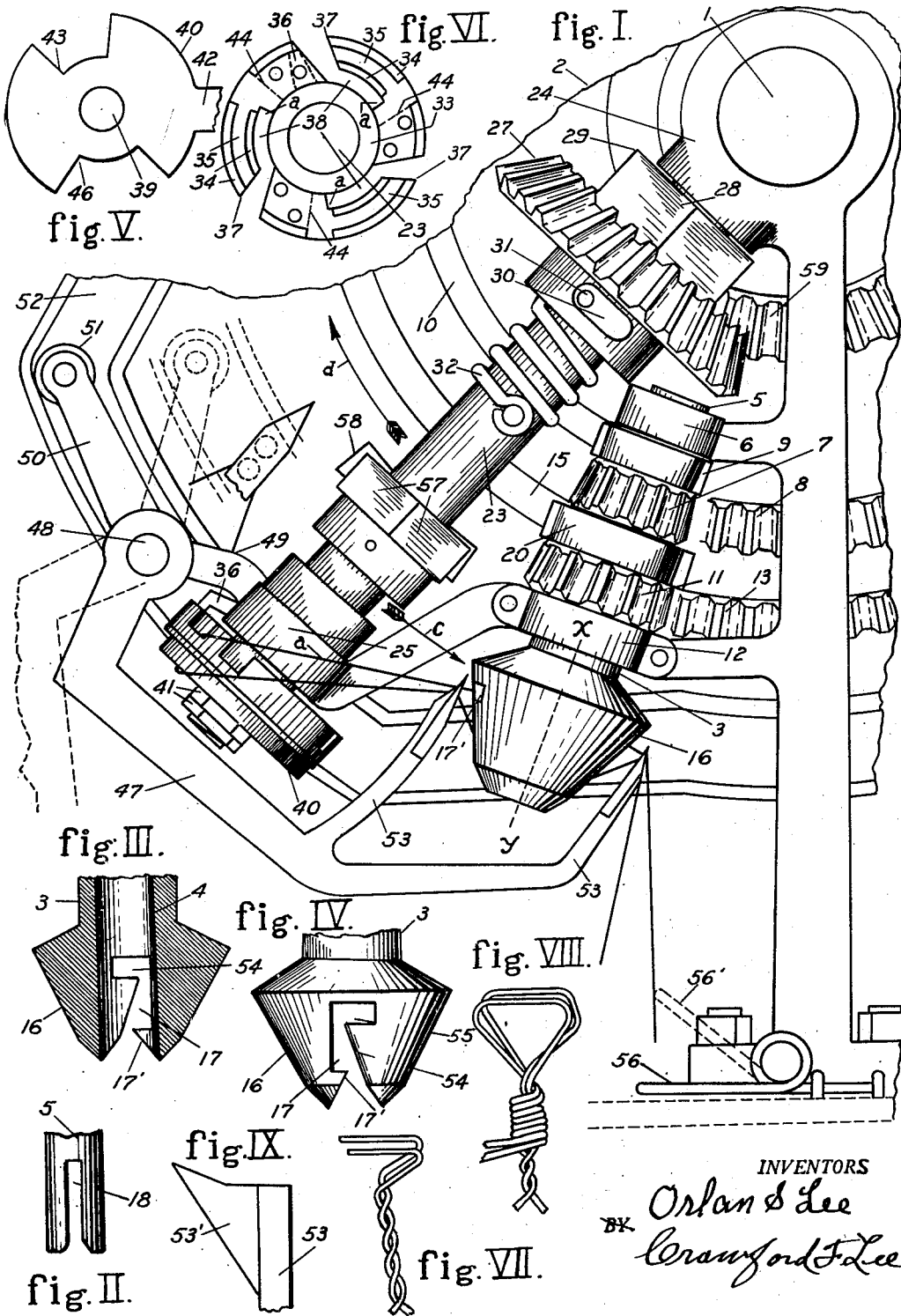
Dec. 27, 1949

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2,492,228

WIRE TYING DEVICE

Filed April 18, 1946



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UNITED STATES PATENT OFFICE

2,492,228

WIRE TYING DEVICE

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Application April 18, 1946, Serial No. 663,093

5 Claims. (Cl. 140-149)

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The object is to provide means to automatically tie wires around bales.

The invention is illustrated in the accompanying drawing for which Fig. 1 is a side view showing a section of a cam wheel. Fig. 2 is a view of the lower end of a shaft showing a transverse slot. Fig. 3 is a sectional view of half of a cone, looking in direction of arrow c. The sectional view is cut on the line x-y of Fig. 1. Fig. 4 is a view of the other half of the cone. Fig. 5 is a top view of a stationary disc. Fig. 6 is a top view of a cutter and retainer disc. Fig. 7 shows a twisted portion of the wires. Fig. 8 shows a twisted portion, a looped portion and the ends of the wires wound around the twisted portion. Fig. 9 shows the angle of an arm to force the wires into the slots of the twisting members.

Two or more of the devices acting in conjunction are employed in the operation of baling. The shaft 1 is journaled transversely above the bale-chamber. The cam-wheel 2 is secured to the shaft 1, one revolution of which completes the tie. The shaft 3, Fig. 3, has a central longitudinal bore 4 in which is journaled the shaft 5. The upper end of the shaft 5 is journaled in the box 6. The gear 7 is secured to the shaft 5 and is designed to be operated by the segment of gear 8 on the cam-wheel 2. A cam-shoe 9 engages a cam 10 on the cam-wheel 2 which serves to retain the shaft stationary except when the revolution of the cam-wheel 2 causes the gear 8 to engage gear 7. The cam 10 is cut away to allow the shaft 5 to be revolved. The shaft 3 is journaled in the box 12 and on the shaft 5 and has integral therewith the gear 11 which is designed to be engaged by the segment of gear 13. The cam-shoe 20 on the shaft 3 engages the cam 15 to retain the shaft stationary until the gear 13 engages the gear 11. The cam 15 is cut away to allow the shaft 3 to be revolved. The lower end of shaft 3 is enlarged and is cone-shaped 16, Figs. 1, 3 and 4 for purposes later explained. A transverse slot 17 is provided and two diametrically opposite shoulders 17'-17' which encircle the end of shaft 5 and are designed to be moved across the end of slot 18 of the shaft 5. The ends of the slots 17 and 18 register even with the slots in alignment so that a wire may pass into the slot 18. When the two ends of the wire from around the bale are brought to within the slots 17 and 18 the tying begins. The cam-wheel is driven one revolution in direction of arrow d, Fig. 1, which causes the gear segments 13 and 8 to engage the gears 11 and 7 respectively. The gear segment 13 of

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the cam-wheel engages the gear 11 a predetermined distance in advance of gear segment 8 engaging gear 7 which causes the shoulders 17'-17' to close the end of slot 18, Figs. 1, 2, 3, and 4, and thereby retain the wires within the slot 18. Continued revolution of the cam-wheel twists the wires below the cone-shaped portion 16 forms a loop of the portions within the slot 18 and winds the ends of the wires around the twisted portion Figs. 7 and 8. The gears 11 and 13 disengage. The cam 15 engages the cam-shoe 20 which stops the rotation of shaft 3. Following this action the gear 7 disengages gear 8. The cam 10 engages the cam-shoe 9 which stops the rotation of shaft 5. The slots 17 and 18 are now again in alignment. The shafts 3 and 5 revolve the same number of revolutions in the same length of time but the shaft 3 begins its revolutions in advance of shaft 5 so as to close the opening into the slot 18 and it completes its revolutions in advance so as to leave the slots 17 and 18 in alignment to allow the looped portion to pass out of the slots. The object of the cone-shaped portion is that as the shafts 3 and 5 revolve the wires will slip downward and form the twist below the cone-shaped portion. Means are provided to bring the wires into the slots 17 and 18 and retain them there until the beginning of the operation of the device, comprising a wire carrying needle 20, Fig. 1, and a retainer assembly, comprising a shaft 23 journaled in the boxes 24-25. The shaft 23 has mounted thereon the gear 27. One end of the hub 28 is triangular. Each of its faces forms a cam-shoe, each of which is adapted to be successively engaged by the cam 29 of the cam-wheel. The gear 27 makes one third revolution to one of the cam-wheel. The other end of the hub of the gear 27 has a slot 30. A pin 31 passes through the slot and into the shaft 23 so that the shaft may be revolved ahead of the gear 27. A spring 32 normally retains the parts in position shown in Fig. 1. A disc 33 is secured to the shaft 23 and has erected from its upper face sections of two parallel annular flanges 34, Figs. 1-6, which form grooves 35 between them. An arm 36 extends radially from the box 25, Fig. 1, and in dotted line Fig. 6. The outer end of the arm extends downward into the groove 35. Three hook portions 37-37-37 and three channels 38-38-38 are formed by cutting away portions from the body of the disc. The diameter of the shaft 23 is reduced at its lower end and passes through the central bore 39 of the disc 40. It is contiguous

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to the disc 33. Lock-nuts 41—41 on the shaft 23 serve to retain the discs 33 and 40 in adjustment. Disc 40 is held stationary by means of an arm 42, part of which is shown in Fig. 5. The arm extends radially and is secured to an arm from the box 25. Disc 40 has cutaway portions 46—46 and a cutting edge 43 designed to be successively engaged by the three cutting side of disc 33 and are set back a suitable distance from the ends of the channels 38—38—38, so that the wires will be caught between the discs 33 and 40 and crimped under the edge of disc 33 when the wires are severed by means of the cutting members 44 being brought into engagement with the cutting edge 43 of disc 40. As the disc 33 continues to complete its movement, the radial arm 36 will prevent the wire from being carried with the disc. The needle 80 in receding, left the wire drawn across the groove 35 and as the disc revolves, the radial arm 36 will cause the wire to be moved from across the groove 35 to off the ends of the flanges 34, 34 to where it is below the radial arm and free to be carried with the disc. The completed movement of the disc 33 leaves the end of the wire caught between the discs 33 and 40 and crimped under the edge of disc 33 and thereby retained at *a*, Figs. 1—6. It also released the wire that had been held in the retainer by the crimped end having been moved to the cutaway portion 46 of disc 40. The completion of the movements of the retainer and twisting members are simultaneous. A shaft carrying the needles 80 is journaled at the under side of the bale-chamber. Slots are provided in the press-chamber through which the needles pass to carry the wire. It is understood that a plurality of the devices, acting in unison are employed in the operation of baling. The wire is held at *a* in the retainer Figs. 1 and 6 from there across the opening into the bale-chamber and through the eye of a needle 80 to a spool of wire. To force the wire into the slots 17—18 of the twisting members, a lever 47 is provided. A shaft 48 is journaled at the outer end of an arm 49 from the box 25, Fig. 1. A lever 47 is secured to the shaft 48 and a crank-arm 50, carrying a roller 51, is secured to the inner end of the shaft 48. The roller 51 is disposed in the groove 52 of an irregular annular cam on the cam-wheel, the regularity of which is broken at two points by being farther out radially from the revolving center of the cam-wheel. When the roller 51 is in the regular portion of the groove 52, shown in dotted lines, Fig. 1, the lever 47 will be out of the way of the wire coming from the retainer to the eye of a needle. One of the two broken sections of the annular groove is not shown. It will be caused to act on the roller 51 by the revolution of the cam-wheel in direction of arrow *d* and causes the arms 53—53 to engage the wire and force it into the slots 17—18. The ends of the slots 17 and 18 are in alignment and as the wire is being forced into them it engages the angles 54—54 of the slot 17, Figs. 3 and 4. The wire through the slot 18 and in engagement with the angles 54—54 of the slot 17 will cause the shaft 5 to be revolved backward as the wire is forced upward by the action of the lever. The cam 10 is cut away to allow the shaft to be so actuated. When the wire has been so forced to above the shoulders 55—55, Figs. 3 and 4, the cam 10 en-

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gages the cam-shoe 6 which brings the shaft back to its normal position and leaves the wire caught above the shoulders 55—55 and so retained. The lever 48 is now forced back to its normal position by the action of the groove 52 on the roller 51. The wire held in the retainer at *a* passes through the slots 17 and 18 and above the shoulders 55—55 continuing downward to across the opening into the bale-chamber and through the eye of a needle to a spool of wire. As the bale forms the wire is crowded back through a slot in the bale chamber and caused to engage a spring 56 disposed in its path. The pressure on the wire produced by the formation of the bale partially overcomes the tension of the spring and brings the loose end to position shown in dotted line 56', Fig. 1. The spring normally parallels the slot in the bale-chamber. The loose end is turned across the slot so as to be engaged by the wire. The other end is secured to the bale-chamber in any suitable manner. The needle 80 brings the wire from around the bale to the channel 38 of disc 33, Fig. 6. The revolution of the cam-wheel in direction of arrow *d* causes the lever 47 to be actuated by means of the annular groove 52 acting on the roller 51 which causes the arms 53—53 on the lever 47 to force the wire into the slots 17 and 18. The wire coming from the retainer and from around the bale, when being brought back to the retainer, will engage the angle portions 53'—53' of the arms 53—53 and by the actions of the needle caused to slide on the angle portions until it is above the arms 53—53 at which time it is in position to be forced into the slots 17 and 18 by the action of the lever 47. The wire coming from the retainer is held in the slots 17 and 18 as before explained. The wire from around the bale is brought by the needle to above the arms 53—53. The action of the annular groove on the roller causes the arms 53—53 to engage the wire and force it into the slots 17 and 18 and retain it there until the revolution of shaft 3 closes the slot 18. The lever is now caused to recede by the action of the annular groove 52 on the roller 51. The same part revolution of shaft 3, above mentioned, also released the wire held above the shoulders 55—55 and left it retained in slot 18 by the shoulders 17'—17'. To prevent the pull on the wire, held in the retainer, by the formation of the bale, from revolving the disc 33, three cam-shoes 57 are provided on the shaft 23, one of which is in engagement with the cam 58 as shown Fig. 1. The cam 58 is adapted to successively engage the cam-shoes 57. One of the cam-shoes 57 engages the cam 58 until the tying operation begins. The mode of operation is as follows: The wire is held in the retainer at *a*, Figs. 1 and 4; passes through the slots 17 and 18 above the shoulders 55—55 and downward across the opening into the bale-chamber through the eye of a needle to a spool of wire. The revolution of the shaft 1 brings the needle 80 to position shown in Fig. 1, which brings the wire into one of the channels 38 of disc 33. The continued revolution of the cam-wheel by means of one of the two broken sections of the annular groove causes the arms 53—53 of the lever 47 to engage the wire and force it into the slots 17 and 18 to above the shoulders 55—55 and then recede to position shown in dotted lines, Fig. 1. Next the gear segments 13 and 59 engage the gears 11 and 27 respectively which starts the revolutions of the shafts 3 and 23. The revolution of shaft 5 next

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starts by gear segment 8 engaging gear 7. Both ends of the wire are now retained above the shoulders 17'—17'. As the delayed action of shaft 5 caused the slot 18 to be closed at its lower end and the shoulders 55—55 to be revolved from under the wire, which allows it to pass to above the shoulders 17'—17'. One of the broken sections of the annular groove now acts on the roller 51 and brings it to position shown in dotted lines, Fig. 1, which moved the lever 47 back to its normal position. Slack in the wires is required to form the tie. As the shafts 23, 3 and 5 revolve, slack in the wire held in the retainer is had by the movement of shaft 23. As the pull on the wire will overcome the tension of the spring 32, Fig. 1, and feed the wire to the twisting members as required. Slack from the wire coming from the needle is had by the action of the twisting members pulling it through the channel 38 and the eye of the needle. The wire from the twisting members to the bale is in contact with the spring 56. The slack is had by tension acting against the spring 56. The wire from around the bale to the twisting members compresses the material in the bale to provide the slack required. The continued revolution of the cam-wheel completes the movement of shaft 23. The disc 33 is now revolved to where the crimped end of the wire is moved to the cutaway portion 46, Fig. 5, of disc 40 and thereby released. The same completed revolution of disc 33 caused the wire coming from the needle to be retained at *a*, Figs. 1 and 6, and severed. The completed movements of the shafts 23 and 3 are immediately followed by the completed movement of shaft 5 which leaves the slots in alignment and allows the looped portion of the wire to pass out of the slots. The completed movement of the cam-wheel brought the needle to its normal position under the bale-chamber and left the wire held in the retainer at *a* and disposed across the opening into the bale-chamber. It also caused one of the broken sections of the annular groove to act on the roller and cause the arms 53—53 to engage the wire and force it to above shoulders 55—55 and then recede. The operation is now finished.

Having described the invention, what we claim as new and desire to secure by Letters Patent is:

1. In a wire tying device—a hollow shaft, a transverse slot in said shaft, shoulder portions

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in said shaft, a shaft journaled in said hollow shaft, and a transverse slot in said journaled shaft, said slot normally registering with the slot in said hollow shaft.

2. In a wire tying device—a shaft journaled in a hollow shaft, transverse slots at one end of each of said shafts, normally registering, shoulder portions in the slot of said hollow shaft and gears on the opposite ends of said shafts to rotate the said shafts independently.

3. In a wire tying device—a hollow shaft one end terminating in a cone-shaped portion, a transverse slot in said cone shaped portion, a shaft slotted at one end journaled in said hollow shaft with said slots normally registering and means for rotating said shafts independently.

4. In a wire retaining member having a rotary cutter and retainer disc—a plurality of segmentary circular grooves formed between annular flanges and a stationary arm extending into said groove to prevent for an interval the rotation of wire with said disc substantially as described.

5. In a wire tying device—in combination with cutter and retainer mechanism a rotatable hollow shaft with a cone shaped portion, a shaft mounted in said hollow shaft, slots in said shaft normally registering, tucker arms for forcing wire into said slots and gears to rotate said shafts to cause portions of the wires to slip off the cone portion while another portion is being twisted and wound about with another portion of the wire.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
270,861	Trimble	Jan. 16, 1883
443,256	Logan	Dec. 23, 1890
492,051	Porter	Feb. 21, 1893
899,309	Lee	Sept. 22, 1908
909,272	Wygant	Jan. 12, 1909
1,534,359	Collins	Apr. 21, 1925
2,405,688	Crumb	Aug. 13, 1946

FOREIGN PATENTS

Number	Country	Date
406,934	Germany	Dec. 4, 1924

Certificate of Correction

Patent No. 2,492,228

December 27, 1949

ORLAN S. LEE ET AL.

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 3, lines 10 and 11, strike out "members 44, 44, 44 of disc 33, to act as a shear. The cutting members 44 are riveted to the under" and insert the same after the word "cutting" in line 8, same column;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of May, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.