

899,014.

W. L. LYON.
WIRE UNITING MECHANISM FOR BALING PRESSES.
APPLICATION FILED NOV. 12, 1906.

Patented Sept. 15, 1908.
5 SHEETS—SHEET 1.

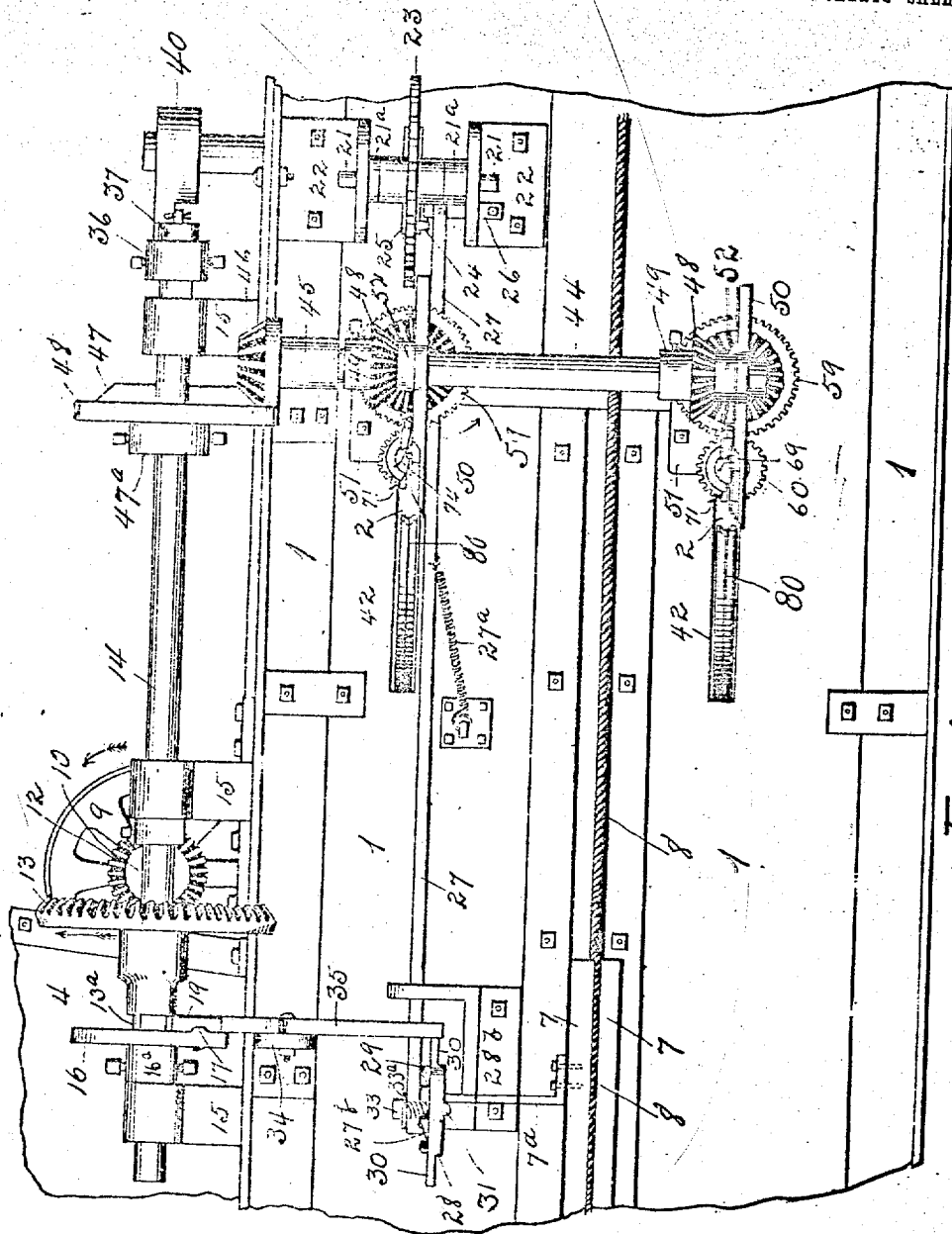


Fig. 1

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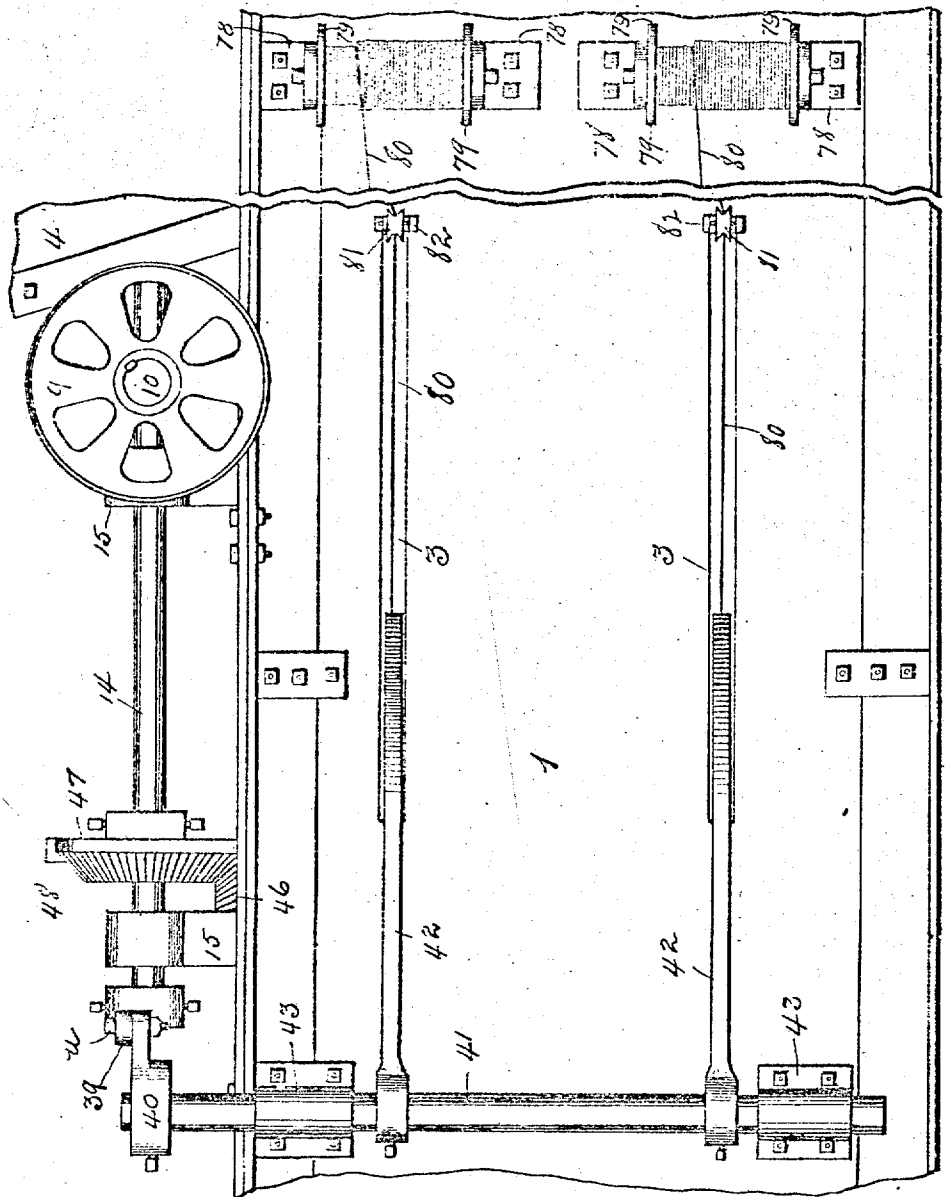


Fig. 2

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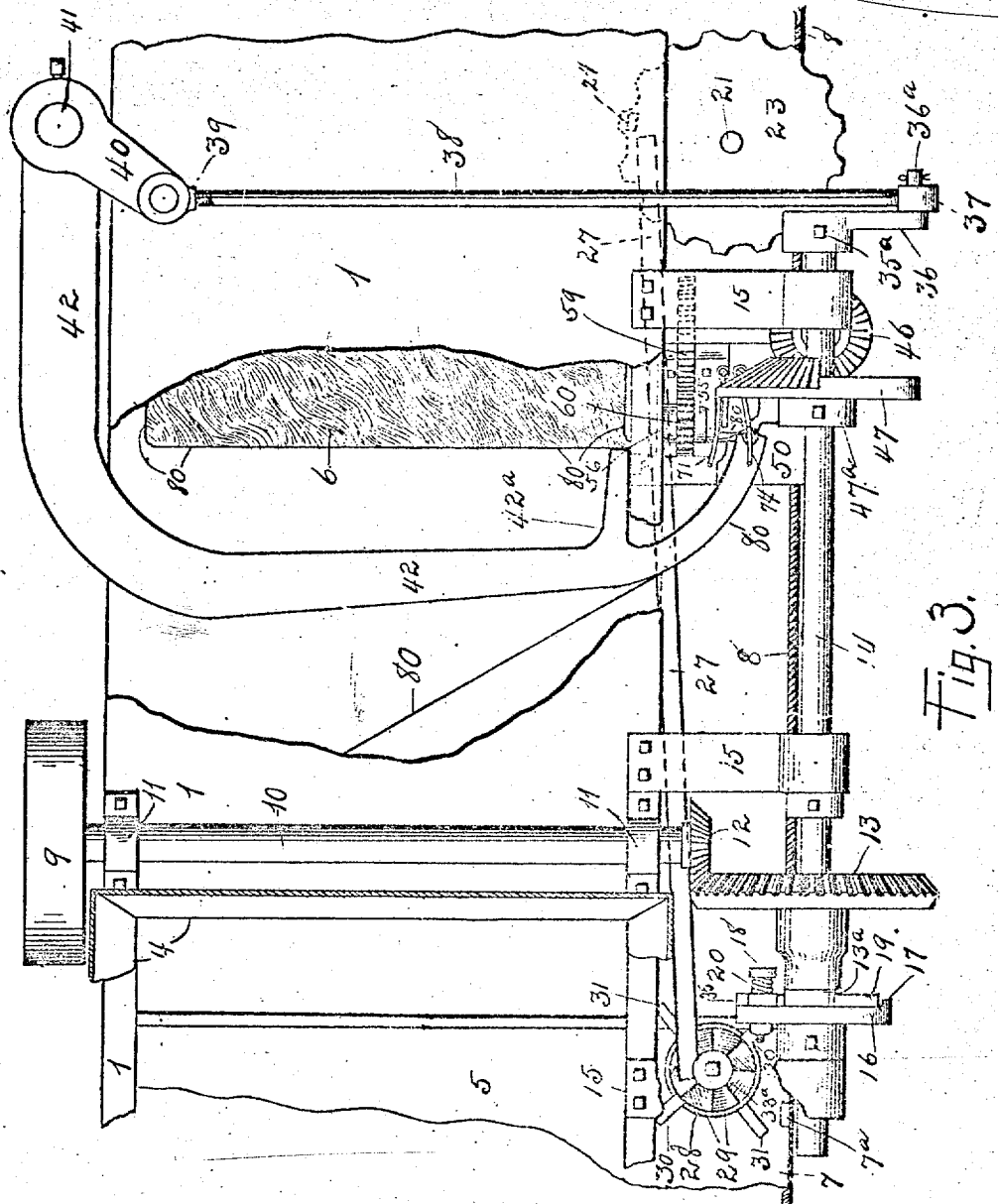


Fig. 3.

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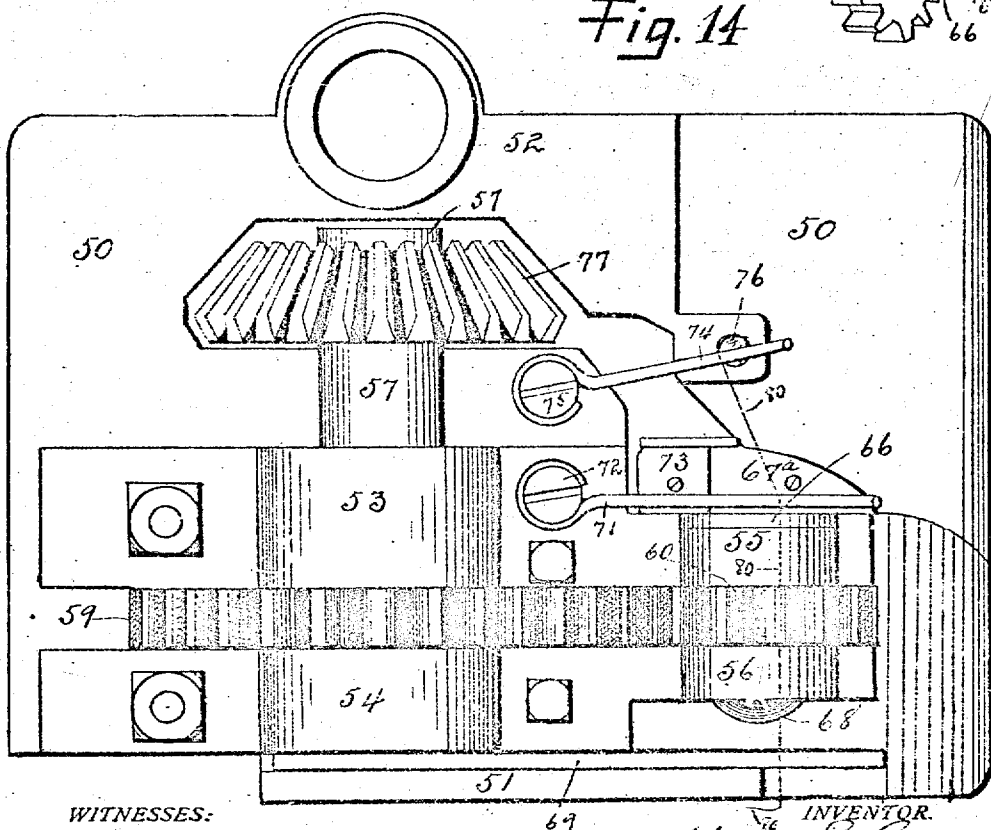
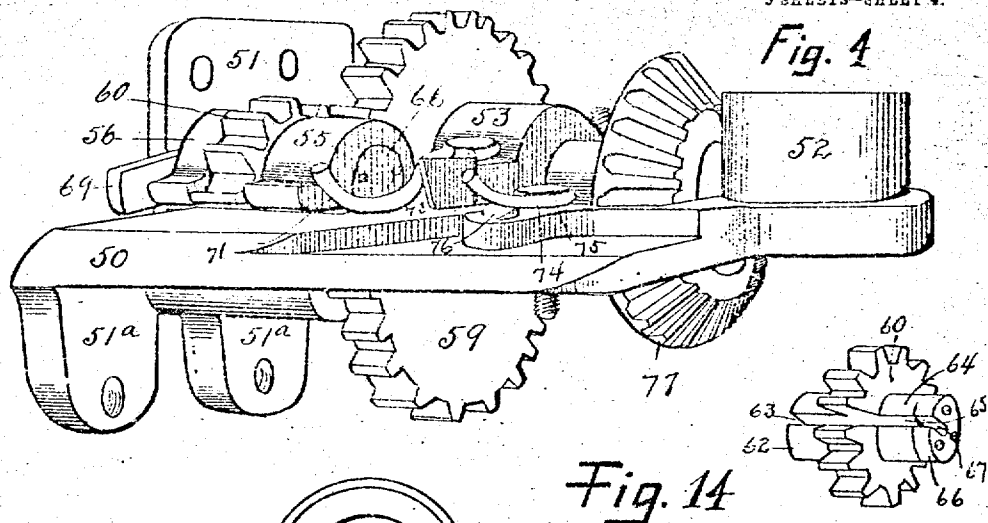
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5 SHEETS—SHEET 4.



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Fig. 5

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5 SHEETS—SHEET 6.

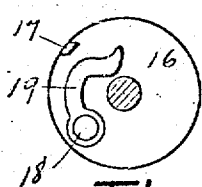


Fig. 12

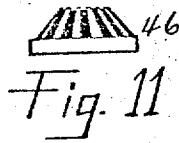
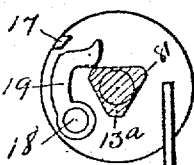


Fig. 11

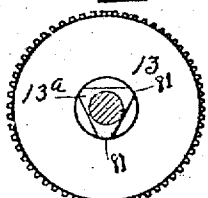


Fig. 8

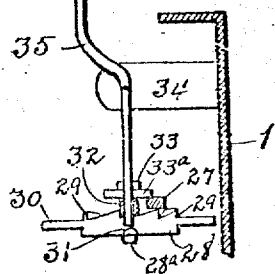


Fig. 9

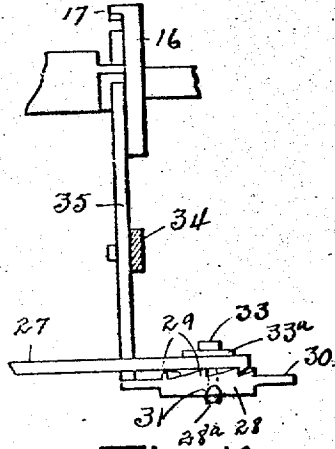


Fig. 10

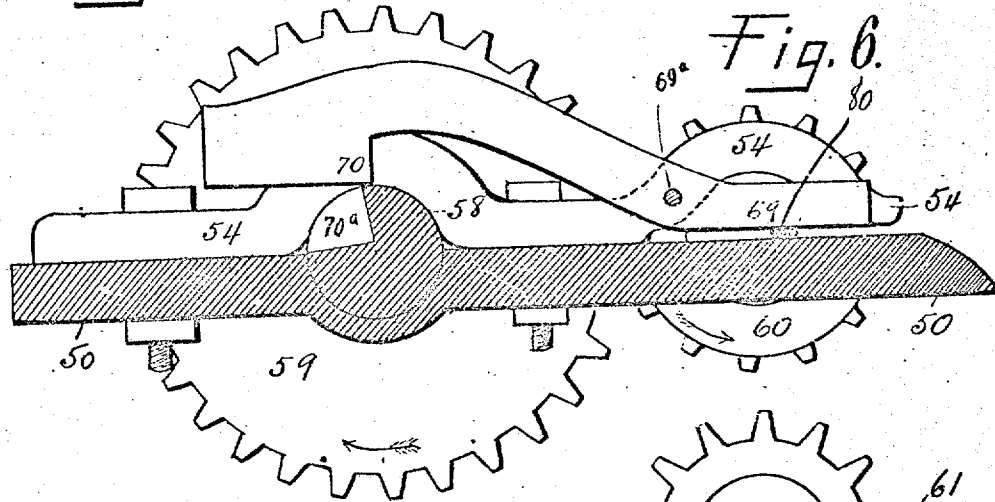


Fig. 6

Fig. 13

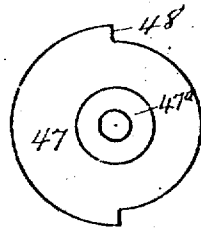
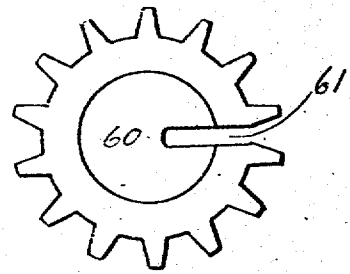


Fig. 7



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UNITED STATES PATENT OFFICE.

WILLIS L. LYON, OF PONTIAC, ILLINOIS.

WIRE-UNITING MECHANISM FOR BALING-PRESSES.

No. 899,014.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Application filed November 12, 1906. Serial No. 343,169.

To all whom it may concern:

Be it known that I, WILLIS L. LYON, a citizen of the United States, residing at Pontiac, in the county of Livingston and State of Illinois, have invented a new and useful Wire-Uniting Mechanism for Baling - Presses, of which the following is a specification.

My invention relates to improvements in machines of the class described whereby the mechanism is rendered certain and efficient in operation, both in properly placing the wire about the bale and in forming a secure and permanent bond.

The main object of the invention is to produce a device by the use or employment of which these advantages may be obtained.

With this and other ends and objects in view, which ends and objects will readily appear as the nature and operation of the invention are disclosed, and by reference to the drawings which form a part hereof, it consists in the novel construction, arrangement, order, disposition, mutual relationship and combinations of parts hereinafter described, illustrated and claimed.

In the accompanying drawings, in which my improvements are embodied in the best form now known to me, I have shown them in connection with only so much of a baling press as is necessary to illustrate their action and operation, and although the press herein shown is of a double-ended type, or that type in which two bales are simultaneously in process of formation, it will be evident that said improvements may be incorporated in any press employing or provided with a reciprocating plunger. The press herein shown is fully illustrated in my co-pending application filed February 19, 1906, Serial No. 301,969. It will be further manifest that some of the improvements herein shown and described may be used without the others and in machines differing in construction, type, operation and purpose from the one illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of a portion of a baling press provided with my improvements, seen from the side on which the wire uniting is located, and which I shall hereinafter designate the proximal side, the parts being in the positions they occupy when the needles are about to carry the wire to the knotting mechanisms; Fig. 2, a similar view,

taken from the opposite side; Fig. 3, a top plan; Fig. 4, a perspective of the knotter; Fig. 5, a top plan of the same; Fig. 6, an elevation of the knot-tying mechanism, partly in section, and some of the parts not shown; Fig. 7, an elevation of the tying-wheel; Fig. 8, a plan of the large bevel-wheel; Fig. 9, a detail, seen from the side, of the tripping mechanism; Fig. 10, a similar view, seen from the inside; Fig. 11, a detail, seen from the edge, of the mutilated miter-wheel; Fig. 12, a plan of the annulus; Fig. 13, a plan of the segmental gear wheel which drives the vertical shaft, and Fig. 14, a detail, showing the wire uniting and cutting devices.

Referring now to the drawings by numericals the same one indicating the same part in the different figures thereof, 1 represents a baling press compression chamber or box provided with needle-slots 2 in one side and elongated slots 3 in the opposite side thereof. As shown, a hopper 4 is located centrally longitudinally of the press-box, and through this hopper the material to be baled is automatically fed into the baling chamber to be compressed by the plunger as it reciprocates to form the bales 6. The plunger is provided with lateral extensions 7 fixed to a cable 8 which actuates it and to which motion may be imparted in any suitable and preferred manner. To the upper portion of the extensions 7 is fixed a trip 7^a.

9 indicates the main driving or pulley wheel, which may derive motion from any source and from which motion is imparted to the moving or operative parts of the machine. It is fixed to the distal end of a transverse shaft 10 journaled in bearings 11 fixed to the top of the press-box 1, and at its proximal end said shaft carries a bevel gear wheel 12, the teeth of which mesh with and impart movement to the teeth of a larger bevel wheel 13 loosely mounted on a shaft 14 extending longitudinally of and parallel with the press box and supported in bracket bearings 15. The hub of the wheel 13 is extended in one direction and its outer end formed into a prism or triangular shaped cam 13^a, see Figs. 8 and 9.

Fixed to the shaft 14 is an annulus 16 having on its face and near its periphery a boss or lug 17. Pivoted on a stud-bolt 18 on that face of the annulus which is contiguous to the end 13^a of the wheel 13 is a dog 19, the free

end of which is held in operative relation to said end 13^a by means of a coil spring 20. Mounted on a journal 21 seated in bearings 21^a in brackets 22 on the side of the press-box is a measuring wheel 23 provided with a lug or boss 24 on one of its faces and near its periphery. A portion of the wheel 23 projects through a slot 25 into the compression chamber and contacts the partially formed bale, as will presently be described. Pivoted to the lower bracket 22 is a trigger 26 to which is pivoted a rod 27 having at its end a pawl 27^b for a purpose also hereinafter described. Fixed in any desired manner to the side of the press box is one end of a retractile spring 27^a, the other end of which engages the pull rod 27. Journaled on a stub-axle 28^a projecting from a bracket bearing 28^b fixed to one side of the press box is a wheel 28^c having on its upper face ratchets 29. Projecting from its periphery at its upper edge are diametrically and oppositely located short tappets 30, and projecting from its periphery at its lower edge and at right angles to the tappets 30 are longer tappets 31. A coil spring encircles the stub-axle 28 and is held in place by means of a nut 33 and washer 33^a, the nut being threaded onto its end.

30 Fulcrumed in a projection 34 fixed to one side of the press box is a bent tripping lever 35, see Fig. 1, the lower end of which is adapted to be tripped by the short tappets 30 and the upper end of which is adapted to contact the lug 17 on the annulus 16.

35 To one end of the shaft 14 is fixed by set screws 35^a or in any other suitable manner a crank-arm 36, the wrist 36^a of which is pivotally connected with the head 37 of a pitman or connecting rod 38, the distal end of which is in turn connected with a head 39 which is pivotally connected with another crank-arm 40 fixed on a vertical shaft 41 to which the needles 42 are also fixed. The needle shaft 45 is journaled in bracket bearings 43 fixed preferably to the side of the press box. As shown, each needle is formed with an elongated, broad heel, a transverse central or body portion and a curved end terminating in a point having a groove transversely thereof to more securely and positively bring the wire into place. Fixed to the needle near its point or terminal, and operating within the press box is a packer arm 42^a projecting in the same direction as does the terminal. This arm, it will be evident, serves to bring the wire directly against or in contact with the bale and in a line therefrom to the uniting mechanism.

50 On the upper end of a vertical shaft 44 mounted in a bearing 45 on the proximal side of the press box is a bevel gear wheel 46, a segment of the base of which is cut away to form a flat portion, see Fig. 11. The shaft

14 carries a mutilated bevel wheel 47, of half of the cogs of which are cut away whereby a projection 48 is left.

47^a indicates an integral hub which holds the wheel 47 from displacement. The mutual cooperation of the wheels 46 and 47 will presently be described. The shaft 44 carries miter wheels 48, one on its upper portion and the other near its lower end, which wheels are held in place by hubs 49 forming a part thereof.

50, 50 represent bed-plates on and between which the several parts of the intertwisting mechanism are mounted. Each is secured to the side of the press box by rectangular projections 51, and at its outer end each is provided with a journal box 52 through which the vertical shaft 44 passes.

53, 54 (see Fig. 4) are journal box caps, the ends of which are extended to form guides 55, 56 for the wire. These extended ends serve a further purpose, later herein described. Mounted in the bearings formed by a portion of each bed-plate and by the caps above referred to is a short shaft 57 (Fig. 5, a small portion of which is cut away to form a cam-shaped end 59 (Fig. 6). Fixed on the shaft 57 is a spur wheel 59 which gears with a twisting pinion 60 journaled in the bearings formed by the bed-plate and the guides 55, 56, and is provided with a radial slot 61. On one side of the twisting pinion and integral therewith, but of less diameter and located beneath the guide 56 is a twisting roller 62 provided with a radial slot 63. On the opposite side of said pinion and also integral therewith is another roller, 64, similar to the roller 62 and provided with a radial slot 65.

Screwed or otherwise fixed to the roller 64 on its outer face is a disk-like shear member 66 provided with a radial slot 67. All of said slots are coincident, or register with each other. Fixed on the upper face of the bed-plate and fitting snugly against the shear member 66 is a stationary shear member 67.

68 indicates a concave throat in the bed-plate, adjacent to the roller 62 and is provided for the purpose of permitting a portion of the wire being twisted to enter therein and to prevent it being cut off on that side of the twisting mechanism. Fulcrumed to the journal box 56 and lying alongside the projection 51 is a wire-locking lever 69, see Fig. 6 its rear end being provided with a hook or catch 70 which periodically engages a wall of the cut-away portion of the cam shaft 58 in operation, as will presently be related. The rear end of a spring clamping wire or plate 71 is secured by a screw bolt 72 to the journal box 53 and projects forwardly, bearing closely upon the shear member 67 and its terminal bent upwardly to permit the ready admission of the wire. To prevent the wire being

drawn too far rearwardly I have provided a stop plate 73 shown as fixed to and on the shear member 67 and the bed-plate; it may however constitute an integral part of the journal box cap 53 or be formed in any preferred manner.

74 is a spring similar to that one last described and is fixed to the bed plate by a screw bolt 75. Near its free end it contacts a pin 76 and its extremity is turned upwardly for the same purpose as is the extremity of the spring 71. Fixed to the outer end of the shaft 57 is a miter wheel 77 which gears with the miter wheel 48.

Journalled in bearings 78 fixed to the distal side of the compression chamber are ordinary spools 79 carrying the baling wire 80, which passes beneath a sheave 81 seated in bearings in brackets 82 fixed to the same side of the press box, thence through the slots 3, thence through and is passed outwardly through the slots 2, thence under the clamping lever 69 and through the radial slots of the twisting and cutting mechanism, thence in front of the first charge of material, around it and brought back to said mechanism.

I shall now proceed to describe the operation, attention being called to the fact, hereinbefore stated, that the plunger 5, the cable 8 and the drive wheel 9 may derive motion from any source whatsoever. And although I shall hereinafter specifically describe the timing mechanism shown in the drawings hereto appended and forming a part hereof, it will be evident that said mechanism may be changed or altered at will. The drive wheel 9 being given a revolution, it will, through the medium of the shaft 10 transmit a full revolution to the bevel wheel 12 which is in mesh with the similar but larger wheel 13, the resultant speed being immaterial. (The wheel 13 is loosely mounted on the shaft 14).

As the bale is forced forwardly by the plunger 5, the count wheel 23 will at each stroke or impulse thereof be given a partial revolution by reason of its teeth contacting the material in the press-box, and when a sufficient number of charges of material have acted on said teeth the lug 24 will come in contact with and trip the rod 27, the distal end of which is in engagement with one of the ratchets on the wheel 28. The circumference of the wheel 23 is preferably one half that of the length of the bale 6. At each revolution of the wheel 23 the rod 27 will engage the ratchet wheel 28 to draw it forwardly two notches, of which there are eight, bringing it into such position that one of the longer lugs 31 will be contacted by the extension or arm 7^a on the plunger, which arm will in turn trip the lever 35 and release the dog 19 from engagement with the prism 13^a. The spring 20 will then act on said dog

to drop or force it into engagement with one of the points 81 of the prism-shaped shaft 13^a to give a revolution to the annulus 16, which being fixed to said shaft by means of its integral hub 16^a causes one full revolution thereof to bring the lug 17 into contact with the tripping lever 35 to release the dog from engagement with the prism. In the meantime the revolution of the shaft 14 will give a revolution to the mutilated bevel wheel 47, the first one-half of which will cause the crank-arm 36 which is connected to and drives the needle shaft to make a one-half revolution, which will bring the point of the needle and thereby the wire over to the intertwisting mechanism, as shown best at Fig. 3. At the instant when the needle is brought into contact with said mechanism the teeth of the wheel 47 will have been brought around to mesh with the teeth of the wheel 46, and it being fixed on the shaft 44 will give the miter wheels 48 and thereby the wheels 77 a full revolution, which motion or revolution is transmitted to the spur 59 on the cam-shaft 58. The cogs on the spur being twice as great in number as those on the pinion 60 with which it meshes, the latter will be given two full revolutions to one of the spur and the ends of the wire be given a double turn or twist by reason of said ends passing within the slots in said pinion and its integral rollers.

It will be evident from an inspection of Fig. 6 that the lever 69 which is fulcrumed at 69^a will, when the catch thereof is riding the entire portion of the shaft 58 clamp the wires 80 and hold them while being twisted, and that upon the shaft being revolved to such extent that the latch or catch will pass the edge of said entire portion it will by gravity drop into the cutaway space 70^a and its other end be raised to release the wires therefrom.

In starting the operation of baling the wire is brought into the position shown at Fig. 3, its end bent around the pin 76, the head of which is tapered toward its front so that the wire may slip thereover but cannot slip back or escape therefrom by reason of the yielding contact of the spring 74 and further by reason of a niche in its rear portion. A charge of baling material being then cast into the hopper will be carried into the compression chamber where it will be acted on by the plunger in its forward impulse toward that end of the compression chamber. It will be evident that the wire is always forwardly of said charge. When a sufficient number of charges have been fed to and compressed by the plunger to be contacted by the count wheel 25 to give it a revolution, the lug 24 thereon will trip the rod 27 to draw the ratchet wheel forwardly two notches as hereinbefore described. This will bring a tappet

31 into position to be acted on by the trip 7^a in the plunger extension in its backward or return movement to move said wheel 28 two more notches, whereupon a tappet 30 will contact and trip the lower end of the lever 35 to release the dog 19 to contact a point 81 of the prism 13^a to revolve the shaft 14 and bring the needle points into contact with the wires 80 and carry them through and across the press box to the point shown at Fig. 3 by dot lines. It will be manifest that the needle points will pass the twister and shear and that they will bring the wires beneath the lever 69 and into the coinciding slots in the rollers, the twisting-pinions and the rotary shear members, thence beneath the clamping plates or springs 71, over the stationary shear members and thence over the pins and into the notches therein hereinbefore referred to, with the spring 74 resting on the head thereof. The operation of intertwisting or knotting the wires is then proceeded with as precedently described. The operation of forming the bond requires two revolutions of the wire-twisting mechanism, the wire being severed by the respective rotary and stationary shear members at the end of the first one half revolution in an evident manner. It will be likewise obvious that the first one-half revolution of the shaft brings the needles forwardly by the action of the crank arms and pitmen, and that the last one-half revolution returns them to their backward position exterior to the press box. It will be further more clear that the end of the wire after having been severed will be held by being looped about the pin 76 and by the spring 74, ready for another action thereon of the needle.

It sometimes occurs in use that the baling material will spring back after being compressed by the plunger and before the bale is complete. When this happens the material will carry the wire backwardly and out of its proper line position with the intertwisting mechanism. To obviate this I have provided a packer arm 42^a projecting from the needle as shown at Fig. 3, which arm, it will be seen is always in contact with said wire to preserve it in proper line position when the plunger is on its return stroke or in its rear position.

Although I have herein specifically described and in the drawings shown the construction and relative arrangement of the several elements of my improvements, yet I do not wish to be understood as confining myself to such specific constructions and arrangements, it being particularly understood that various changes may be made in the details of construction, especially in the timing mechanism, without departing materially from the general idea involved.

To a certain extent the mechanical advantages of the present invention have been set forth in connection with the statement of the

purposes and objects thereof and the detail description of the mechanism; but concisely stated the leading benefits secured thereby are as follows:—

First: Every movement of the device is automatic and requires no attention from an attendant;

Second: The wire is brought from one to the other side doubled upon itself or in a loop, thus: ; one of the members of which is that which is coming direct from a spool or reel and the other is that which has been drawn around the bale while it was in process of formation;

Third: On most machines which have come under my observation the wire has been first cut into bale lengths. My device feeds the wire from an ordinary reel, or continuously;

Fourth: On the ordinary devices of this character the bond is tied partly by hand and necessitates the employment of a baltie; in my invention it is automatically formed and a baltie is dispensed with;

Fifth: The respective combined parts are positive in their timing action;

Sixth: The bond of union is doubly twisted and is therefore safe and secure;

Seventh: My improvements hereinbefore described may be attached to any baling press provided with a reciprocating plunger, slight changes in the details of construction only being necessary.

Having thus set forth the construction and operation, the purposes and advantages of the invention, I claim as new and desire to secure by Letters Patent the following, to-wit:—

1. A device of the character described including an integral twisting pinion, twisting rolls and a shear member, said elements provided with registering slots and immovable with relation to each other.

2. In a device of the character described, a mechanism comprising a base, a slotted twisting wheel, means for driving it, means fixed to said wheel for severing the baling wire, and a lever for holding one end of the wire.

3. In a device of the character described, a mechanism comprising a base, a slotted twisting wheel, means for driving it, means for severing the baling wire, and a lever for holding an end of the wire.

4. In a baling press, mechanism including a base, a wire-intertwisting wheel mounted to rotate thereon, and a locking lever carried on said base.

5. In a device of the character described, an intertwisting mechanism comprising a base, a twisting wheel journaled in bearings thereon, said wheel provided with a radial slot, means for driving said wheel, a wire-cutting member fixed to said wheel and adapted to revolve therewith, a stationary

wire-cutting member fixed to said base, and a wire-locking lever mounted on said base.

6. In a device of the character described, mechanism comprising a base, a shaft journaled in bearings thereon, a spur wheel mounted on said shaft, a wire-twisting wheel journaled in other bearings on said base, the caps of said bearings extended to form wire-guides.

7. In a device of the character described, a shaft, a base on which it is mounted in bearings, means for driving said shaft, an end thereof constituting a cam, and a wire-locking lever adapted to be actuated by said cam.

8. In a baling press, mechanism including a base, an intertwisting wheel mounted to rotate thereon, a wire-locking lever and a spring adapted to hold an end of the wire, said lever and spring both supported on said base.

9. A device of the character described including a twisting pinion and a rotary shear member actuated thereby, both provided with coincident radial slots, said members immovable with relation to each other.

10. A device of the character described comprising a twisting pinion, a rotary shear member actuated thereby, both provided with coincident slots, and both being immovable with relation to each other and a stationary shear member fixed to the base.

11. In a device of the character described, mechanism comprising a base, a slotted twisting pinion, means actuated thereby for severing the wire, a clamping lever, means for actuating it, and retaining springs for guiding and holding said wire.

12. In a device of the character described, mechanism comprising a base, a slotted twisting pinion, means actuated thereby for severing the wire, a clamping lever, a cam shaft by which it is actuated, and springs adapted to guide and hold said wire.

13. In a device of the character described, mechanism comprising a base, a slotted twisting pinion, means for severing the wire, a clamping lever, means for periodically operating it, a stop plate, and retaining springs adapted to guide and engage said wire.

14. A device of the character described including a base, a twisting mechanism comprising a rotary wire-twisting pinion seated in bearings therein, a rotary shear member fixed to said pinion, said pinion and shear member provided with registering radial slots, and a stationary shear member fixed to the base, said base being provided with a throat adapted to receive the bulge of the wire being twisted.

15. Wire-twisting and severing mechanism for a device of the character described comprising an integral pinion, twisting rollers on each side thereof, and a shear member fixed to one of said rollers, all of said elements provided with registering radial slots and immovable with relation to each other.

16. Wire-twisting and severing mechanism for a device of the character described comprising a base, a slotted pinion mounted in bearings thereon, twisting rollers on each side thereof provided with radial slots, a shear member fixed to one of said rollers and provided with a slot registering with the slots in the pinion and rollers, said three last elements immovable with relation to each other, and a stationary shear member fixed to the base.

17. In a device of the character described, a wire-twisting pinion, twisting rollers on each side thereof and a shear member fixed to one of them, all of said elements provided with coincident radial slots, and all being immovable with relation to each other.

18. In a device of the character described a base, a twisting-pinion journaled in bearing pillows therein, caps for said pillows, their ends projected to form wire-guides, and a twisting-roller on each side of the pinion.

19. In a device of the character described, a base, a twisting-pinion journaled in bearing pillows forming a part thereof, caps for said pillows, secured to the base and their forward ends projected to form wire-guides, a twisting roller on each side of said pinion, a rotary shear member fixed to one of said rollers, said rollers, pinion and shear member provided with coincident slots and said base provided with a throat in which the bulge of the wire being twisted is adapted to lie.

20. In combination in a device of the character described, a press-box, a count-wheel projecting through its side and adapted to be actuated by the baling material, a lug thereon, a pull-rod adapted to be actuated thereby, and a ratchet faced wheel adapted to be given a partial rotation by said pull-rod.

21. In combination in a device of the character described, a press-box, a count-wheel projecting through its side and adapted to be actuated by the baling material, a lug thereon, a pull-rod adapted to be actuated thereby, a ratchet faced wheel adapted to be given a partial revolution by said rod, long and short tappets on said wheel, a lever adapted to be actuated by the latter, an annulus, a spring actuated dog thereon adapted to be tripped by said lever, a cam-shaft adapted to be actuated by said dog, needles, and means intermediate said shaft and needles for imparting forward and return movements thereto.

22. The combination in a device of the character described, of a count-wheel, a ratchet faced tappet-wheel, intermediate means whereby the latter is given an intermittent rotary motion by the former, and a plunger arm adapted also to impart intermittent rotary motion thereto between the periods at which it is acted on by said intermediate means.

23. The combination in a device of the character described, of a count-wheel, a ratchet faced tappet-wheel, intermediate means whereby the latter is given intermittent rotary motion by the former, a plunger arm adapted also to impart intermittent rotary motion thereto between the periods when it is acted on by said intermediate means, a shaft longitudinally of the press-box, a bevel wheel loosely mounted thereon, its hub extended to form a cam or prism, an annulus mounted on said shaft, means for actuating it, a dog on the annulus and means for throwing it into and out of engagement with said cam.

24. The combination in a device of the character described, of a count-wheel, a ratchet-faced tappet wheel, intermediate means whereby the latter is given intermittent rotary motion by the former, a plunger arm adapted to impart intermittent rotary motion thereto between the periods at which it is acted on by said intermediate means, a shaft longitudinally of the press-box, a bevel wheel loosely mounted thereon, its hub extended to form a cam or prism, means for driving it, an annulus on said shaft, a dog thereon, and a tripping lever actuated by the tappets for throwing it into and out of gear with said cam.

25. The combination in a device of the character described, of a count wheel, a ratchet faced tappet wheel, intermediate means whereby the latter is given intermittent rotary motion by the former, a plunger arm adapted to give intermittent rotary motion thereto between the periods at which it is acted on by said intermediate means, a shaft longitudinally of the press-box, a bevel wheel loosely mounted thereon, its hub extended to form a cam or prism, means for driving it, an annulus on said shaft, a dog thereon, a tripping lever actuated by the tappets for throwing it into and out of gear with said cam, a mutilated bevel wheel on said shaft, a bevel wheel in gear therewith, a vertical shaft driven thereby, a knotting

mechanism, and means carried on said vertical shaft for actuating it.

26. The combination in a device of the character described, of a count wheel, a ratchet faced tappet wheel, intermediate means whereby the latter is given intermittent rotary motion by the former, a plunger arm adapted to give intermittent rotary motion thereto between the periods at which it is acted on by said intermediate means, a shaft longitudinally of the press-box, a bevel wheel loosely mounted thereon, its hub extended to form a cam or prism, means for driving it, an annulus, a dog thereon, a tripping lever actuated by the tappets for throwing it into and out of gear with said cam, a mutilated bevel wheel on said shaft, a vertical shaft, a knotting mechanism, and means carried on and driven by said last named shaft for operating it.

27. The combination in a device of the character described, of a count wheel, a ratchet-faced tappet wheel, intermediate means whereby the latter is given intermittent rotary motion by the former, a plunger arm adapted to give intermittent rotary motion thereto between the periods at which it is acted on by said intermediate means, a shaft longitudinally of the press box, a bevel wheel loosely mounted thereon, its hub extended to form a cam or prism, means for driving it, an annulus, a dog thereon, a tripping lever actuated by the tappets for throwing it into and out of gear with said cam, a mutilated bevel wheel on said shaft, a vertical shaft, a knotting mechanism, means carried on and by said last named shaft for actuating it, a needle-shaft, and means intermediate it and the first named shaft for imparting an oscillating motion to the needle.

In testimony that I claim the foregoing as my own I have hereunto set my hand this 13th day of October, A. D. 1906.

WILLIS L. LYON.

Witnesses:

L. M. RICHARDS,
C. S. RICHARDS.