July 4, 1950 W. W. TRANTER ET AL 2,513,690

BALER

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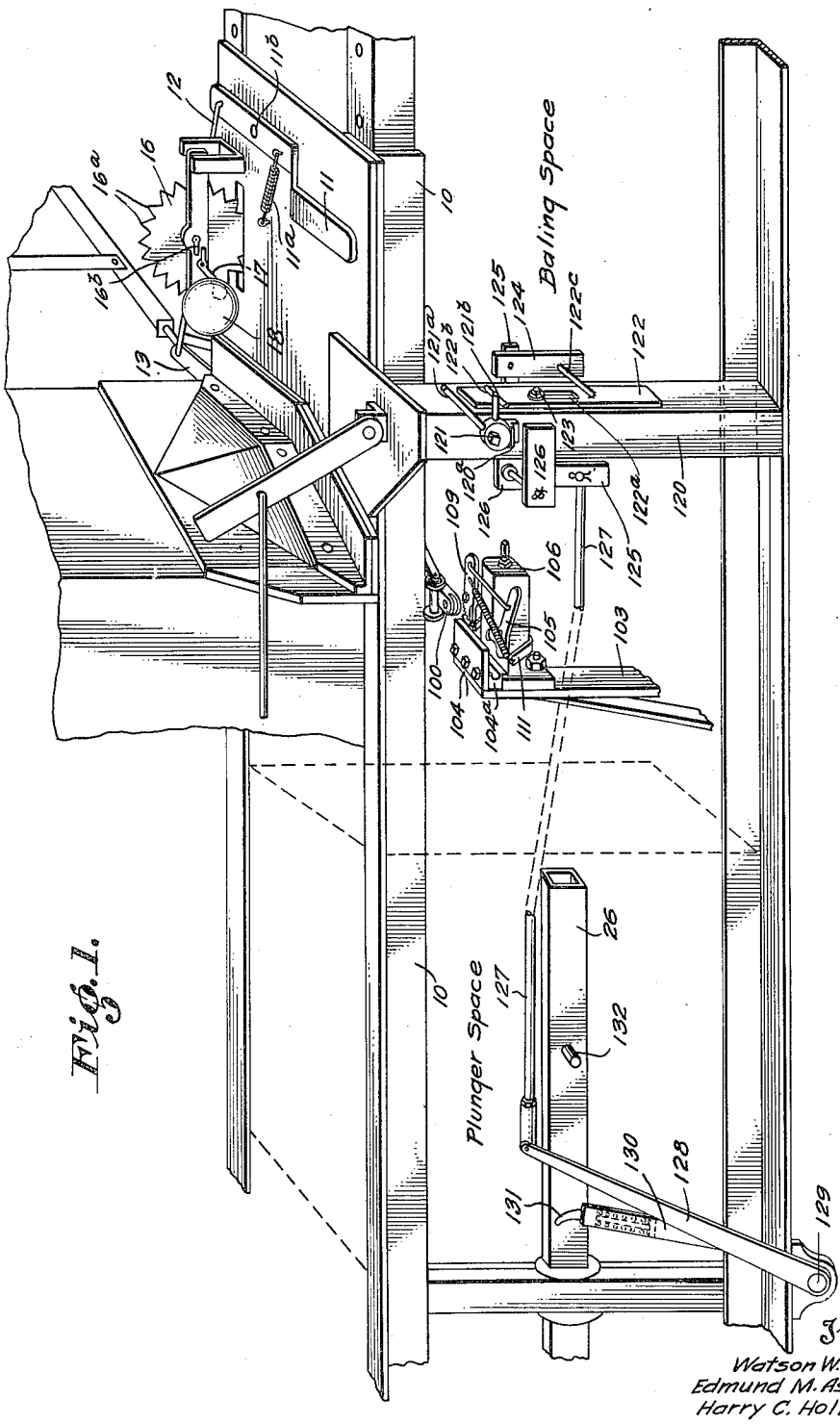


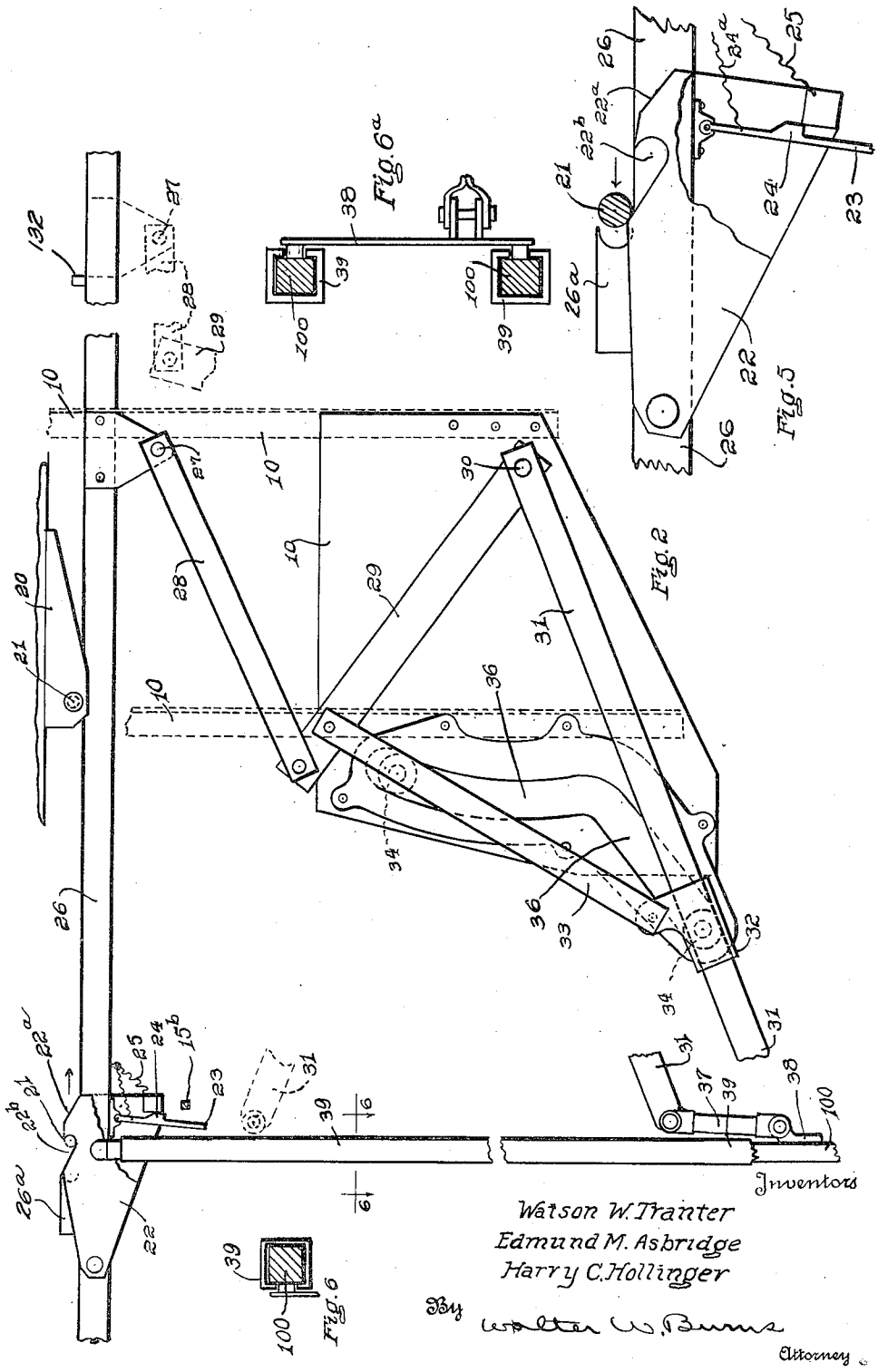
Fig. 1.

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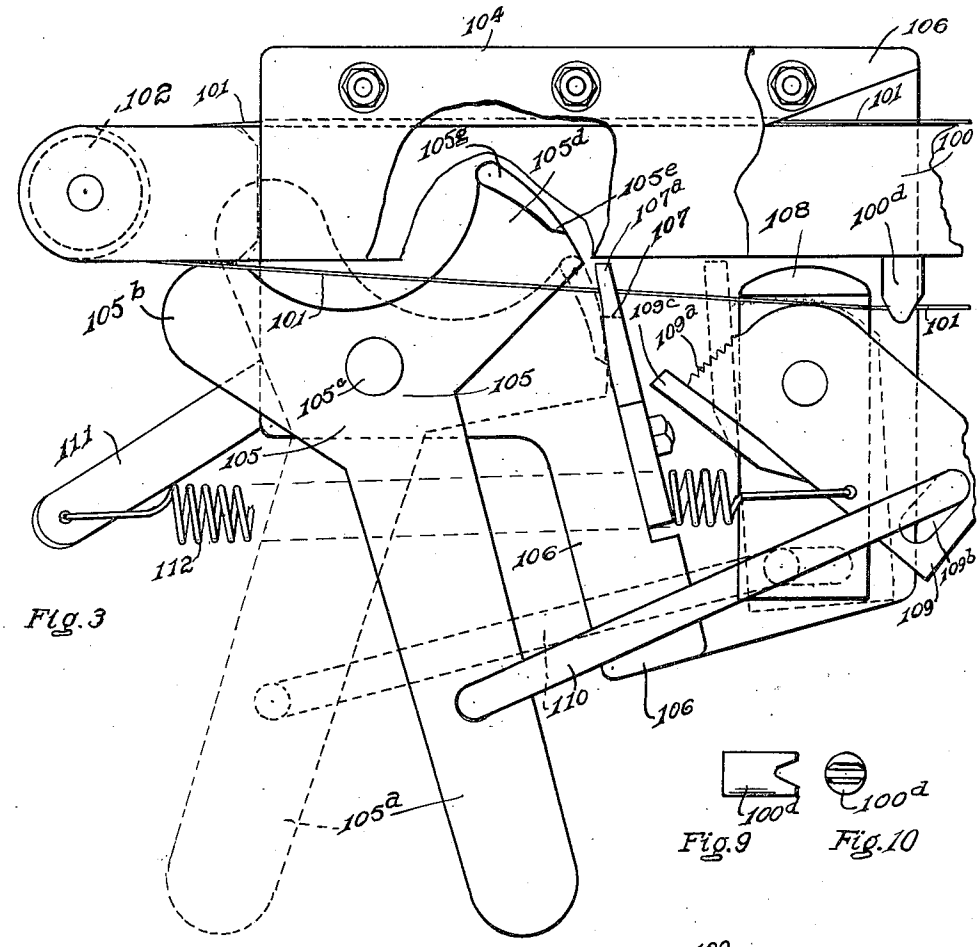


Fig. 3

Fig. 9 Fig. 10

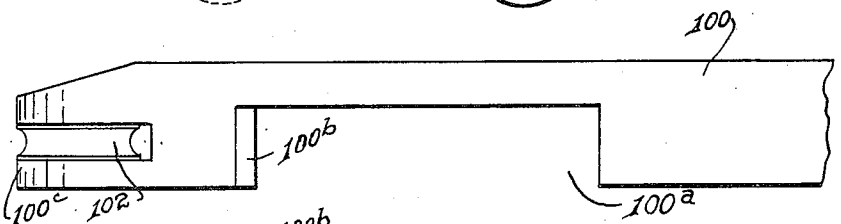


Fig. 7

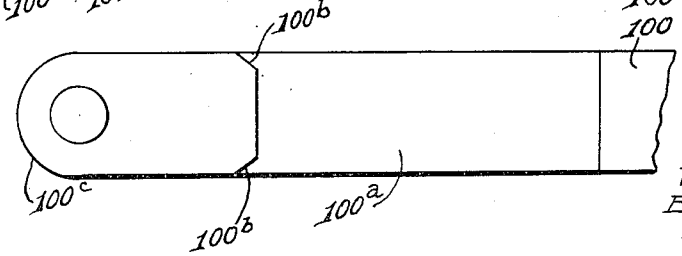


Fig. 8

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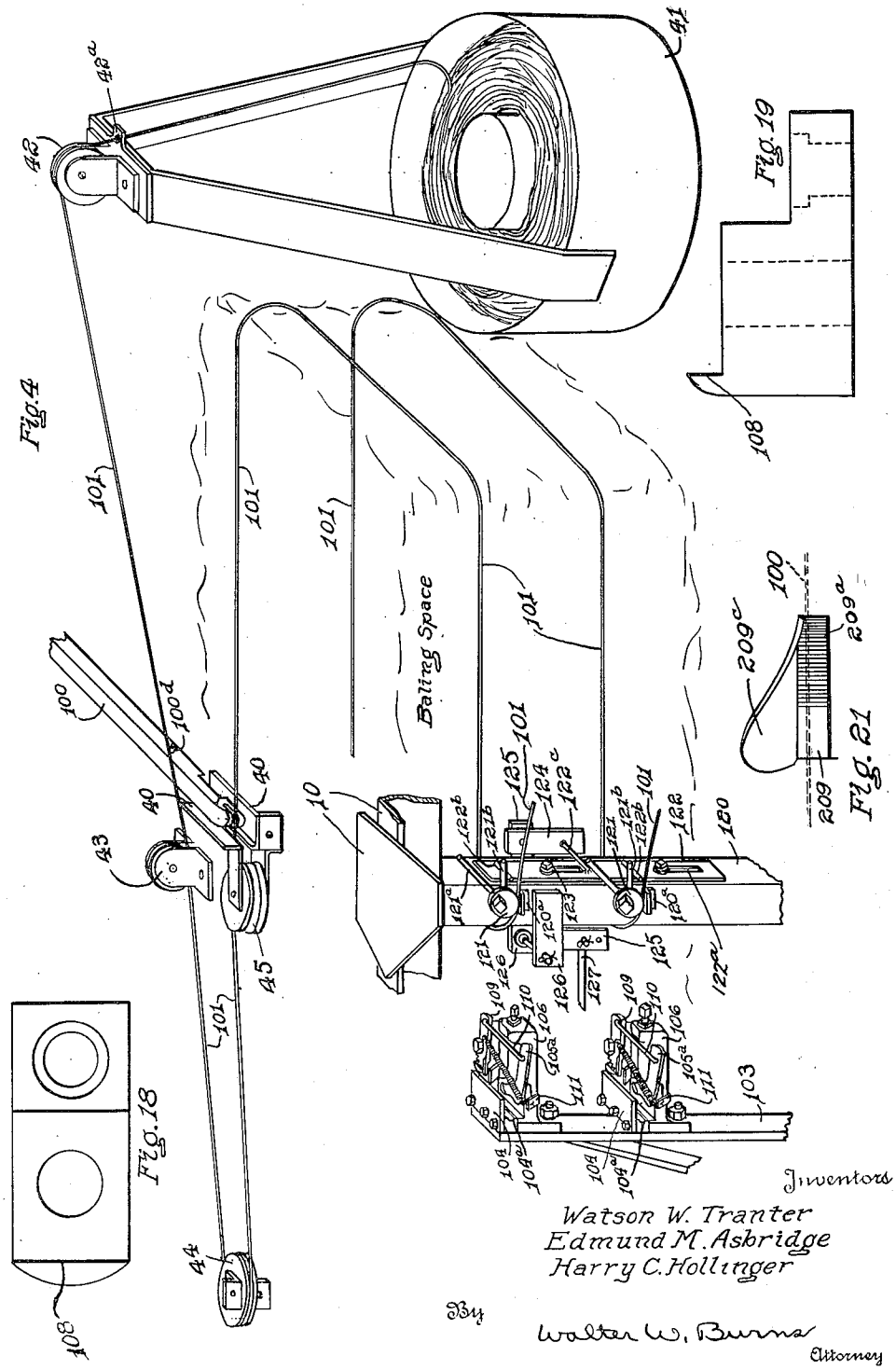
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Fig. 11

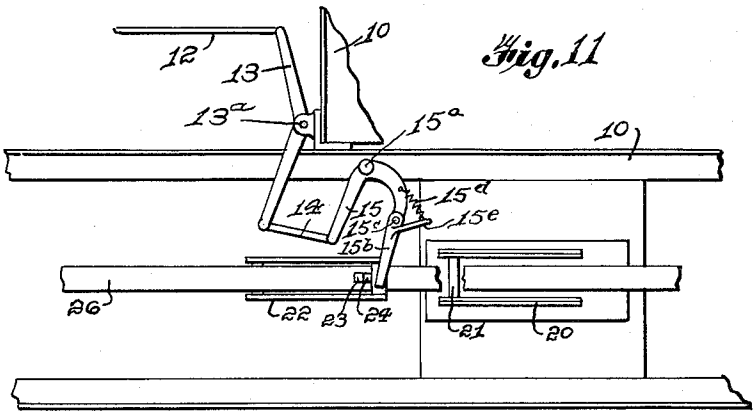


Fig. 12.

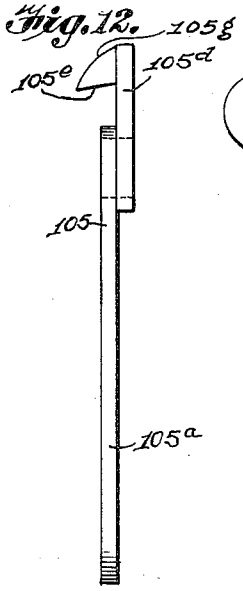


Fig. 13

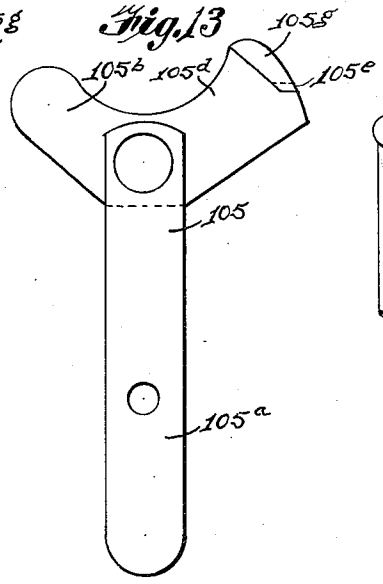


Fig. 14

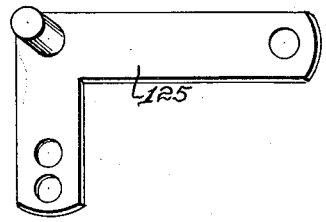


Fig. 15

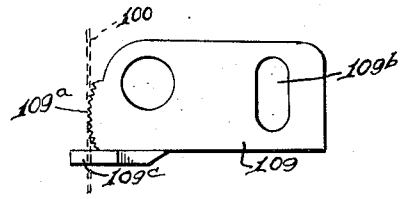


Fig. 17

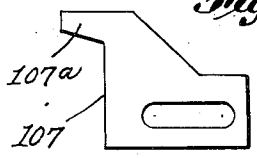


Fig. 16

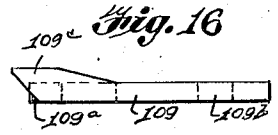
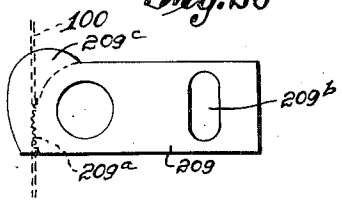


Fig. 20



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UNITED STATES PATENT OFFICE

2,513,690

BALER

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Application March 30, 1944, Serial No. 528,744

22 Claims. (Cl. 100—20)

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This invention relates to baling devices and particularly to those constructions wherein the wire is passed across the path of the material to be baled to assist in the operation of securing the bale with wire.

In baling machines and particularly those which are designed primarily for operation while traveling over the ground, the reduction of weight to a minimum is important both as to the weight of the machine itself and also the number of operatives to be carried.

In the machines where an operative sits on the inside of a combined loader and baler, the dust and chaff from the loader side makes it difficult for the operative to see and perform his work.

A primary object of this invention is the simplification and improvement of a hay baler having a needle means for passing a wire across the path of the material to be baled, to the outside of the machine, without direction by an operative and in such a manner that as the bales are successively formed, the wire ends for the bales will be on the same side so that a single operative may tie the wires.

Another object of the invention is the provision of an improved and simplified mechanism for driving the needles to a point on the outside of the baler and placing the wire ends in position to be tied.

A further object of the invention is the provision of an improved baler wherein the needle pushes the wire to the opposite side of the machine where it is held and cut, the cut end being then free to be tied by the operative sitting at the side of the machine.

A still further object of the invention is the provision of a baler wherein the needle passes a loop of wire to the side of the machine adjacent the seat of the operative, after which the wire is gripped and cut, one end being free, after being cut, to be placed in a holding means which is released as the next gripping operation takes place.

A still further object of the invention is the provision of an improved and simplified mechanism for passing the wire across the baling space of a baler from one of its four sides to the opposite side, with means for holding and cutting the wire to enable the ends to be placed in position to be secured together.

A still further object of the invention is the provision of a baler wherein the needle forces a loop of wire across the baling space after which, one side of the loop is held by a gripping means, the other side being severed from the gripped side at substantially the same time.

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Other and further objects of the invention will be apparent to those skilled in the art from a reading of the complete specification and claims.

Referring to the drawing wherein is illustrated a preferred embodiment of the invention.

Fig. 1 is a perspective view of the baler showing a general elevational view, parts of the baler which are conventional being broken away or omitted.

Fig. 2 is a plan view of the needle operating mechanism with the front of the machine at the top of the figure.

Fig. 3 is a plan view of the needle end, its adjacent gripping means and the wire cutter showing their relation to the needle.

Fig. 4 is a perspective view of the gripping and cutting mechanism showing the path followed by the wire relative to the bale, one wire coil being omitted.

Fig. 5 is an enlarged view of the catch mechanism of Fig. 2.

Fig. 6 is a cross-section of one guide and needle on the line 6—6 of Fig. 2.

Fig. 6a is a cross-section of both needles and guides similar to Fig. 6.

Figs. 7 and 8 are side and bottom views respectively of the needle.

Figs. 9 and 10 are views from side and rear of the wire guide shown on Fig. 3.

Fig. 11 is a side view of the tripping mechanism for starting the needle operation.

Figs. 12 and 13 are detail views of the cutter 105.

Fig. 14 is a perspective view of the bell crank 125.

Figs. 15 and 16 are detail views of the gripper 109.

Fig. 17 is a side view of the stationary cutter 107.

Figs. 18 and 19 are detail views of the stationary grip 108.

Figs. 20 and 21 are detail views of a modified form of the movable gripper means shown on Figs. 15 and 16.

Similar reference characters refer to the same or similar parts throughout the specification and drawing.

In balers, it has been found to be more advantageous to have a needle operating mechanism which gives a relatively slow movement during the first part of the first half of the cycle of its movement and a relatively rapid move-

ment during the latter part of the first half of its cycle. During the recession of the needle movement, the reverse takes place, the first part being rapid and the latter being relatively slow.

To bring about this result, there is provided a varying speed mechanism and its controlling connection which I will now describe.

On the main frame 10, is the needle operating control lever 11 which is normally held in position to operate by a spring 11a. The lever 11 is fulcrumed at 11b and is connected at its inner end to a link 12. The opposite end of the link 12 is pivoted to a bell crank 13 fulcrumed at 13a on the main frame 10. The link 14 operatively connects the other arm of the bell crank 13 to one arm of a bell crank lever 15, also fulcrumed on the main frame 10 at 15a. On the other arm of the lever 15 is pivoted a releasing member 15b provided with a rule-joint, as at 15c, permitting pivotal movement in one direction only. The releasing member 15b is normally held in position ready to operate by a spring 15d connected at one end to an arm 15e and at its other end to the bell crank lever 15. This releasing member 15b is in position to operate the release catch 23 to put the needle operating mechanism in motion, as will be presently described.

There is provided a star wheel 16 having teeth 16a which engage the upper portion of the bale being formed and as the latter moves in being formed, the star wheel revolves. The star wheel is of a size such that its periphery will be equal to the length of the bale to be formed. In the present illustration the star wheel 16 is non-adjustable. On the shaft of the star wheel 16 is a short arm 16b which engages a hammer operating arm of the bell hammer 17. The hammer 17 is in position to ring the bell 18 as the arm 16b operates the hammer 17, once at the end of each revolution of the star wheel 16. The ringing of the bell 18 is the signal that the bale being formed is of the proper size to be bound; whereupon the operator moves the handle of the lever 11 to his right to operate the bell crank lever 15 to cause its releasing member 15b to release the catch member 23 which in turn releases the needle operating latch which will now be described.

The cross head 20 on the plunger of the usual and conventional type of baler, carries a pin 21 which registers with a latch 22 which is released by suitable operating means, already described, when the bale becomes of sufficient size to require binding. A catch 23 with a detent 24 normally holds the latch 22 so that it is not in position to be caught by the pin 21. However, when the bale is of sufficient size to be bound, the releasing member 15b is moved by the handle 11, as already described. This member 15b engages the end of the catch 23 and moves it against the spring 24a to cause the detent 24 to disengage from the latch 22. The spring 25 now pulls the latch 22 to the position shown in Fig. 2, ready to be engaged by the pin 21 at the end of its next stroke.

With the latch 22 in position for operation, as shown in Fig. 2, the cross head 20 on its next stroke causes its pin 21 to engage the slant face 22a forcing the latch 22 to one side and to then enter the operating slot 22b, the spring 25 continuously tending to force the latch 22 to operative position. With the reversal of movement, the catch 22 which is mounted on the needle operating slide tube 26 moves the latter for a single cycle. Connected to the slide tube 26 is a pin-bearing 27 upon which is pivotally mounted one end of an operating link 28. This link 28 is connected to one end of a swinging arm 29 which pivots bodily about a pivot 30. Also pivoted on this pivot 30 is an arm 31 which carries a sliding block 32. Pivotally connected between the free end of the arm 29 and the block 32 is a link 33. On one side of the sliding block 32 is a cam roller 34 which engages a cam slot 36. It is to be noted that the cam slot 36 is of irregular shape. During the first part of the stroke, the angular travel of the arm 31 is very much slower than during the latter part of the stroke. As illustrated in Fig. 2, the fast moving part of the cam is constructed on the arc of a circle. On the return stroke, the pin 21 engages an abutment 26a which is rigidly attached to the slide tube 26, and returns the slide tube 26 to its initial position. The first portion of this return movement is fast while the latter portion of the movement is relatively slow.

Pivoted to the free end of the swinging arm 31 is a link 37 which is connected to a needle operating frame 38. Perpendicular to the baler frame are guides 39 in which are mounted for sliding movement, the needles 100. The frame 38 is connected to and moves the needles 100 in the guides 39.

There are two needles 100, one above the other to take care of the two wires with which the bales are bound. As the operation of the needles and their coacting devices is identical, the operation of only one will be described in detail.

Referring to Fig. 4, the baling wire 101 is held from displacement in the guide 40 on the inside of the baling frame.

In Fig. 4 is illustrated diagrammatically the path of the baling wire and the position of one of the needles as it starts to contact the wire prior to forcing it through the baling space.

The wire 101 feeds out of a coil box 41, through an eye 42a to a guide pulley 42 over which the wire passes to pulleys 43, 44 mounted at suitable places on the main frame 10. From the pulley 44, the wire passes to a pulley 45 located adjacent the guide 40, already described.

In the end of the needle 100 is a pulley 102 which forces the wire across the path of the baling mechanism.

The needle 100 has a cut away portion 100a and a shoulder 100b for a purpose to be presently described.

Below the pulley 102 is a rounded end portion 100c of the needle which is used to operate the cutter in a manner to be described.

On a supporting bracket 103 is mounted a guide 104 which guides the needle in the outer portion of its travel.

A wire cutting member 105 has an arm 105a for operating the gripping means and a short arm 105b which contacts and is operated by the needle end 100c. The cutting member 105 is provided with another arm 105d which carries the cutting edge 105e.

The cutting member 105 is pivotally mounted at 105c on the side bracket 106 in such a manner that when it is moved pivotally, the cutting edge will coact with a stationary cutter member 107 mounted rigidly on the bracket 106. The outer end of the arm 105d is provided with a curved guide 105g, tapered outwardly, which serves as a lifting means for the wire 101, to guide the same into a position for cutting.

The two arms 105b and 105d are so placed with

relation to each other, and to the path of the needle 100 and also to the pivot 105c of the arm 105, that as the forward end 100c of the needle pushes against the arm 105b, the arm 105d will be forced into the cut-away portion 100a of the needle 100. This action is brought about by the forward portion 100c of the needle pushing against the arm 105b and pivoting the cutter member 105 about its pivot 105c. The pivot 105c, is close enough to the needle so that the needle cut-away portion 100a receives the arm 105d when the needle is extended. When the needle is withdrawn, the inner face 100b engages the side of the arm 105d which operates the cutting member and brings the edge of the arm 105d into the vertical plane of the side of the needle 100, as shown in dotted lines in Figure 3.

Mounted adjacent the side of the needle 100 is a gripping means which holds the wire while and after it is cut as will now be described.

The gripping device consists of a stationary grip 108 which is mounted rigidly relatively to the bracket 106, and the pivoted wire gripper 109. The gripper 109 has a toothed edge 109a which moves close enough to the grip 108 so that after the wire is cut, the tendency from the resiliency of the bale to pull the wire inwardly will bind the same and hold it against movement. The outer end of the gripper 109 has a slot 109b in which operates the end of a grip cutter link 110. This link 110 has a pivoted end operating loosely in the slot 109b while its other end is pivoted in the arm 105a of the cutter member 105.

On the gripper 109 and adjacent the toothed edge 109a thereof, is a wire guiding finger 109c which guides the wire downwardly to gripping position. Acting also as a guide to move the wire to cutting position is a cutter finger 107a integral with the cutter member 107. The finger 107a extends toward the needle 100 just short of contacting it when the needle is in extended position. As the needle 100 pushes the wire out to cutting position, the finger 107a guides the wire downwardly to gripping and cutting position. When the wire is so guided to gripping position, the gripper finger 109c holds the wire from jumping from between the jaws of the gripping means, until the wire is firmly held in place, after which the cutting operation takes place as will be described.

An arm 111 is rigidly mounted on the bracket 106 and is provided with an eye to which is connected one end of a spring 112. The other end of the spring 112 is connected to an eye in the arm of the gripper member 109 and tends to make the latter rotate clockwise as illustrated in Fig. 3. Since the link 110 connects the arm 105a and the gripper slot 109b, movement of the gripper 109 under influence of the spring 112 will also cause a tendency of the arm 105a to move clockwise, as illustrated.

On the side of the needle 100 is a grooved wire guide 100d which is mounted rigidly on the needle 100 in a position which, when the needle is at its most advanced position, will be close to the gripper 109. As the wire is pushed sidewise somewhat into the cut-away portion 100a by the cutter arm 105d the groove of the guide 100d tends to assist in placing the wire in position to be gripped by the gripper 109 and to be cut by the cutter 107. A groove 104a at the side of the needle path provides space for the wire as the needle enters the guide 104.

As the formation of a bale is started, the wires have to be placed across the baling space. In order to insure that there will be sufficient wire to do the tying after formation of the bale, there are provided a pair of wire-holding means.

Adjacent to the gripper and cutter means and at some distance therefrom in the direction of travel of the bale, there is mounted an upright standard which is rigidly connected to the frame. This standard is designated 120.

Mounted on one side are a pair of wire holding means consisting of a stationary member 120a and a pivoted holding member 121 having coacting means to grip the wires and hold them. Each holding member 121 has two projecting arms 121a, 121b. The arms 121b cooperate with an automatic tripping device which trips and releases both wire holding members 121 simultaneously. The arms 121a are used for hand control of the holding means when the wires are inserted.

On one side of the upright member 120 is a slide member 122 which is supported loosely on the upright with free but limited vertical movement. Bolts 123 pass through slots 122a and are supported in the upright 120. Trip arms 122b are integral with the slide member 122 and extend into position to engage the respective arms 121b of the holding members 121 when the slide 122 is raised. A lifting link 124 is pivoted at one end to an extension 122c of the slide member 122 and at its upper end to an arm of a bell crank lever 125. The bell crank lever 125 is pivotally mounted on arms 126 mounted rigidly on the upright member 120.

Connected to the other arm of the bell crank lever 125 is one end of a rod 127. This rod 127 when it moves to the right as illustrated, turns the bell crank lever 125 and by means of the connecting link 124, raises the slide 122. As the extensions or trip arms 122b contact their respective arms 121b, the holding members 121 release the wires 101 from their coacting gripping means.

The rod 127 is connected at its other end to a bell crank lever arm 128 which is mounted on the shaft 129. The shaft 129 is mounted pivotally at the bottom of the baler frame and carries at the inner side, another arm 130. On the upper end of the arm 130 is a spring-pressed detent 131 which is in position to be engaged by the lug 132 mounted on the needle operating slide tube 26.

In operation as the needle operating slide tube 26 moves to the left as illustrated in Fig. 1, the detent 131 is forced down as the lug 132 passes. On return, when moving to the right as illustrated, the detent 131 with the arm 130 and the shaft 129 together with the arm 128 are forced in a clockwise direction, as illustrated on Fig. 1, until the lug 132 rides over the top of the detent 131. This causes the rod 127 to operate the bell crank lever 125 to lift the slide 122 to operate to release the holding members 121, and in turn to release the wires for a purpose to be later described.

In Figs. 20 and 21, there is illustrated a modified form of the gripping member 109. In this form, the gripper 209 has a toothed surface 209a and a slot 209b, but instead of being provided with a finger, there is provided a guide lip 209c which extends over the path of the wire 100 and forces the wire to its place between the grip 108 and the toothed surface 209a.

The operation of the machine as a whole will now be described.

The baling operation having been started in the well-known manner with the wires held by the holding members 121, hay or other material is fed into the baling press and the well-known plunger alternately presses the hay or other mate-

rial into the bale being formed and then withdraws to permit more material to be put into the bale chamber in front thereof. As the formation of this bale continues, the wire being secured by holding member 121, is pulled around the end of the bale first formed. When it is time to complete and tie one bale and start forming a new bale, the bell 18 located adjacent to the star wheel 16 rings, signalling the operator, who in turn pushes lever 11 located on top of the baler. This trips catch 23 which allows the latch 22 to come into a position where it may be engaged by the pin 21 of the crosshead 20. As the crosshead 20 reverses its movement, the pin 21 and the latch 22 start the needle operating mechanism to drive the needle 100 across the baling chamber, pushing the wire 101 into the cutting and gripping mechanism as shown in Fig. 3, whereby the wire 101 is caught by the teeth 109^a and gripper 108. As the needles return, the wire 101 is cut by cutting members 105^e and 107 leaving one wire end gripped by the members 108 and 109 and one looped end wire free. As this operation takes place, the upright grippers 121 are released through mechanism 122 as already described, Fig. 1. At this point of operation, the operator manually clamps the loose looped end wire by the holding members 121. While this operation is being done, the bale in the chamber is being formed and moved along the bale chamber, pushing the wire around the end of the bale the wire end being gripped by the gripper 109. After the operator manually clamps the wire 101 by holding member 121, he now immediately, by pushing lever 105 releases the wire held by the gripper 109. This releases wire 101 for completing the tie of the bale, which is performed manually. As the manual operation is being carried out, a new bale is being formed.

The looped end of the wire for the new bale, as already stated, is being held by holding member 121. When the new bale is ready to be tied, the operation of the manual lever 11, causes the pin 21 on the crosshead 20 to engage the latch opening 22^b and the needles again bring in wire loops which are caught by the gripping devices 108, 109 and cut by the cutters 105^e and 107. On reaching its former position, the pin 21 overrides the opening 22^b to position the latch 22 for engagement by the detent 24. By the same action, the end of the catch 23 pivots the depending pivoted end 15^b which latter is restored by the spring 15^d. At this point, the detent 24 engages the latch 22 to hold it retracted from operative position and the cycle is complete.

As the movement of the latch 22 begins the forward movement of the needle operating slide tube 26, the link 28 begins to swing the arm 29. This causes the link 33 to pull on the sliding block 32. As the block 32 is mounted on the swinging arm 31 and since its movement is, by the cam roller 34, confined to movement along the cam slot 36, movement of the block 32 takes place under this control.

It will be noted that the first part of the cam slot 36 which is followed by the cam roller is more nearly radial with relation to the pivot 30 of the swinging arm 31, than the last part of the cam slot 36, which in the embodiment illustrated is constructed on an arc about pivot 30 as center. Due to this construction, for a given movement of the needle operating slide tube 26, there will be a less movement of the swinging arm 31 during the initial part of the stroke, than during the last part of the stroke. This initial slow movement, pulls the needle 100, through the frame 38 and the link 37, slowly to start the needle on its movement.

One advantage of the slow starting movement is that there is less liability of breaking the wire as the roller pulley 102 of the needle 100 begins to force the wire through the baling space. As the pulley 102 with the needle 100 passes through the baling space, the wire is fed from the usual wire coil box 41. As the needle 100 at its outer end 100^c pushes against the arm 105^b of the cutter 105, the cutter member 105 will be pivotally moved. This movement causes the arm 105^d of the cutter member to swing into the recess 100^a of the needle 100. This causes the wire to ride up on the slope 105^g adjacent the cutting edge 105^e. Near the end of the movement of the arm 105^d into the recess 100^a, the wire passes over the end of the slope 105^g of the arm 105^d, the wire dropping into position between the cutting edge 105^e of the cutter 105, and the stationary cutter 107.

At the same time, the wire is assisted in its movement to a position between the two cutter members 105^e, 107, by the cutter finger 107^a. Also at the same time, the wire drops behind the grip lug 108. Since the movement of the cutter 105 by the needle 100, also moves the gripper 109, through the link 110, to open position, the wire drops in place to be gripped between the toothed edge 109^a of the gripper 109 and the grip lug 108.

When the needle begins to move back to its initial, inoperative position, by means of a reversal of movement of the parts 26, 27, 28, 29, 31, 32, 33, and 34, the wire loop is left in place and as the shoulder 100^b engages the arm 105^d, the cutter member 105 reverses its movement. The spring 112 operates to close the toothed edge 109^a against the grip lug 108 with the result that the wire is firmly held in place. The guide finger 109^c assists to prevent the wire 101 from escape from the gripping means until the wire is firmly held.

Continued movement of the needle toward inoperative position causes the cutting edges 105^e and 107 to cut the wire immediately after it is gripped between the gripping means 109^a and 108. Since as the needle recedes, it leaves the wire loop, the cutting of the wire results in a short end gripped in the gripping means and a long end which is to become a part of the wire for the new bale just started. As the needle operating slide tube 26 starts its return movement simultaneously causing the needle to recede, the lug 132 engages the detent 131, turning the shaft 129, swinging the arm 128, pushing the rod 127, turning the bell crank 125 to lift the releasing slide 122. This, through the lugs 122^b, turns the holding means 121. At about this time, the operative has taken the wires in his hand so that when the releasing action takes place he can remove the wires from the holding means.

The completed bale now moves through the baling frame with the new bale being formed in front of it as the old bale is pushed toward the discharge end of the baler. One end of the wire at the rear of the bale having been released from the holding means 121, the other end which is held by the gripper 109, pulls the wire around the bale as the formation of the new bale progresses. In this way there is a longer free piece of wire on the gripper end than when the gripping took place. The arms 105^a are now manually engaged to release the grippers 109. The ends of the wire will now be free for tying with the ends released

from the holding means. It is believed to be apparent that were it not for the release of the wires held by the holding means substantially as soon as the gripper 109 gripped the wire, an immediate tightening of the wire would take place with eventual breakage as a result. While it would be possible to release the wire for the completed bale as soon as the new bale was started, the tying would then have to be made with the knot at the bale end. This is not to be desired.

As soon as the wires are tied, the bale is completed.

The operation continues with the cycle above set forth, repeated until the material is all baled.

While in the specification and claims, the term wire is used, it is to be understood that this is used broadly and to mean a cord, string, metallic or non-metallic strip or any other suitable elongated flexible element which may be used to secure a bale.

While an embodiment and modifications of the invention have been illustrated and described in detail, it is to be understood that the disclosures are merely illustrative and that modifications and changes may be made without departing from the spirit of the invention and within its scope as claimed.

Having described our invention what we claim is:

1. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, means for forcing the needle through the path of the bale-forming means, a wire gripping means adjacent the place of limit of needle travel, and having a pivoted member, a wire cutting means adjacent the gripping means for severing the baling wire and also having a pivoted member, a link connection between the two pivoted members to move one from the other, and means on the needle to move the cutting and gripping means to open position as the needle travels toward extended position and to operate the gripping and cutting means in the return movement.

2. In a baling machine, a baler needle having a wire-bearing surface substantially on its axis and adjacent its forward end and a cut away portion, means for forcing the needle through the path of the bale forming means, wire cutting and gripping means adjacent the needle path, and means including a pair of extending members separate from, but operable by, the needle, one of the extending members being in the path of the needle to open the cutting and gripping means and simultaneously force the other member into the cut away portion of the needle during a part of the needle movement, the member in the cut away portion being operated by the needle in another part of the needle movement to close the cutting and gripping means.

3. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end and having a pair of oppositely facing shoulders, a wire cutter, a gripping device, means connecting the two together whereby one may be operated by movement of the other, and a bell crank lever connected to and for operating the cutter and gripping device, the arms of the bell crank lever being in position to be operated by one shoulder when the needle is operated in one direction and by the other shoulder when the needle is operated in the opposite direction.

4. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end and having a pair of oppositely facing shoulders, a wire cutter having a lever arm extension, a gripping device having a lever arm extension, and a link connecting the arms together to permit operation of one by the other, one of the arms having bell crank arms extending therefrom and in position to be operated upon, respectively by the shoulders of the needle as the latter is moved.

5. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutting means and a wire gripping device mounted adjacent the path of needle movement and each having slanting guide portions for guiding the wire to the gripping and cutting means, and means operated by the needle for pushing the slanting guide portion of the cutting means under the wire to place it in position to be gripped and cut.

6. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutter and a wire gripping device mounted adjacent the path of needle movement, the cutter having a movable member in the path of, and for operation by, the needle, and a guiding means on the movable member for pushing the wire out of its normal position to guide it to the cutter and gripping device.

7. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutter and a wire gripping device mounted adjacent the path of needle movement, the cutter having a movable member in the path of, and for operation by, the needle, a guiding means on the movable member for pushing the wire out of its normal position to guide it to the cutter and gripping device, and means for opening the cutter and gripping device to receive the wire as the guiding means operates to place the wire in position to be gripped and cut.

8. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutter and a wire gripping device mounted adjacent the path of the needle movement, the needle having a recessed portion to receive the cutter, means integral with the cutter to force the cutter against the wire, and guide means to guide the cutter under the wire to place the wire in cutting position.

9. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutter and a wire gripping device mounted adjacent the path of the needle movement, the needle having a recessed portion to receive the cutter, means integral with the cutter to force the cutter against the wire, guide means to guide the cutter under the wire to place the wire in cutting position, and means connecting the cutter means with the gripping device to open the latter to receive the wire.

10. In a baling machine, a baler needle having a wire-bearing surface adjacent its forward end, a wire cutter separate from and in the path of, for operation by, the needle, a wire-gripping device mounted adjacent the path of the needle, and a wire holding device for securing the wire after it has been cut by the cutter.

11. In a baling machine, a baler needle having a wire-bearing surface, a cutter, a wire gripping means, a wire-holding device for securing the wire after it has been cut, and means for automatically releasing the holding device at substantially the same time as the gripping of the wire by the gripping means.

12. In a baling machine, a baler needle having a wire-bearing surface, a cutter, a wire gripping means and a wire-holding device for securing the

wire after it has been cut, and coacting means for causing the gripper to grip the wire and the cutter to cut the wire adjacent the gripping means and the holding device to release its wire, all substantially at the same time.

13. In a baling machine, a baler needle having a wire-bearing surface, a cutter, a wire gripping means and a wire-holding device for securing the wire after it has been cut, means for driving the needle slowly in the initial and last portions of its movement and faster during the other portions, and coacting means for causing the gripper to grip the wire, the cutter to cut the wire and the holding device to release the wire, all at substantially the same time.

14. In a baling machine having a bale-forming means, a baler needle having a wire-bearing surface substantially on its axis and adjacent its forward end, means for forcing the needle through the path of the bale-forming means, a wire-gripping means adjacent the place of limit of needle travel, a wire-cutting means separate from the needle and adjacent the gripping means for severing the baling wire, and coacting means between the needle and gripping means to operate the gripping means by the needle.

15. In a baling machine having a bale-forming means, a baler needle having a wire-bearing surface substantially on its axis and adjacent its forward end, means for forcing the needle through the path of the bale-forming means, a wire-gripping means adjacent the place of limit of needle travel, a wire-cutting means separate from the needle and adjacent the gripping means for severing the baling wire, and coacting means between the needle, gripping and cutting means to operate the two latter by the needle.

16. In a baling machine, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, means for forcing the needle point through a predetermined path, a wire-cutting means adjacent the path of the needle to receive the wire from the needle, and a wire-gripping means adjacent the path of travel of the needle and in position to receive the wire, the needle and cutting means having coacting surfaces therebetween for operating the cutting means by the needle after the wire has entered the gripping means.

17. In a baling machine, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, wire-gripping means, wire-cutting means, means for forcing the needle through a predetermined path, means operating in co-ordination with the needle to guide the wire into gripping position in the gripping means, and means under control of the needle for causing operation of the cutting means and gripping means at substantially the same time.

18. In a baling machine having a bale-forming means, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, means for forcing the needle across the path of the bale-forming means, a wire-cutting means, wire-gripping means, and means under control of the needle for operating the cutting means and the gripping means, including a connection between the cutting means and the gripping means for operating the latter by the former.

19. In a baling machine having a bale-forming means, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, means for forcing the needle across the path of the bale-forming means, a wire-cutting means and a wire-gripping means adjacent the place of limit of needle travel, the wire-gripping means being under control of the movement of the wire-cutting means, and means operated by the needle to operate the cutting means and gripping means.

20. In a baling machine having a bale-forming means, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, means for forcing the needle across the path of the bale-forming means, a wire-gripping means, a wire-cutting means, the wire-gripping and wire-cutting means being in position to receive the wire carried by the needle during a portion of its stroke, coacting means between the needle and cutting means to operate the cutting means by the movement of the needle, and an operating connection between the gripping means and cutting means whereby the cutting means and gripping means are operated to cut and grip the baling wire during another portion of the movement of the needle.

21. In a baling machine having a bale-forming means, a baler needle having a wire-engaging surface substantially at its axis and adjacent its forward end, means for forcing the needle across the path of the bale-forming means, a wire-cutting means, a wire-gripping means, and means for placing the wire-cutting and wire-gripping means in position to receive the baling wire during movement of the needle in one direction and to cause operation of the wire-cutting and wire-gripping means when the needle moves in the opposite direction.

22. In a baling machine having a bale-forming means, a baling needle having a wire-engaging surface substantially on its axis and adjacent its forward end and having a cut-away portion, means for forcing the needle across the path of the bale-forming means, a wire-gripping means adjacent the needle path, and a wire-cutting means separate from but operable by a surface of the needle to place the cutting means and gripping means in position to receive the baling wire during one portion of the needle travel, the wire-cutting means and gripping means being operable by a surface of the cut-away portion to cut and grip the baling wire during another portion of the needle travel.

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