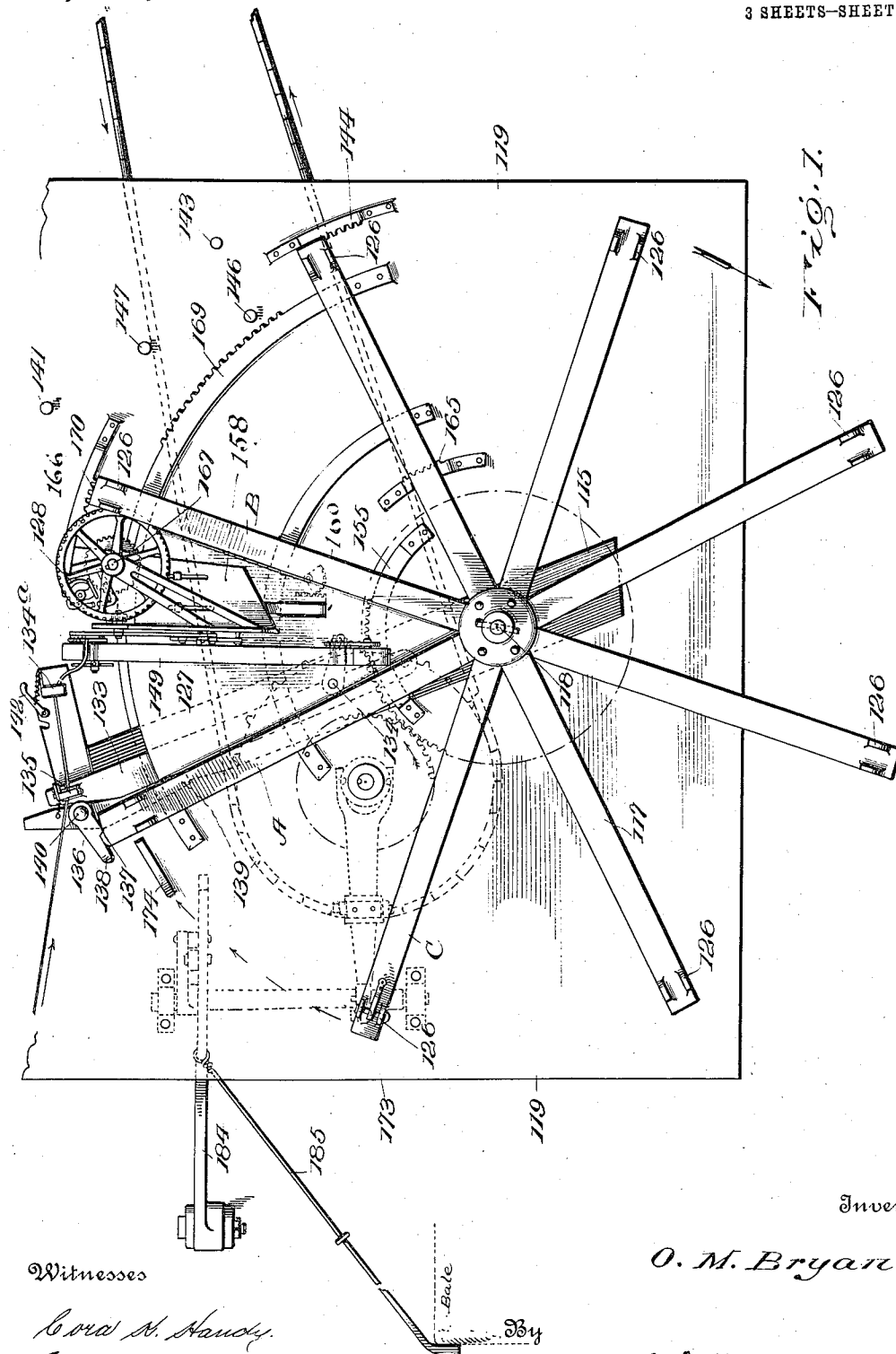


O. M. BRYAN.  
HOOP FORMING APPARATUS.  
APPLICATION FILED SEPT. 19, 1911.

1,052,407.

Patented Feb. 4, 1913.

3 SHEETS—SHEET 1.



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Witnesses

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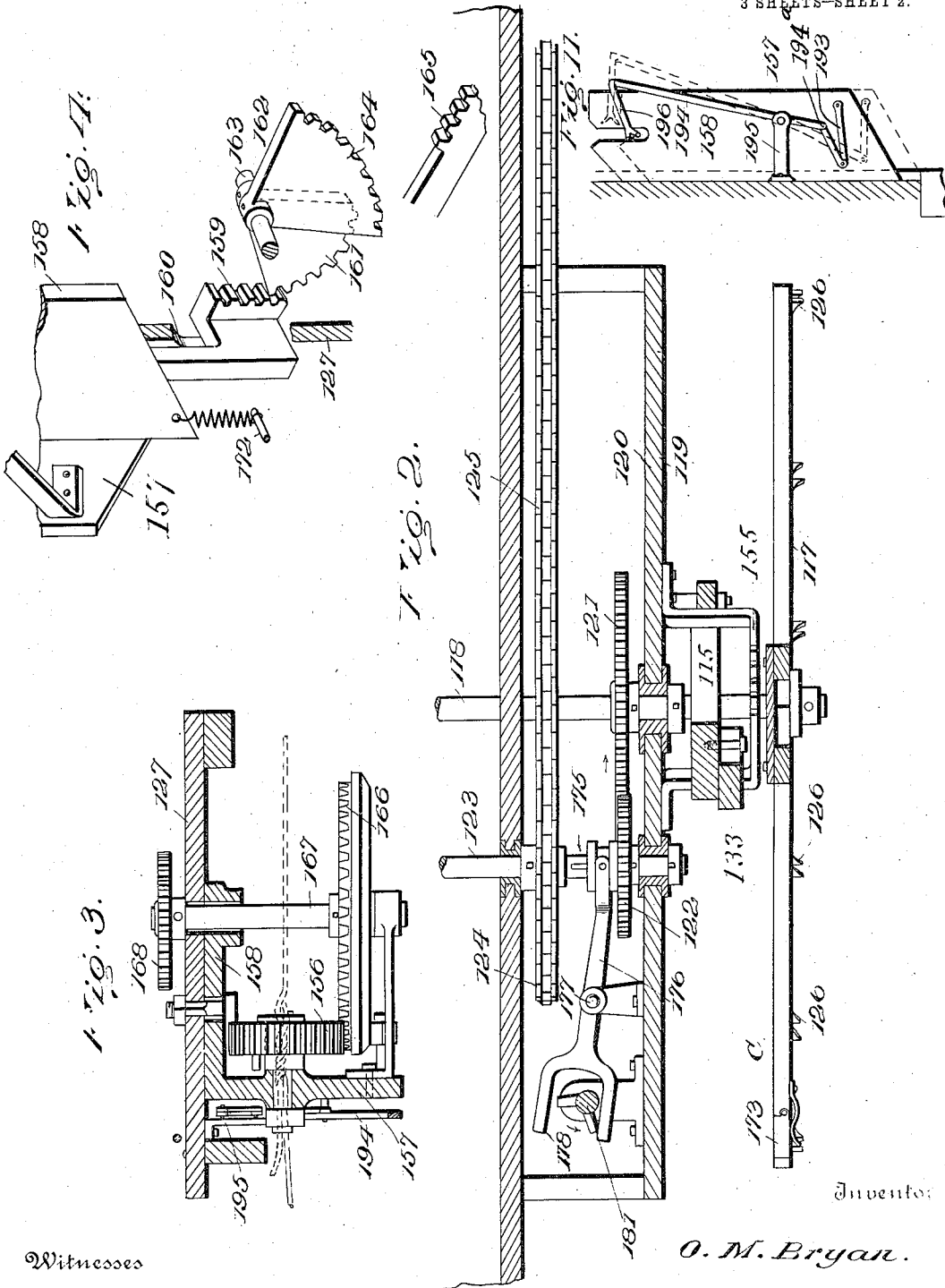
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3 SHEETS-SHEET 2.



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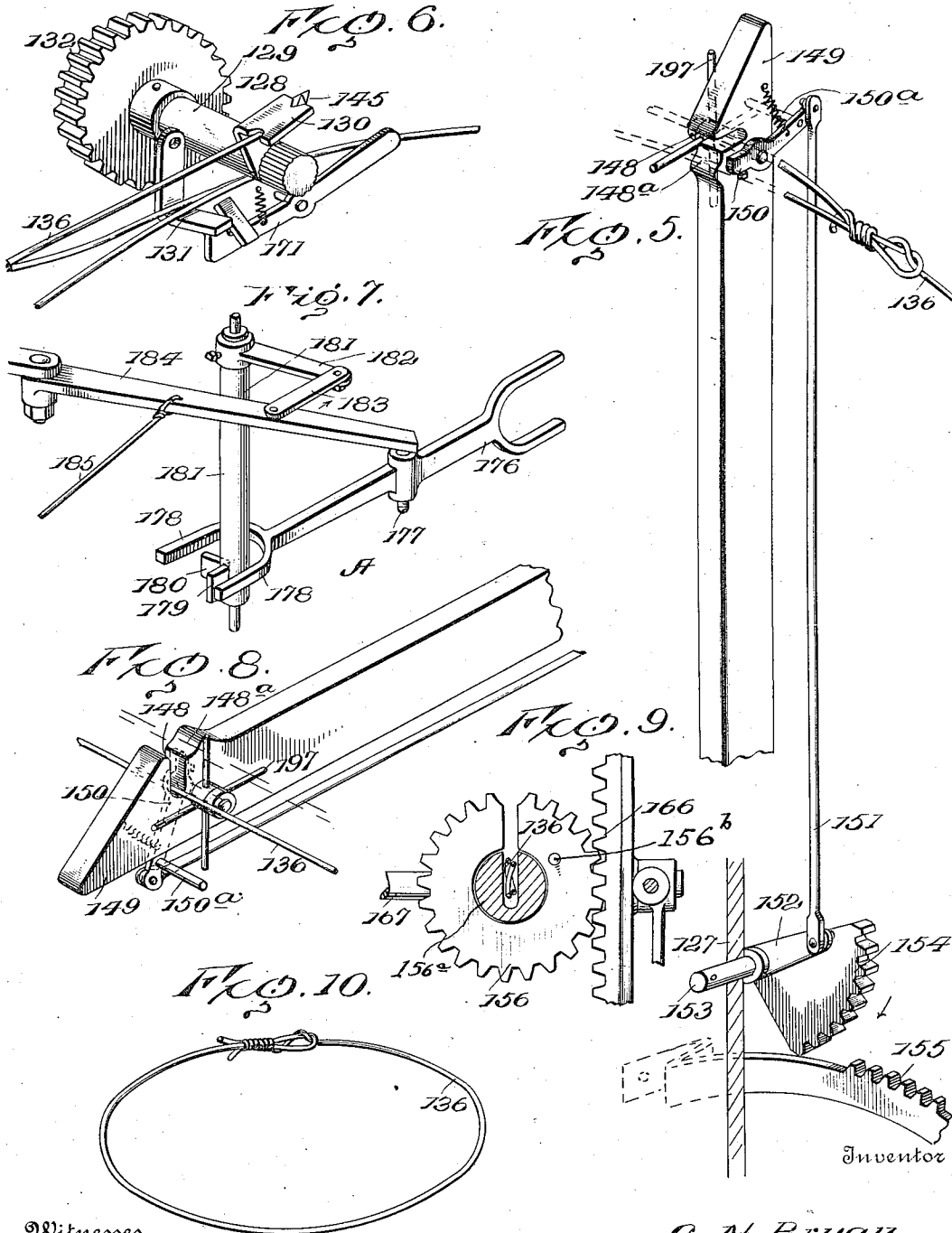
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## HOOP-FORMING APPARATUS.

1,052,407.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Original application filed March 21, 1911, Serial No. 615,982. Divided and this application filed September 19, 1911. Serial No. 650,224.

*To all whom it may concern:*

Be it known that I, OSCAR M. BRYAN, a citizen of the United States, residing at Chanutte, in the county of Neosho and State of Kansas, have invented certain new and useful Improvements in Hoop-Forming Apparatus, of which the following is a specification.

This invention comprehends certain new and useful improvements in machines for forming wire loops, the present invention, although adaptable for forming hoops for general purposes, being designed particularly as an adjunct to and part of an improved machine for baling hay or the like, the present application being a division of my allowed application for Letters Patent of the United States for baling machine, filed March 21, 1911, Serial No. 615,982.

The machine just referred to embodies, among other features, baling mechanism, means for applying wire hoops to the bales as they are formed, and means for forming the hoops and for casting them into devices which pass them to the hoop applying mechanism, and the present invention, which has to do particularly with the hoop forming devices, has for its primary object an improved construction and arrangement of parts whereby wires will be automatically taken from a spool or spools and formed into hoops for the bales, the invention also having for its object an improved hoop forming mechanism which will be fed continuously from the wire holding spool or spools, which will form portions of the wires into hoops, which will automatically overlap the ends of the wires, which will automatically cut the loops from the wires leading from the spools and hold such wires, which will automatically twist the overlapped and looped ends of the wires, and which will then immediately positively cast the completed hoops laterally, whereby they are dropped into hoop holding racks or other receptacles from which they may be passed to the means which are designed to directly apply the hoops to the bales. And the invention also has for its object a machine or apparatus of this general character which will generally improve automatic hoop forming devices and baling machines of the automatic continuous type, and

render the same more useful and commercially desirable.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a side elevation of my improved hoop forming apparatus; Fig. 2 is a horizontal sectional view thereof; Fig. 3 is a detail section through the twisting device; Fig. 4 is a fragmentary perspective view of the means for raising and lowering the support for the looping devices; Fig. 5 is a fragmentary perspective view of the wire cutter; Fig. 6 is a detail perspective view of the looper; Fig. 7 is a similar view of a clutch device hereinafter specifically described; Fig. 8 is another view of the cutter; Fig. 9 is a detail view of the twister pinion and its actuating crown wheel; Fig. 10 is a view of one of the hoops formed; and Fig. 11 (Sheet 2) is a detail view of the device that is designed to force the upwardly projecting ends of the hoop wire down into the twister preparatory to the operation of the latter.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters, the same numerals being used in the present case that are used for corresponding parts in the application of which this is a division, so that, should it become necessary to refer to both applications for a perfect understanding of the entire machine, little difficulty may be experienced in identifying corresponding parts.

Referring to the drawings, the numeral 117 designates, as a whole, a preferably vertically disposed reel, of which there are two in the baling machine hereinbefore referred to, of like construction and simultaneous operation, located on opposite sides of the baling mechanism, and so arranged that they will simultaneously form two hoops. Only one of these reels is illustrated and

only one will be described, for the reason that, as before stated, the invention is applicable for general use in forming hoops and is not necessarily restricted in its application to a baling machine.

The reel 117 is secured on the end of a shaft 118 which is journaled in and projects outwardly from a supporting element which in the present instance is in the form of a board, designated 119, arranged in spaced relation to the main framework, as best seen in Fig. 2, so as to form a well 120, in which certain parts of the reel driving mechanism are mounted. In this well is a gear wheel 121 secured to the shaft 118 and meshing with a gear wheel 122 mounted on a countershaft 123. The shaft 123 carries a sprocket wheel 124 around which a drive chain 125 passes, said chain being driven in any desired way, as by connection with some movable part of the baling machine before mentioned. From the darts or arrows at the upper right-hand corner of Fig. 1 it will be understood that an anti-clockwise movement is imparted to the countershaft 123 and a clockwise movement imparted to the shaft 118 and the reel 117 carried thereby. The reel 117 comprises a rimless structure embodying, in the present instance, eight equally spaced radially extending spokes or arms, each of which is provided near its outer end with lugs 126, designed to directly support the wire that is being formed into a loop or hoop. As it is necessary to distinguish three of these arms from the others, I have designated such arms A, B and C.

A segmental web or plate 127 is secured to the arms A and B and fills the space between the same, said plate carrying a looper 128 which comprises (Fig. 6) a spindle 129 journaled in the plate, a notched and angular looping finger 130 being secured to the spindle near the outer end thereof. The spindle 129 has a wire guiding finger 131 designed to direct the wire toward and underneath the spindle. Said spindle is provided at its inner end with a spur pinion 132 designed to engage a rack 170, as will be hereinafter more specifically set forth.

Mounted freely upon the shaft 118 on the inner side of the reel 117 is an arm 115, said arm being mounted to rock or oscillate and carrying a bar 133 which is pivotally connected thereto, as at 134 to swing in a plane parallel to the plane of movement of the arm. This arm 115 carries a wire clutch 134<sup>a</sup>, and the bar 133 also carries a clutch, designated 135. The wire 136 passes from the spool through these clutches, said clutches being spring closed. As the reel is rotated, the arm A, which is notched at its outer end, as at 137, and which is longer than the other arms by the projection of its end beyond the notch, is adapted to engage a swinging link 138 carried by the outer

end of the arm 115, whereby the continued movement of the reel 117 will cause the arm 133 to swing toward the right, as the reel is viewed in Fig. 1 carrying the clutches with it and consequently the wire 136 also. The arm 115 carries a lever 139 pivoted at 140, the lower arm of said lever being designed to engage with the adjoining edge of the pivoted bar 133. In the rotation of the reel and in the swinging movement of the arm 115, the upper end of this lever 139 will finally engage and trip upon a pin or bumper 141, projecting from the front face of the board 119, while at the same time a releasing lever 142 which is part of the clutch 134<sup>a</sup> will engage a similar pin 143. The engagement of the lever 142 with the pin 143 will release the hold of the clutch 134<sup>a</sup> upon the wire, and the engagement of the lever 139 with the pin 141 will cause said lever 139 to impart a swift swing to the bar 133, whereupon the clutch 135 will overtake the clutch 134<sup>a</sup> and carry the end of the wire forwardly over the guide 131 and under the spindle 129. Immediately thereafter, the rotation of the reel will bring the pinion 132 in engagement with the teeth of a relatively short rack 144 that is secured to the board 119, and the spindle 129 will be turned sufficiently to cause the looping finger 130 to form a two-third loop of the wire around the spindle, as indicated in Fig. 6. The end of the wire will thus be caught, the looping finger being held in this position by a spring detent 145, and as the reel continues to revolve, the lever 139 will finally contact with a pin or bumper 146, the lever being thereby tripped and releasing the bar 133, which flies back with open clutch. As the reel still continues to move around, the link 138 will engage and be tripped by the pin or bumper 147, the arm 115 being thereby released, whereby said arm with its bar 133 will come back with open clutches to its original starting position illustrated in Fig. 1.

In the further movement of the reel, it is evident that the wire will be drawn through the clutches and formed into a complete circle around the series of lugs 126, the looper 128 finally arriving at a point where a complete loop has been formed, and the end of the wire coming from the reel stretching from the clutches again to the looper will fall into the notch 148 of a cutter bar 149. At this point in the movement, the pivoted cutter 150 carried by the cutter bar 149 and spring held in an inoperative position, will be rocked to cut off the wire by means of a link rod 151. One end of said link rod is pivotally connected to a crank 152 (see Fig. 5) on a stub shaft 153 mounted in the plate 127, the shaft 153 also carrying a toothed segment 154 which meshes with a rack 155

secured to the board 119. The wire will thus be cut and it is thus only necessary to twist the looped ends and to cast the completed hoop laterally from the reel. These operations are accomplished by the following means and in the following manner: The twister, designated 156, is in the form of a spur pinion mounted on a stationary hub 156<sup>a</sup> (see Fig. 9) and provided with a slot designed to receive the looped ends of the wire, and said pinion is journaled on the projecting angular side 157 of a frame or bracket 158 mounted for a slight vertical movement on the outer side of the plate 127. The plate 127 is normally in lowered position, but in the rotation of the reel 117, when the looper 128 is at the point illustrated in Fig. 1, and the wire 136 has been cut by the cutter bar 149 and its knife, a rack 159 formed on the lower end of the frame 158 and working in a slot 160 in the plate 127, will be engaged by one section 161 of a double segment 162 mounted on a shaft 163 journaled in the plate 127, the other section 164 of said double segment at this time meshing with a rack 165 secured to the board 119. Consequently, this movement of the double segment will effect the raising of the frame 158, whereby to carry the twister pinion 156 upwardly, so that the walls of its slot will straddle the wire. Immediately thereafter the twister pinion will be rotated. Said pinion meshes with a crown gear wheel 166 secured on the outer end of a shaft 167 journaled in the frame 158, whereby to rotate the pinion 156. The shaft 167 carries at its inner end on the inner face of the plate, a spur pinion 168. On the rotation of the reel, this pinion 168 will engage a rack 169 secured to the board 119 to effect the rotation of the twister and the twisting of the looped wires, but immediately before that engagement, it is to be understood that the looper pinion 132 will have engaged the rack 170 so as to impart a further movement to the spindle 129 and the formation of a complete loop. Thus the ends of the wire will be completely looped around the spindle and will be twisted, the twisted loop being then automatically stripped from the outer free end of the spindle 129 by means of a cam lever 171 pivotally connected to the plate 127, and operated by means of the shaft 167 which strikes the rear end of the lever 171 when the frame 127 is permitted to lower, said frame being lowered either by gravity or by a pull spring 172, as indicated in Fig. 4. When the frame comes up, the shaft 167 merely strikes the rear end of the lever 171 and passes by it, but when coming down, the shaft engages the rear end of the lever 171 and throws the opposite end thereof against the wire so as to wedge inwardly thereon to cast the loop upon the spindle

129. As soon as the hoop has been completed, it is cast laterally from the reel into any suitable receptacle, such as the rack of the baling machine hereinbefore mentioned, by means of the arm C which carries a laterally movable pivoted section 173 at its outer end designed for engagement by a cam 174 projecting outwardly from the board 119.

In order to automatically start and stop the reel and particularly when the same is embodied in my improved baling machine, I have provided clutch mechanism, best illustrated in Figs. 2 and 7. A clutch 175 is designed to effect the coupling and uncoupling of the wheel 122 and shaft 123, said clutch being operated by means of a shipper lever 176 pivoted intermediate of its ends at 177 and having a forked arm 178, the ends of which are designed for alternate engagement by angularly disposed lugs 179 and 180. These lugs are formed on a vertically disposed shaft 181 and said shaft is provided with a crank 182 connected by a link 183 with a pivoted arm 184. The arm A of the reel is designed to strike the arm 184 so as to partially rotate the shaft 181 in a direction to effect the engagement of the lug 179 with the forked arm 178 of the shipper lever 176, the consequent movement of the shipper lever throwing the clutch 175 out and breaking the driving connection between the shaft 123 and the reel shaft 118. As a bale in the press is completed and is pushed forwardly and nearly completes its forward movement, it will engage a link rod 185 connected to the arm 184 and consequently effect the partial rotation of the shaft 181 in the opposite direction, which will cause the lug 180 to engage the arms 178 and rock the shipper lever in a direction to throw the clutch in, whereby to again start the reel.

As best illustrated in Fig. 11, the frame 158 has a link 193 connected to it, said link being pivotally connected to a jointed arm 194 fulcrumed on a stationary bracket 195. The upper end of this arm bends inwardly and is forked, as at 196. As the frame 158 moves outwardly, the joint of the arm 194 is broken at 194<sup>a</sup>, as is manifest and shown in full lines in this Fig. 11, whereby the upper forked end thereof will be moved inwardly so that the forked end 196 will engage the wire and positively move it down into the slot of the twister pinion 156 so that the twister pin 156<sup>b</sup> on the side of the twister pinion will come in contact with the wire and release the wire around the loop. It is to be understood that the loop itself does not twist, but lies in the slotted hub 156<sup>a</sup> that carries the twister pinion.

The cutter bar 149 (see Fig. 8) carries a pin wheel 197 embodying four arms that are

adapted to sweep past the cutter recess 148 and a receiving recess 148<sup>a</sup> formed in the cutter bar in spaced relation to the cutter recess 148. The cutter 150 is provided with an outwardly directed finger 150<sup>a</sup> that is designed to strike the pins of the wheel 197 which projects perpendicularly, as shown. Now, as the rear end of the cutter 150 is moved to cut the wire, the finger 150<sup>a</sup> will pass the adjacent pin 197, but will hit it, and as the finger 150<sup>a</sup> comes back it will hit it again, causing the pin 197 just under the wire to raise the end of the wire upon the receiving recess or saddle 148<sup>a</sup>, where it will stay and be pushed forward at the proper time to form another loop, thus leaving the cutter recess 148 empty to receive the next wire to be cut. As the operations of the different elements together combining to produce my improved hoop forming mechanism have been described in connection with the description of the construction and arrangement of the parts, the practical operation of the apparatus will therefore be understood and no further detailed description of the operations is deemed necessary.

While the foregoing description and accompanying drawings disclose what I believe to be the preferred embodiment of my invention, it is to be understood that the invention is not limited thereto, but that various changes may be made in the construction, arrangement and proportions of the parts without departing from the scope of the invention as defined by the appended claims.

Having thus described the invention, what is claimed as new is:

1. Hoop forming mechanism, including a reel provided with radial arms adapted to hold the wire as it is being formed into a hoop, one of said arms being provided with a laterally movable section, and means engaging said section for automatically casting the hoop from the reel.

2. Hoop forming mechanism, including a rotatable reel provided with radial arms adapted to hold the wire as it is being formed into a hoop, one of said arms being provided with a laterally movable section, and a relatively stationary cam designed for engagement by said section, whereby to move the same laterally and cast the hoop from the reel.

3. Hoop forming mechanism, including a rotatable reel, driving mechanism therefor, clutch mechanism including a shipper lever designed to couple and uncouple the reel from its driving mechanism, said shipper lever being provided with a forked end, a shaft formed with lugs received in said end and adapted to be oscillated about its longitudinal axis for the alternate engagement of said lugs with the forked end of the shipper lever, a swinging arm oper-

atively connected to said shaft to turn the same, the reel being provided with an arm adapted to engage the swinging arm to move the same in one direction, and means for moving said arm in the opposite direction.

4. Hoop forming mechanism, including a rotatable reel, driving mechanism therefor, clutch mechanism including a shipper lever designed to couple and uncouple the reel from its driving mechanism, said shipper lever being provided with a forked end, a shaft formed with lugs received in said end and adapted to be oscillated about its longitudinal axis for the alternate engagement of said lugs with the forked end of the shipper lever, a swinging arm operatively connected to said shaft to turn the same, the reel being provided with an arm adapted to engage the swinging arm to move the same in one direction, and means for moving said arm in the opposite direction, said last-named means embodying a link rod, substantially as described.

5. Hoop forming mechanism, including a rotatable reel, a swinging arm, a clutch carried by said arm, a bar pivotally mounted upon the arm to move in a plane parallel with the movement of the arm, a clutch carried by the bar, a looper and twister carried by the reel, means for automatically moving the bar relative to the arm during the rotation of the reel in a direction to cause the clutch carried by the bar to overtake the clutch carried by the arm, means for opening the last named clutch during the movement of the bar whereby to feed wire into the looper, and means for automatically actuating said looper, whereby to wind a strip of wire around the reel into a hoop formed for subsequent action thereon by the wire twisting and cutting devices.

6. Hoop forming mechanism, including a rotatable reel, wire loop twisting and cutting devices carried thereby, a swinging arm, means whereby the reel will move said arm with it during a portion of the revolution of the reel, a bar pivotally mounted upon the arm, a clutch carried by the arm, a clutch carried by the bar, the wire being adapted to be threaded through said clutches and held thereby, a lever fulcrumed upon the arm, a bumper adapted to strike said lever at one point in the movement of the arm whereby to accelerate the movement of the bar on the arm so as to advance the clutch of the bar toward the clutch of the arm to feed the wire into the looper, means for automatically opening the clutch on the bar during such movement, and means for immediately thereafter in the continual rotation of the reel imparting an initial movement of the looper.

7. Hoop forming mechanism, including a rotatable reel, a looper carried thereby, means for feeding wire into the looper, 130

means for automatically imparting an initial movement to the looper to effect a portion of the loop immediately after the feeding of the wire into the looper, the continued rotation of the reel winding the wire thereon and finally forming a complete circle, means for then cutting the wire close to the wire feeding devices and for imparting a second movement to the looper to complete the loop, and means for twisting the looped wire.

8. Hoop forming mechanism, including a rotatable reel, a looper carried thereby, means for feeding wire into the looper, means for rotating the looper to hold the wire whereby the continued rotation of the reel will form the wire into a complete circle, means for cutting off the wire, means for twisting the looped wire, and means for automatically stripping the loop from the looper.

9. Hoop forming mechanism, including a rotatable reel, a rotatable looper carried thereby, means for feeding wire into the looper, means for subsequently imparting an initial movement to the looper to partially form a loop, the continued rotation of the reel winding the wire around the reel into a complete circle, means for cutting the wire, means for imparting a second movement to the looper to complete the loop, means for twisting the looped wire, and means for automatically stripping the loop from the looper.

10. Hoop forming mechanism, including a rotatable reel, a looper carried thereby, means for actuating the looper, means for feeding wire into the looper, means for cutting the wire, means for twisting the looped wire to complete the hoop, a cam lever arranged to engage the wire at the looper to strip the wire from the looper, and means for automatically actuating said lever.

11. Hoop forming mechanism, including a rotatable reel provided with a notched arm, a looper carried by said reel, means for actuating the looper, a twister carried by the reel, means for actuating said twister, a cutter carried by the reel, means for actuating said cutter, wire feeding devices adapted to feed wire into the looper, said feeding devices embodying a freely movable arm, a link carried by said arm and adapted for engagement by the arm of the reel, whereby to effect the movement of the wire feeding arm by the reel, and means for automatically disengaging the link from the arm of the reel.

12. Hoop forming mechanism, including a rotatable reel, a looper carried thereby and embodying a rotatable spindle provided with a looping finger adapted to engage the wire and turn it over the spindle in the rotation of the latter, a pinion secured to

the spindle, and a relatively stationary rack designed for engagement by said pinion.

13. Hoop forming mechanism, including a rotatable reel, a cutter bar carried thereby, a cutter co-acting with and carried by the cutter bar, a link rod connected to the cutter, a shaft carried by the reel, a toothed segment connected to the shaft, a crank arm carried by the shaft and connected to the link rod, and a relatively stationary rack designed to engage with said segment for the purpose specified.

14. Hoop forming mechanism, including a rotatable reel, a plate embodied therein, a radially movable frame carried by said plate, twisting devices carried by said frame, said twisting devices including a slotted twister, means for automatically moving the frame outwardly in the reel whereby to cause the walls of the slot of the twister to straddle the wire, and means for rotating said twister.

15. Hoop forming mechanism, including a rotatable reel, a looper carried thereby, a frame supported by the reel and movable radially thereon, twisting devices carried by the frame, means for automatically moving the frame outwardly to carry the twisting devices into an operative position, and a stripping device adapted to strip the looped wire from the looper, the stripping device being operated by and upon the movement of the frame to its inner inoperative position.

16. Hoop forming mechanism, including a rotatable reel, a frame carried thereby and movable in a radial direction thereon, wire twisting devices carried by said frame, the frame being provided with a rack and movable outwardly to carry the twisting devices to their operating positions, a double segment carried by the reel, one section of said segment meshing with said rack, and a relatively stationary rack designed for engagement with the other section of the segment in the rotation of the reel whereby to move the frame outwardly.

17. Hoop forming mechanism, including a rotatable reel, a frame carried thereby, a shaft journaled in said frame, a crown gear carried by said shaft, a twister pinion journaled in the frame and meshing with said gear, a pinion secured to said shaft, and a relatively stationary rack bar designed for engagement with said pinion in the rotation of the reel.

18. Hoop forming mechanism, including a rotatable reel, a frame carried thereby, a twister pinion carried by the frame and formed with a wire receiving slot, means for moving the frame outwardly to carry the twister pinion to its operative position, and means for automatically pushing the wire down into the slot of the pinion upon upward movement of the latter.

19. Hoop forming mechanism, including a rotatable reel, a frame carried thereby, a twister pinion carried by the frame and formed with a wire receiving slot and a relatively stationary hub also formed with a slot, means for moving the frame outwardly to carry the twister pinion to operative position, an arm, and an operative connection between said arm and frame for automatically pushing the wire down into the slot of the pinion at its hub upon the outward movement of the frame.

20. In a machine of the character described, a cutter bar provided with a cutter notch and a saddle arranged in stepped relation to the notch, a cutter carried by the cutter bar and arranged to cut the wire, and means operable by said cutter for moving the cut wire from the notch and to the saddle.

21. In a machine of the character described, a cutter bar provided with a cutter notch and a wire receiving saddle, a pin wheel rotatably mounted on the cutter bar, a cutter co-acting with said notch to cut the wire lying therein, means for operating the cutter, and means carried by the cutter for striking the pin wheel to carry the cut wire from the notch to the saddle.

22. Hoop forming mechanism comprising means for forming a wire into a circle, means controlled by the first mentioned means for looping and twisting the ends of the wire to close the circle, and means for automatically discharging the hoop.

23. Hoop forming mechanism comprising means for forming a wire into a circle, means controlled by the first mentioned

means for looping and twisting the ends of the wire to close the circle, means for feeding the wire to the looping means, and means for automatically discharging the hoop.

24. Hoop forming mechanism comprising means for forming a wire into a circle, means controlled by the first mentioned means for looping and twisting the ends of the wire to close the circle, means for feeding the wire to the looping means, means for severing the wire after it has been formed into a circle, and means for automatically discharging the hoop.

25. Hoop forming mechanism comprising a rotary carrier, a looper mounted thereon adapted to bend and retain the end of a wire whereby the rotation of the carrier will cause the wire to form a hoop about the same, means on the carrier to feed wire to the looper, means to twist the wire and thereby close the hoop, and means for severing the hoop from the unbent wire.

26. Hoop forming mechanism comprising a reel on which wire is wrapped to form a hoop, a looper carried by said reel to initially loop wire, and means for feeding the wire to the looper consisting of a pair of clutches arranged to travel toward the looper, the forward clutch having a constant rate of travel and the rear clutch having a variable rate of travel.

In testimony whereof I affix my signature in presence of two witnesses.

OSCAR M. BRYAN. [L. S.]

Witnesses:

C. H. BARDWELL,  
J. A. CANNAN.