To all whom it may concern:

Be it known that I, Wilber Emery, a citizen of the United States, and resident of Wilmington, in the county of New Castle and State of Delaware, have invented a new and useful Improvement in Bale-Tie Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to bale-tie machines.

The object of my invention is to provide a simple and efficient machine of this character in which a single strand of wire may be fed continuously to a cutter to be cut into predetermined lengths and then quickly bent and twisted to form a single loop tie, the ties so formed being collected in bundles, the arrangement being such that while the ties of one bundle are being assembled the ties in the preceding bundle may be bound up by the operator.

To these ends my invention comprises the novel features hereinafter set forth and claimed.

In the accompanying drawings Figure 1 is a general plan view of a machine partly broken away; Fig. 2 is a side elevation. Fig. 3 is a vertical section on the line 3–3, Fig. 1; Fig. 3A is a detail of the pin wheel and finger plates; Fig. 3B is a section on the line 3B–3B, Fig. 3A; Fig. 4 is a rear view of the machine showing particularly the means for operating the cutting mechanism; Fig. 5 is a section on the line 5–5, Fig. 1; Fig. 6 shows the detail of the cutting mechanism; Fig. 7 is an enlarged section on line 7–7 of Fig. 5; Fig. 8 is a section on the line 8–8, Fig. 1; Figs. 9 and 10 show details of the cutting mechanism; Figs. 11 and 12 are details of the bender.

In the drawings the numeral 2 designates the bed supported by front legs 3 and rear legs 4. The bars 5 and 6 connect the bed to the rear legs. The main shaft 7 is mounted in the bearings 8 and 9 in the bed and motion is communicated to said shaft by the tight and loose pulleys 10 and 11. On the opposite end of the shaft 7 is the double gear 12 which is arranged to be slipped on a feather key and is retained in position by the washer 13. The shaft 7 at this end is slightly reduced to form a shoulder for said gear 12. Different sized gears 12 may be employed to make different 55 lengths of bale-ties. The gear transmits motion through the intermediate gear 14 to the gear wheel 15. The intermediate gear 14 revolves on the pin 16 which is adapted to be moved in the segmental slot 17. The gear 15 is mounted on the shaft 18 of the wire feeding mechanism. The standard 19 is cast integral with the bed 2 and forms a bearing for the shaft 20 which receives motion from shaft 18 through gears 21 and 22. The shafts 18 and 20 carry the feed rolls 23 and 24 which operate continuously and so feed the wire continuously into a suitable guide 25 supported from standard 19 by the plate 26. The upper shaft 18 is supported in a block 28 which tilts on a pivot 29 and is held down to bring the upper roll 31 in contact with the wire by means of springs 30 and 32, said springs resting on the plate 22 bolted to block 28. The block 28 can be raised slightly to introduce the wire by means of the cam lever 33. The double gear 12 meshes with the gear-wheel 35 mounted on the pin 36, and said gear-wheel 35 meshes with the gear-wheel 37. In this way motion is transmitted to the cutter-head shaft 34 which is supported in the standard 38 of the bed and said shaft carries at its forward end the cutter-head 39. This cutter-head 39 has a slot 40 cut in its periphery and the smaller diameter of said cutter-head is the same as that of the feed-rolls 23 and 24, said cutter-head being so geared as to make the same or practically the same number of revolutions 90 as said feed rolls. A fixed cutter 41 is inserted in the cutter-head and the co-acting cutter 42 is fixed in the block 43 which is pivotally mounted on the pin 44. The spring 45 acts to hold the cutter 42 normally out of engagement with the cutter 41. The cutter 41 is secured in place by the setscrew 41A. The block 48 has the lug 46 projecting beyond the rim of the cutter-head 39 and through the mechanism acting on said lug, the cutter 42 is moved forward to co-act with the cutter 41, all as fully hereinafter set forth.

On shaft 8 is mounted the combined spur and miter-gear 47 which meshes with the gear-wheel 48, said gear-wheel making one revolution to each bale-tie formed. The gear-wheel 48 is secured to the hub.
of miter-gear 49 which is fixed on short shaft 50 supported in bearing 51 forming a part of the bed. The miter-gear 49 meshes with the miter-gear 52 fixed on the short-shaft 53 which is supported in the bearing 54 forming part of the bed. On the other end of the shaft 53 is secured the disk 55 which carries the bent arm 56 for actuating the pin-wheel 57 of the conveying mechanism. The pin-wheel 57 carries eight pins 58 spaced at equal intervals which are successively engaged by the arm 56. The wheel 57 is moved one-eighth of a revolution by the engagement of the arm 56 therewith and is then locked in position by the locking ring 59 during the remainder of the revolution of the disk 55. It will be observed that the locking ring 59 is broken at intervals by the passages 56 which permit the pins 58 to pass through said ring when wheel 57 is rotated by arm 56 whereinupon the further rotation of said ring 59 acts to lock the pin-wheel 57 against further movement by the pins engaging on the inside of the ring.

The pin-wheel 57 is fixed on the end of the conveyor rod 60 which is supported in bearings in a series of brackets 61 and the bracket 62. The rod 60 has a series of finger plates 63 attached thereto, said finger plates having eight slotted fingers 64 corresponding to the eight pins 58 of the pin-wheel 57. One of the finger-plates 63 is secured to pin-wheel 57, the others being attached to flanges 65 fixed on the rod 60.

The wire which is fed into the machine by feed-rolls 23 and 24 is passed through guide 26 under the cutter-head 39 and through rod 66 incased in the stationary tube 68 having the longitudinal slot 69a. The rod 66 is provided with a slot 67 on its under side. However, after each cutting operation, the rod 66 is tilted by means of the finger plate 69, the fingers of which correspond to the slotted fingers of finger plate 63 and pins 58 of pin-wheel 57. This finger plate 69a operates an arm 70 which is inserted in the end of rod 66, and the arm 70 is in the path of finger plate 69a and is pressed downward by the passing of each finger, while at the same time the slotted fingers of finger plates 63 straddle the wire and carry it down in slots 71 of brackets 61. The rod 66 is drawn back to its normal position to receive the next incoming wire by means of the spring 72 which acts to pull down arm 70 to rest on stop pin 73 thereby closing slot 67. At each movement of the pin-wheel 57, a wire cut to length is carried down into the bending and twisting head which will be described later and at the same time a finished tie is carried out of said twisting head and is dropped down the slot 71 to the counting mechanism which also will be described later.

The miter-gear 47 meshes with the miter 77 which slides on two feather keys placed on the stem of the head 78 by which rotary movement is imparted to the head 78. This miter-gear 77 is journaled in the bearing 79 forming part of the bed. The head 78 is yieldingly arranged by means of the coiled spring 80 placed in a recess of the miter-gear 77 and pressing against said gear at the end of the recess and against a screw head 81 attached to the end of the stem 78 of the head 78. The head 78 has the miter-gear 82 mounted loosely on its stem 78, said gear being held from rotation within the head by the screw 83 passing through the bearing 79. In this manner motion is conveyed through miter 84 on shaft 85 carrying the gear 86 and through intermediate gears 87 to gear 88 which carries a bending pin 89. The bending pin passes down through an opening in said gear 88 and is normally pressed back by the lever 90 pivoted on the head of the screw 91. A spring 92 tends to force said bending pin 99 backward. The pin 89 is moved forward to project from the face of gear 88 and bend the wire by the cover-plate 93 which has a recess 94 so arranged that at an interval in each revolution of the gear 88 the bending pin 89 is thrown backward by the force of the spring 92 causing the end of pin 89 to disappear in gear 88 and to reappear after about one-fourth of a revolution of gear 88.

Within the head 78 is the sliding pin 95 around which the wire is bent by the revolution of bending pin 89. Pins 89 and 95 extend from opposite sides of the slot 96 in head 78 and through which slot the wires are carried into and out of said head. The pin 95 is at intervals caused to withdraw from slot 96 by the action of lever 97 normally held by spring 98 in position to press pin 95 forward into slot 96, but at intervals being actuated to withdraw pin 95 from slot 96. This actuating mechanism consists of a cam 99 on gear 48 actuating a bar 100 which is normally held against gear 48 by spring 101. The bar 100 is reciprocated by means of the cam 99 engaging therewith and the movement of said bar 100 operates the lever 102 which is pivotally connected to said bar 100 and to the bar 106. The lever 102 is fulcrumed on the pin 106 and an arm 104 is fixed to pin 106 to enter slot 105 in head 78 and press upon lever 97 to withdraw pin 95 and release the head of the completed bale tie. Lever 102 is operated to reciprocate the bar 106 and at intervals causes it to project so as to contact with the lug 46 of the cutter head mechanism thereby moving said cutter head and bringing the cutter 45 into co-acting engagement with the cutter 41 to sever the wire. The movements of withdrawing the pin 95 and cutting the wire are synchronous or practically so. In front of the head 78 is located the vise block 180.
107 attached to the bed by the screw 108. This vise block carries the adjustable screw 109. A pin 110 co-acts with the screw 109 to form the vise for holding the wire during the twisting operation. The rear end of the pin 110 is attached to the lever 111 full-crowned on the pin 112 in a slot in the upper vise block 113 which is attached to the bed by the screw 114. The lever 111 carries at its opposite end the roller 115 which moves in contact with the cam 116 on the gear wheel 48.

I will now describe the means for collecting the finished bale ties in bundles and counting the same so as to apportion an equal number to each bundle.

The completed bale ties being passed down slots 71 in brackets 61 and released by the slotted fingers of finger plates 63 fall into pockets 117 in the counting wheels 118. There are 20 of these pockets in each wheel and each may hold for instance twenty-five ties. These ties are retained in the wheels 117 by guides 113 until the pockets pass beyond the guides 118 when the ties contained in the pockets will be discharged upon one or the other side of the horns 119. The lever 120 which is pivoted to swing as at 121 directs the ties into one of the horns 119. The machine is so arranged that preferably 250 ties accumulate on one side of horns 119 whereupon the lever 120 is shifted so as to direct the same number of ties to the other side. This is accomplished in the following manner: The rear end of the conveyor rod 60 is secured to gear 121 which meshes with gear 122 rotating on pin 123 fixed in the bracket 69. The gear 122 has secured to it a side plate 129 which carries pins 125 and 126. The pin 125 operates slot wheel 127 once during each revolution of gear 122 which is preferably arranged to make one revolution for every twenty-five ties made. The pin 125 enters successively each of the twenty slots of said wheel. These slots correspond to the twenty pockets in counting wheels 117. Pin 126 operates to raise locking pawl 128 pivoted at 129 to legs 4 and pressed downward by a spring 130. This raising of the locking pawl takes place at the time pin 125 begins to operate the slot wheel 127 allowing pawl 128 to immediately fall upon the periphery of slot wheel 127 and then enter the next slot to lock the wheel in position just as pin 125 is leaving said wheel. Counting wheels 117 and slot wheels 127 are fixed on shaft 121 which has bearings in the legs. The slot wheel 127 carries on its side a cam 122 which has a locking pin 123 so that it can be set to any of twenty positions on slot wheel 127. The object of this adjustment is to allow the operator to remove the ties from a pocket in wheels 117 in case the machine misses some ties, and by withdrawing cam 132 on slot wheel 127 one hole, the count of the ties into the horns 119 is kept correct. The cam 132 controls the count of ties into horns 119 by at intervals pressing on and releasing the lever 134 which is held in position to divert ties from the pockets of wheels 117 into one side of horns 119 by springs 133 and is thrown over to divert ties into the other side of horns 119 by the action of cam 132. Preferably ten pockets are emptied on one side of the horns and ten on the other side making bundles of 250 each. It is obvious that cam 132 could be arranged to deposit the contents of a lesser number of pockets to form a bundle of ties on horns 119, a multiple of the number contained in one of the pockets. The lever 134 operates a series of levers 120 being fixed with them on rod 136 which is journaled in the legs. These levers 120 divert the ties as above explained to one side or the other of horns 119.

In the operation of the machine, the wire is fed by the rolls 23 and the Fig. 24 through guide 26 under the cutter-head 39 into the slot 67 in the rod 66. As soon as the wire has been fed the proper distance to give the required length of wire from which to form the bale-tie, and while said wire is still moving, the cutter-head, rotating continuously, brings the cutters around in proper position to cut the wire at the desired point, and by means of the mechanism previous described the movable cutter is moved into co-action with the stationary cutter so as to sever the wire. As the cutter-head is moving in the same direction as the wire, the wire is not stopped during the cutting operation, but continues to move forward and consequently there is no buckling of the wire behind the cutter as in the case where the wire is stopped at the instant of the cutting operation. The instant the wire is cut, the rod 66 is tilted to register slot 67 with slot 71, and the cut length of wire is stranded by the slotted fingers of finger-plates 68 and is carried down slots 71 through slot 96 to the center of the continuously rotating bending and twisting head 78. With the wire held in this position the bending-pin 89 operated by the mechanism previously described acts to bend the end of the wire about half way around pin 95, bringing said end between the vise members 109 and 110. The bending pin thereupon immediately withdraws into the gear 88 and passes by the wire at the instant that the bent end of the wire is grasped by said vise members. The continuously rotating head 78 twists the wire to form a loop, when the pin 95 is withdrawn and the finger-plates 68 carry the tie out of the head 78 and drop the same down the slot 71 to the counting wheels, from which they are deposited in bundles in pre-determined numbers on horns 119, all as above set forth. The continuously ro-
tating head carrying the bending and twisting mechanism is adapted to yield longitudinally to provide for the take-up in the wire due to the twisting and this is accomplished through the spring 80 which permits the rotating head to yield sufficiently for this purpose.

I provide a continuously rotating head carrying the bending and twisting mechanism so that there is no stopping of the head after one wire has been bent and twisted and another wire is fed immediately to the head when it comes around in position to bring the slot 96 in register with the slot 71. Furthermore the bending mechanism rotates continuously and is retracted immediately after the bend is made so as to clear the wire.

While I have described and claimed my invention as a bale-tie machine, this has only been done for convenience of description, and I wish to extend its application to the manufacture of any article to which it may be found adaptable.

What I claim is:

1. In a bale-tie machine, the combination of feeding-mechanism, a rod having a longitudinal slot therein to receive the wire, a sleeve inclosing said rod, said sleeve having a longitudinal slot therein, and means for bringing said slots into coincidence.

2. In a bale-tie machine, the combination of feeding-mechanism, a rod having a longitudinal slot therein to receive the wire, a sleeve inclosing said rod, said sleeve having a longitudinal slot therein, and means for rotating said rod to bring said slots into coincidence with each other.

3. In a bale-tie machine, the combination of feeding-mechanism, a rod having a longitudinal slot therein to receive the wire, a sleeve inclosing said rod having a longitudinal slot therein, and means for turning said rod intermittently to bring said slots into coincidence.

4. In a bale-tie machine, the combination of feeding-mechanism, a rod having a longitudinal slot therein to receive the wire, a sleeve inclosing said rod, said sleeve having a longitudinal slot, a projection on said rod, and an intermittently rotated wheel having fingers adapted to engage the projection on said rod.

5. In a bale-tie machine, the combination of feeding-mechanism, a spring actuated rod having a longitudinal slot therein to receive the wire, a sleeve inclosing said rod having a longitudinal slot therein, a projection on said rod, and an intermittently rotated rotary wheel having fingers adapted to engage said projection.

6. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, a support beyond said cutting-mechanism to receive the wire, a rotary-wheel having recesses to receive the wire from said support, pins on said wheel, a rotary disk, and means carried by said disk adapted to engage one of said pins on each revolution of said disk.

7. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, a support to receive the wire beyond said cutting-mechanism, rotary wheels having recesses to receive the wire from said support, pins arranged at intervals on one of said wheels, a rotary disk, means carried by said disk for locking said wheel during part of the rotation of said disk, and means carried by said disk for engaging said pins.

8. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, a support beyond said cutting mechanism to receive the wire, rotary wheels having recesses to receive the wire from said support, pins at intervals on one of said wheels, a rotary disk, an arm carried by said disk adapted to engage one of said pins and move past the others, and a mutilated flange on said disk adapted to pass between said pins.

9. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism beyond said feeding mechanism comprising a rotary head having a peripheral groove to receive the wire, and cutters in said head adapted to operate on the wire in said groove.

10. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism beyond said feeding mechanism comprising a rotary head, a fixed cutter carried thereby, a movable cutter cooperating therewith, and means for moving said movable cutter at predetermined intervals.

11. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism comprising a rotary head, a fixed cutter, a pivotally mounted cutter cooperating with said fixed cutter, and means for rocking said cutter at predetermined intervals.

12. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism comprising a rotary head having a fixed cutter, a pivotally mounted cutter, a projection on said last-mentioned cutter, a cam-operated mechanism adapted to engage said projection to move said cutter into cutting engagement with said first-mentioned cutter.

13. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism beyond said feeding mechanism, said cutting-mechanism comprising a rotary head, a fixed cutter, a spring-actuated pivotally mounted block in said head, a cutter carried by said block, and means for tilting said block at predetermined intervals.

14. The combination of feeding-mechanism, cutting-mechanism beyond said feeding-mechanism, said cutting mechanism...
comprising a rotary head, a fixed cutter, a spring-actuated pivotally mounted block in said head, a cutter in said block, said block projecting beyond said head, a rod adapted to engage said projecting portion of said block, a rotary wheel having a cam face, and connections between said rod and said cam face, whereby said rod is adapted to move said cutter-block at intervals.

15. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, twisting and bending mechanism, means for feeding the cut wire to said bending and twisting mechanism, said twisting and bending mechanism comprising a slotted rotary head, a spring-actuated forming pin adapted to enter said slotted head, a spring-actuated bending pin adapted to enter said slotted head, a rotary member on which said bending pin is mounted, means for withdrawing said pins, and clamping mechanism adapted to hold the wire during the rotation of the twister.

16. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, means for feeding the wire thereto, the bending and twisting mechanism comprising a rotary slotted head, a spring-actuated forming pin adapted to enter said slotted head, a spring-actuated bending pin mounted on said gear-wheel, means for withdrawing said forming pin and bending pin, and clamping mechanism adapted to hold the wire during the rotation of said twister.

17. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, means for feeding the wire thereto, the bending and twisting mechanism comprising a rotary slotted head, a spring-actuated forming pin adapted to enter said slotted head, a gear-wheel, a spring-actuated bending pin mounted in said gear-wheel, a cover-plate having a recess formed therein to receive said pin during the rotation of said gear-wheel, whereby said bending pin is withdrawn, means for withdrawing said forming pin, and clamping means to hold the wire during the rotation of said twister.

18. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, means for feeding the wire thereto, the bending and twisting mechanism comprising a rotary slotted head, a forming pin adapted to enter the slot in said head, a spring-actuated lever connected to said forming pin, means for actuating said lever to withdraw said pin, a spring-actuated bending pin, means for withdrawing same, and clamping mechanism adapted to hold the wire during the rotation of said twister.

19. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, means for feeding the wire thereto, said bending and twisting mechanism comprising a rotary slotted head, a forming-pin adapted to enter the slot in said head, a spring-actuated lever connected to said forming pin, an arm adapted to engage said lever, means for moving said arm into engagement with said lever to withdraw said forming-pin, a spring-actuated bending pin, means for withdrawing same, and clamping means adapted to hold the wire during the rotation of said twister.

20. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, means for feeding the wire thereto, said bending and twisting mechanism comprising a rotary slotted head, a spring-actuated forming pin adapted to enter the slot in said head, a spring-actuated bending pin adapted to enter the slot in said head, a movable lever engaging one of said opposing members, and a rotary cam-member engaging said lever to operate the clamping member carried thereby.

21. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, continuously rotating bending and twisting mechanism, clamping mechanism comprising opposing members, a spring-actuated lever carrying one of said opposing members, and a rotary cam-member engaging said lever to move said movable clamping member.

22. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, continuously rotating bending and twisting mechanism, clamping means comprising opposing members, a block through which said movable member passes, a lever pivotally mounted on said block, a spring interposed between said lever and said block, and a rotary cam-member engaging said lever to move said movable clamping member.

23. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, continuously rotating bending and twisting mechanism, counting mechanism, and means for delivering the wires singly thereto.

24. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, a counting-wheel having peripheral pockets, means for delivering the bale-ties to said pockets, and means for delivering the contents of a portion of said pockets to one receptacle, and a portion to another receptacle.

25. In a bale tying machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, a rotary member having peripheral pockets, means
for feeding the bale-ties thereto, a guard for holding the bale-ties in said pockets, and a reversible guide for directing the contents of the pockets of said rotary member to receptacles below.

26. The combination of feeding-mechanism, cutting-mechanism, bending and twisting mechanism, a rotary member having peripheral pockets, means for directing the bale-ties to said pockets, a guard for holding said ties in said pockets, a shiftable guide adapted to direct the bale-ties into different receptacles, and means for shifting said guide.

27. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, bending and twisting mechanism, a rotary member having peripheral pockets to receive the wires, a toothed wheel on the shaft of said rotary member, a driving wheel having a projection adapted to enter the teeth in said toothed wheel, and means carried by said driving wheel to lift said pawl from said toothed wheel when said projection enters one of the teeth of said toothed wheel.

28. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, bending and twisting mechanism, an intermittently operated rotary member having peripheral pockets adapted to receive the bale-ties, a guard for holding said bale-ties therein, a reversible guide for directing the ties into different receptacles, a cam member on the shaft of said rotary member adapted to engage said guide, and a spring returning said guide when said cam is passed.

29. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, bending and twisting mechanism, an intermittently operated rotary member having peripheral pockets to receive the ties, and a guard to hold said ties therein, a spring-actuated guide to direct the ties to different receptacles, a toothed wheel on the shaft of the rotary member, a driving wheel having a projection adapted to enter the teeth of said toothed wheel, said toothed wheel having pin-holes, a cam member on said shaft, and a pin on said cam-member adapted to enter the pin-holes in said toothed wheel, said cam-member being in the path of said guide.

30. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, bending and twisting mechanism, a rotary-member adapted to carry the cut wires one at a time to the bending and twisting mechanism, a gear-wheel, connections between the shaft of said rotary member and said gear-wheel, a projection on said gear-wheel, a toothed wheel adapted to be engaged by said projection, and a rotary-member on the shaft, said toothed wheel having peripheral pockets to receive the ties.

31. In a bale-tie machine, the combination of cutting mechanism, and means for feeding the wire continuously thereto, said cutting means moving in the direction of the moving wire, and means for conveying the cut length of wire out of the path of the on-coming wire.

32. In a bale-tie machine, the combination of cutting mechanism, and means for feeding the wire continuously thereto, said cutting means moving at the same, or substantially the same, speed and in the direction of the moving wire, and means for conveying the cut length of wire out of the path of the on-coming wire.

33. In a bale-tie machine, means for cutting the wire into predetermined lengths while the same is in motion, said means comprising a rotary head carrying co-acting cutters, the forward movement of the cutters while the wire is being cut being approximately equal to the forward movement of the wire, and means for conveying the cut length of wire out of the path of the on-coming wire.

34. In a bale-tie machine, means for conveying the cut length of wire out of the path of the on-coming wire.

35. In a bale-tie machine, means for cutting the wire into predetermined lengths while in motion consisting of a rotary head with co-acting cutters mounted in its periphery, the peripheral speed of the head being approximately equal to that of the wire, and means for conveying the cut length of wire out of the path of the on-coming wire.

36. In a bale-tie machine, the combination of continuously rotating feed-rollers, and means for cutting said wire into predetermined lengths while in motion consisting of a rotating head with co-acting cutters mounted in its periphery, the peripheral speed of the head being approximately equal to that of the wire, and means for conveying the cut length of wire out of the path of the on-coming wire.

37. In a bale-tie machine, the combination of a rotary head carrying co-acting cutters, and means for actuating said cutters after a predetermined number of revolutions of said head, and means for conveying the cut length of wire out of the path of the on-coming wire.

38. In a bale-tie machine, the combination of means for feeding a wire continuously, and means for cutting it into predetermined lengths while it is in motion, and means for conveying the cut length of wire out of the path of the on-coming wire.

39. In a bale-tie machine, the combination of feeding-mechanism, cutting-mechanism, a rotary-member adapted to carry the cut wires one at a time to the bending and twisting mechanism, a gear-wheel, connections between the shaft of said rotary member and said gear-wheel, a projection on said gear-wheel, a toothed wheel adapted to be engaged by said projection, and a rotary-member on the shaft, said toothed wheel having peripheral pockets to receive the ties.
tion of means for feeding a wire continuously, and rotating cutters to cut the wire to predetermined lengths while it is being so fed, and means for conveying the cut length of wire out of the path of the on-coming wire.

40. In a bale-tie machine, the combination of means for feeding a wire continuously into the machine, and a rotary-head in the path of said wire, said head carrying means for cutting off said wire into predetermined lengths while it is in motion, and means for conveying the cut length of wire out of the path of the on-coming wire.

41. In a bale-tie machine, the combination of means for feeding a wire continuously, and means for cutting a wire into predetermined lengths while in continuous motion, and means for conveying the cut length of wire out of the path of the on-coming wire.

42. In a bale-tie machine, means for cutting a wire into predetermined lengths while the wire is in motion consisting of a rotary head carrying co-acting cutters, and means for conveying the cut length of wire out of the path of the on-coming wire.

43. In a bale-tie machine, the combination of means for feeding forward a wire, means for cutting the wire into predetermined lengths, means for retaining the wire before it is cut, means for releasing same after it is cut, and a continuously revolving bending and twisting head.

44. In a bale-tie machine, the combination of a continuously rotating bending and twisting head, and means for clamping the bent over portion of the wire to the unbent portion while the twist is being made.

45. In a bale-tie machine, the combination of a continuously rotating head, and means carried thereby for bending the wire and twisting the same to form a loop.

46. In a bale-tie machine, continuously rotating means for bending the end of a length of wire.

47. In a bale-tie machine, continuously rotating means for bending the end of a length of wire, in combination with means for releasing the wire when the bend is completed.

48. In a bale-tie machine, the combination of a continuously rotating head, and continuously rotating means for bending the end of a length of wire carried by said head.

49. In a bale-tie machine, the combination of a rotating head, and continuously rotat-

50. In a bale-tie machine, the combination of a continuously rotating head, means for forming a loop on the end of a length of wire carried by said head, and means for clamping the wire while the loop is being formed.

51. In a bale-tie machine, the combination of a continuously rotating member, a moveable projection carried thereby, means for advancing said projection at intervals to grasp and bend the wire, and means for retracting said projection to clear the wire after the bend is made.

52. In a bale-tie machine, the combination of a continuously rotating member, and a retractable pin carried thereby for bending the wire.

53. In a bale-tie machine, the combination of a continuously rotating member, a retractable pin carried thereby, means for advancing said pin to grasp and bend the wire, and means for retracting said pin to clear the wire after the bend is made.

54. In a bale-tie machine, the combination of means for feeding forward a wire, means for cutting same into predetermined lengths, continuously rotating bending and twisting mechanism, and means for holding the wire while it is being twisted.

55. In a bale-tie machine, the combination of a continuously rotating bending and twisting head, and means for feeding a length of wire thereto.

56. In a bale-tie machine, the combination of a bending and twisting mechanism, means for delivering a predetermined number of ties therefrom into suitable holders, and means for discharging the ties from a number of said holders to form a single bundle.

57. In a bale-tie machine, the combination of an intermittently operated rotary member having pockets to receive the bale-ties, means for discharging the predetermined number of pockets into one receptacle, and means for cutting out one or more of said pockets without affecting the count.

In testimony whereof, I the said WILBER EMERY have hereunto set my hand.

WILBER EMERY.

Witnesses:
HENRY SABRAUSK.
ARTHUR C. GLUCKMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."