

1,163,902.

W. EMERY.  
BALE TIE MACHINE.  
APPLICATION FILED JAN. 9, 1913.

Patented Dec. 14, 1915.

4 SHEETS—SHEET 1.

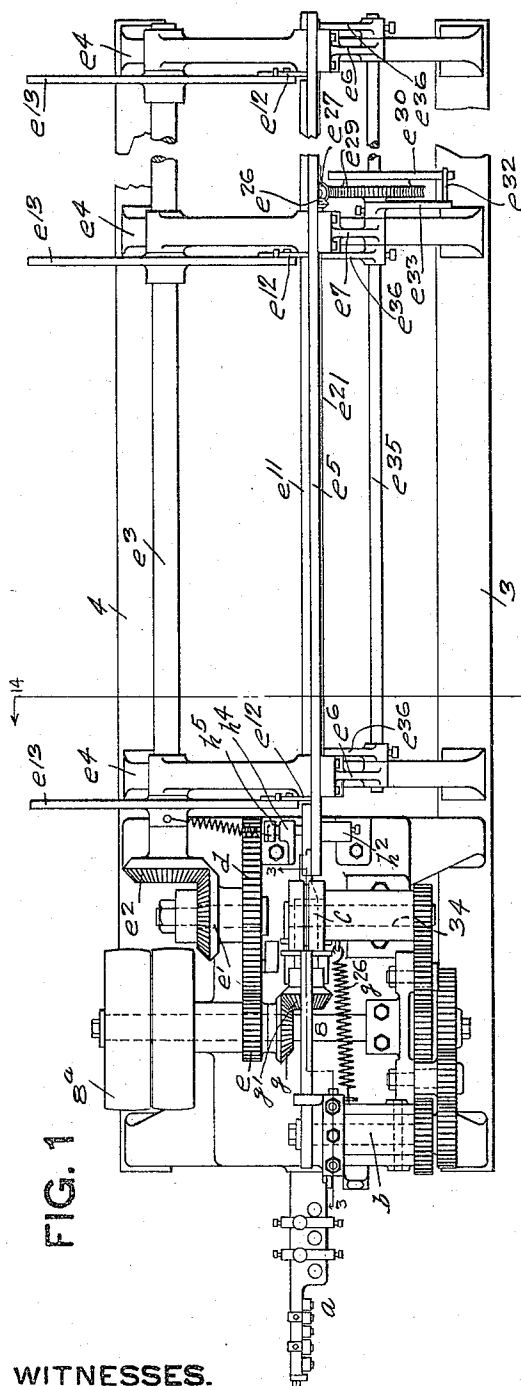


FIG. 1

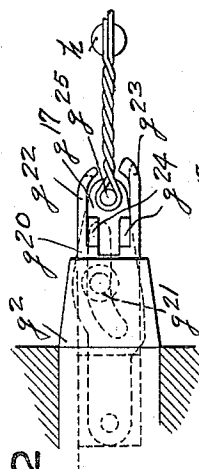


FIG. 22

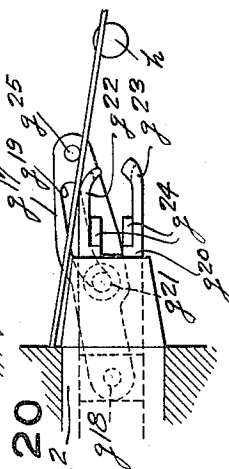


FIG. 20

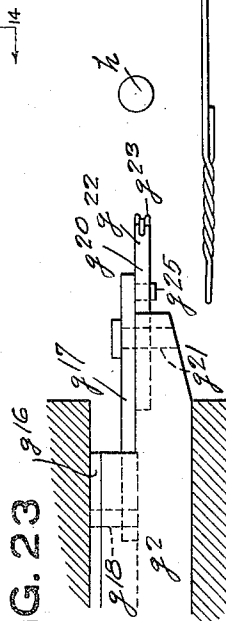


FIG. 23

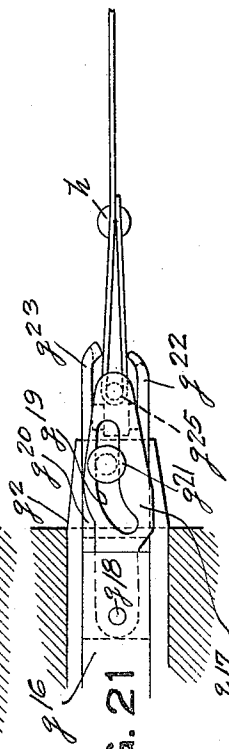


FIG. 21

WITNESSES.

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Robert C. Lottman

INVENTOR.

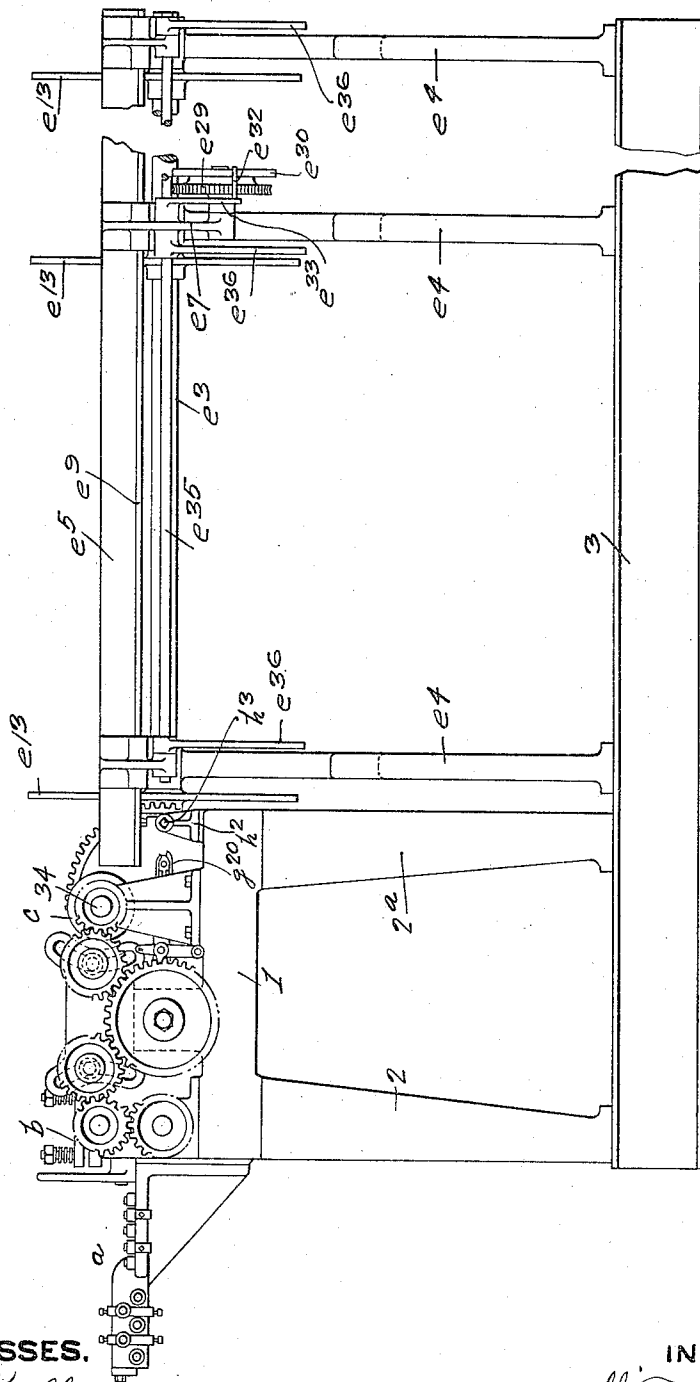
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4 SHEETS—SHEET 2.

FIG. 2



WITNESSES.

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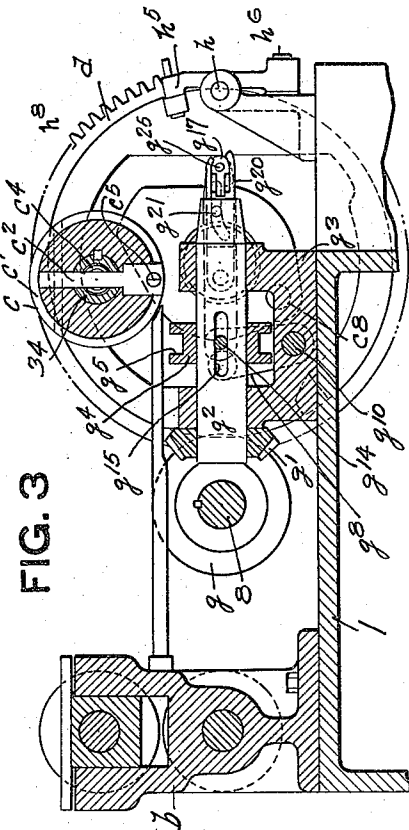
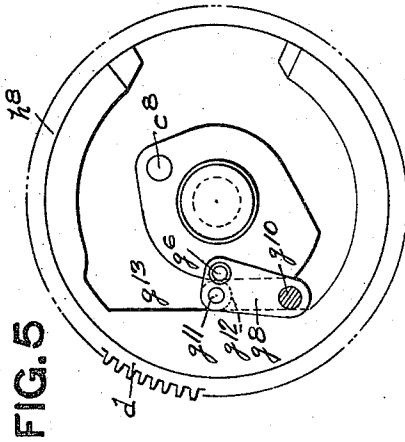
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4 SHEETS—SHEET 3.



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FIG. 11

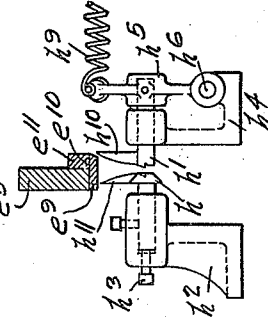


FIG. 4

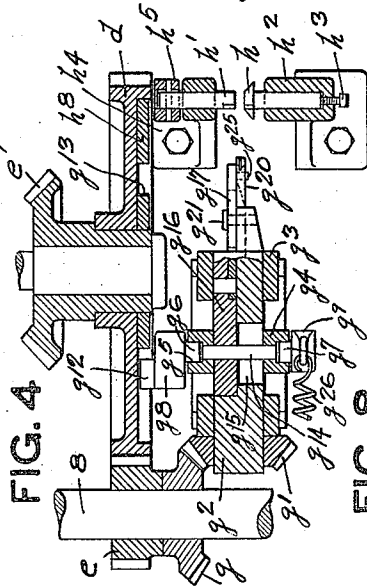


FIG. 6

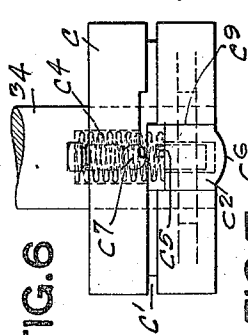
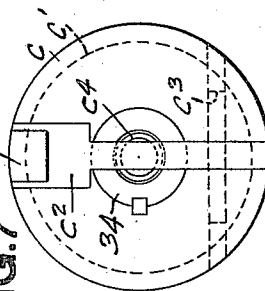


FIG. 7



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FIG. 12

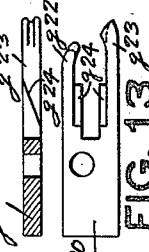


FIG. 10



FIG. 8

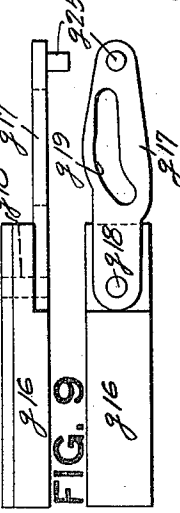


FIG. 9



FIG. 13



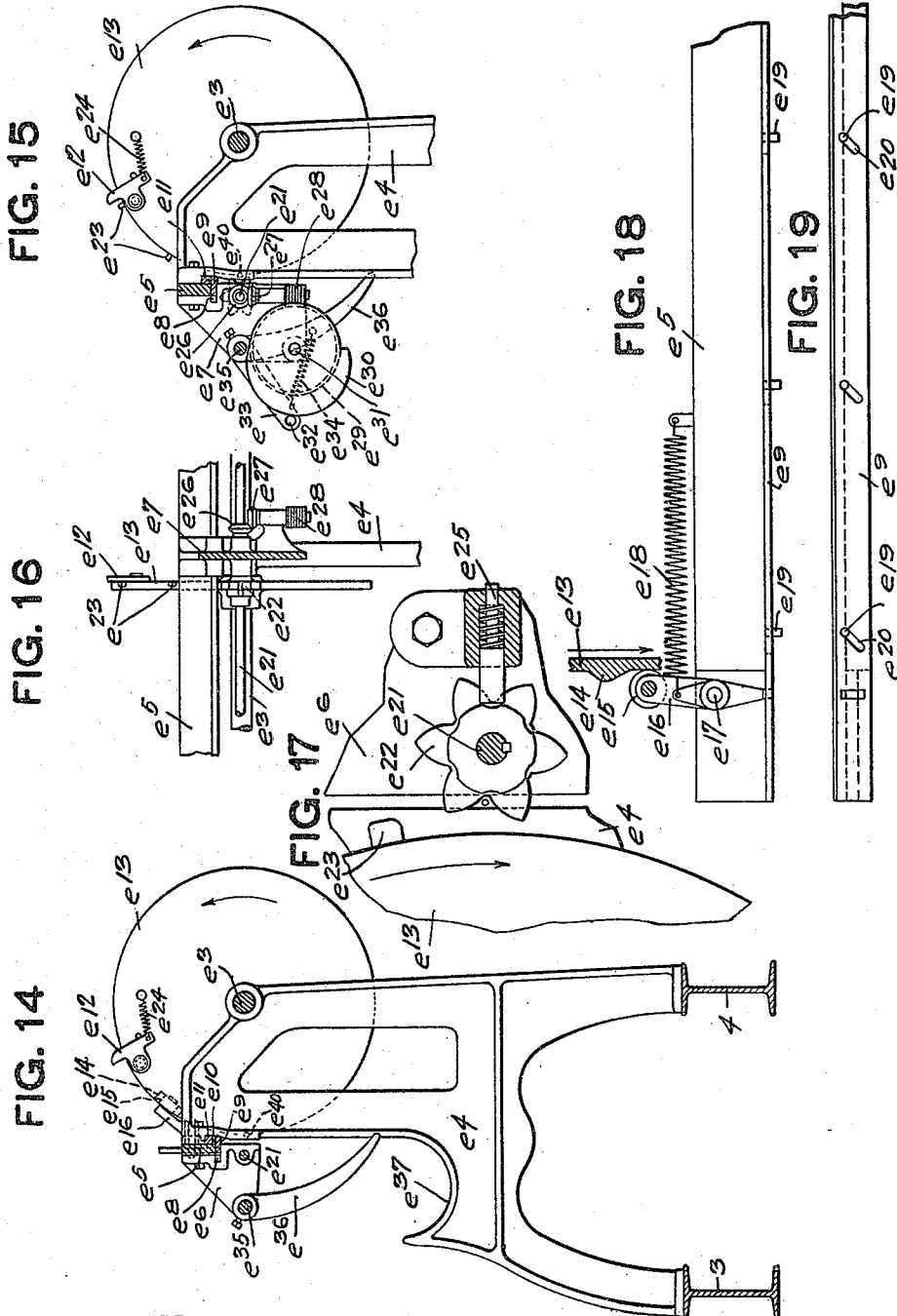
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BALE TIE MACHINE.

APPLICATION FILED JAN. 9, 1913.

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4 SHEETS—SHEET 4.

1,163,902.



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# UNITED STATES PATENT OFFICE.

WILBER EMERY, OF WILMINGTON, DELAWARE, ASSIGNOR TO PITTSBURGH STEEL COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## BALE-TIE MACHINE.

1,163,902.

Specification of Letters Patent.

Patented Dec. 14, 1915.

Application filed January 9, 1913. Serial No. 741,075.

*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, or machines of like character.

The object of my invention is to provide a simple machine of this character in which wires are cut to lengths, and the bending and twisting of the wire to form the loop is done in a rapid and efficient manner, so as to turn out the bale-ties in large quantities at low cost.

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

Referring to the drawings Figure 1 is a top plan view; Fig. 2 is a side elevation of the machine; Fig. 3 is a vertical section through the line 3—3 of Fig. 1; Fig. 4 is a horizontal sectional detail through the bending and twisting head; Fig. 5 is a detail of the cam which actuates the bending mechanism; Figs. 6 and 7 are details of the cutting off mechanism; Figs. 8, 9 and 10 are details of the bending mechanism; Fig. 11 is a detail of the clamping device; Figs. 12 and 13 are details of the jaws which assist in the bending operation; Fig. 14 is a vertical section on the line 14—14, Fig. 1; Figs. 15, 16 and 17 are details of the counting mechanism; Figs. 18 and 19 show the device for retaining the wire while it is being fed forward and dropping it after it is cut off, and Figs. 20, 21, 22 and 23 show the different positions of the wire during the twisting and bending operation.

In the drawings the numeral 1 designates a suitable bed supported by legs 2, 2<sup>a</sup> which are bolted to I-beams 3 and 4. The bed carries a suitable straightener *a* which is of common construction and does not need to be specifically described. The main shaft 8 is driven from suitable source of power by a belt engaging the pulley 8<sup>a</sup>, and gear mechanism driven by said shaft operates the wire feeding mechanism *b* and the cut-off head *c*, all as shown and described in an application filed by me March 4, 1912, Serial No.

681,587. The cut-off head *c*, however, of the present application differs to some extent from that shown in said application. The cut-off head *c* is keyed on shaft 34 and said head has the annular slot *c'*, the bottom of which is approximately the same diameter as the feed rolls in the feeding mechanism *b*. Across the front of head *c* in a slot *c''* in said head is the lever *c''* fulcrumed on pin *c'''*. A spring *c''''* inserted in a recess in shaft 34 bears against the lever *c''* and normally forces the same outwardly. The lever *c''* carries the movable cutter *c''''* which is securely fixed in said lever, said lever having the projection *c'''''*. A fixed cutter *c''''''* co-operates with the movable cutter *c''''*, said movable cutter being actuated periodically by the pin *c''''''* on the cam-wheel *d* which engages the projection *c'''''*, and the wire is cut in slot *c'* when the amount of wire for one bale-tie has been fed to the machine.

The spur gear *e* is keyed on the shaft 8, and through gears *d*, *e'* and *e''* operates the shaft *e'''* which is supported in bearings on the uprights *e''''* bolted to the I-beams 3 and 4. The uprights *e''''* carry the flat rod *e'''''* and said rod carries the brackets *e''''''* and *e'''''''*. A plate *e''''''''* is inserted in the slot *e'''''''''* of brackets *e''''''* and *e'''''''* and said plate acts normally to close the slot *e'''''''''* in the wire-guide *e''''''''''* to retain the wire fed to said guide before said wire is cut. This wire-guide *e''''''''''* is not continuous, but may be in sections so that fingers *e'''''''''''* studded on circular plates *e''''''''''''* carried by the shaft *e'''* may pass between the sections and force the wire out of the slot *e'''''''''''* each time said slot is opened by the movement of the plate *e''''''''''*. To provide for the movement of the plate *e''''''''''* I employ the following mechanism: On one of the circular plates *e'''''''''''*, the first one of the series, is the lug *e''''''''''''* which contacts at each revolution of the plate *e'''''''''''* with a friction roll *e'''''''''''''* studded on the lever *e''''''''''''''*. The lever *e''''''''''''''* is pivoted on *e'''''''''''''''* which is fastened in the cut-away forward portion of the rod *e'''''''''''*. The friction roll *e'''''''''''''* is held against plate *e'''''''''''* by spring *e''''''''''''''* attached to rod *e'''''''''''*. The other end of lever *e''''''''''''''* is inserted in a transverse slot in the plate *e''''''''''* and when the roll *e'''''''''''''* is moved forward the plate *e''''''''''* is moved backward. Pins *e''''''''''''''* are fastened in the under side of plate *e''''''''''* projecting through diagonal slots *e''''''''''''''* in said plate *e''''''''''* and as the lever *e''''''''''''''* pushes back the

plate  $e^9$ , the diagonal slots  $e^{20}$  cause the plate  $e^9$  to move diagonally backward and side-wise. This causes the plate  $e^9$  to open the slot  $e^{10}$  and this movement is timed at the precise instant that fingers  $e^{12}$  on plates  $e^{13}$  press upon the wire to move it out of the guide  $e^{11}$ .

A rod  $e^{21}$  passes through the brackets  $e^6$  and  $e^7$ , and star-wheels  $e^{22}$  are keyed on said rod. One of these star-wheels is guided by two pins  $e^{23}$  on the plate  $e^{13}$ . The first pin actuates one of the star-wheels  $e^{22}$  and through it the rod  $e^{21}$  with its series of star wheels  $e^{22}$  to discharge the wire after the same has been headed. The second pin  $e^{23}$  actuates the star-wheel, so that the series of star-wheels embrace between their points the descending cut length of wire carried down by fingers  $e^{12}$  on the circular plates  $e^{13}$ . At the instant that the wire is so embraced the fingers  $e^{12}$  strike pins  $e^{40}$  fastened in the side of uprights  $e^4$  and as the fingers bend backward against the pull of springs  $e^{24}$  to clear said pins, the wire is left in the embrace of the star-wheels  $e^{22}$ . To prevent the rod  $e^{21}$  with its star-wheels from spinning, I employ a simple form of locking device consisting of the spring actuated locking-pin  $e^{25}$  engaging in depressions of the hub of star-wheel  $e^{22}$ .

On the rod  $e^{21}$  is the fixed bevel-gear  $e^{26}$  operating through bevel gear  $e^{27}$  and worm  $e^{28}$  the worm wheel  $e^{29}$  which is integral with the cam-wheel  $e^{30}$ . The said worm-wheel and cam are loosely mounted on a pin  $e^{31}$  in the bracket  $e^7$ . The cam  $e^{30}$  has a pin  $e^{32}$  resting against its periphery, said pin being secured in lever  $e^{33}$  and a spring  $e^{34}$  acts to hold the pin  $e^{32}$  in contact with said cam. The lever  $e^{33}$  is keyed on the rod  $e^{35}$  which passes through brackets  $e^6$  and  $e^7$  and is supported thereby. The rod  $e^{35}$  carries fixed on it a series of arms  $e^{36}$ . This mechanism constitutes the counting device and operates as follows: The cam  $e^{30}$  being actuated by the revolution of rod  $e^{21}$  through gears  $e^{26}$ ,  $e^{27}$  and worm  $e^{28}$  and worm wheel  $e^{29}$  makes one revolution to one bundle of ties, say 250. The arms  $e^{36}$  are gradually carried outwardly by the action of cam  $e^{30}$  allowing the ties which have accumulated between them and the uprights  $e^4$  to drop down into the horns  $e^{37}$ , which may be formed integral with the uprights  $e^4$ . As soon as the count of ties for one bundle is complete the arms  $e^{36}$  are drawn back quickly by the action of spring  $e^{34}$  so that the passage of ties to horns  $e^{37}$  is blocked, and the operator has time to remove the bundle before the arms  $e^{36}$  again open.

I will now describe the twisting and bending mechanism.

On the shaft 8 is keyed the bevel gear  $g$  meshing with the bevel gear  $g'$  which is keyed on the end of the bending and twist-

ing head  $g^2$  which is supported in bracket  $g^3$  and carries the collar  $g^4$  with an annular groove  $g^5$ . Pins  $g^6$  and  $g^7$  on the levers  $g^8$  and  $g^9$  enter the groove of the collar  $g^4$  and said levers are keyed on opposite ends of pin  $g^{10}$  which has a bearing in bracket  $g^3$ . The levers  $g^8$  and  $g^9$  with the pin  $g^{10}$  form substantially a yoke. The lever  $g^8$  carries the pin  $g^{11}$  and roller  $g^{12}$  which is adapted to roll in the groove  $g^{13}$  in the side of cam-wheel  $d$ . A pin  $g^{14}$  passes through the collar  $g^4$  and is fastened to same and said pin passes through an elongated slot  $g^{15}$  in the head  $g^2$ , said slot permitting the pin with the collar  $g^4$  attached to move lengthwise on head  $g^2$ , but said collar and said pin must rotate with said head. The pin  $g^{14}$  also passes through a hole in the slide  $g^{16}$  which slides in a groove in the side of the head  $g^2$ . The slide  $g^{16}$  carries on its forward end the bending member  $g^{17}$  pivoted on the pin  $g^{18}$  fixed in the slide  $g^{16}$ . The bending member  $g^{17}$  has the irregular or cam slot  $g^{19}$ . The head  $g^2$  is tapered at its front end and partly cut away. Under the bending member  $g^{17}$  is inserted the fixed plate  $g^{20}$  which carries the pin  $g^{21}$  extending through the groove  $g^{19}$ . The plate  $g^{20}$  has the jaws  $g^{22}$  and  $g^{23}$  and inclined planes  $g^{24}$ . The plate  $g^{17}$  carries at its front end the pin  $g^{25}$ .

The action on the wire of the above described mechanism is shown in Figs. 20 to 23. The cut length of wire being carried down by the mechanism previously described is so positioned that the end rests on the tapered end of head  $g^2$  and on the support or jaw  $g^{22}$  of plate  $g^{20}$  as shown in Fig. 20. The cam-slot  $g^{13}$  has actuated collar  $g^4$  and moved the same forward carrying with it the slide  $g^{16}$  and bending member  $g^{17}$ , and this operation has through the movement of slot  $g^{19}$  on the pin  $g^{21}$  thrown the pin  $g^{25}$  outward from between the jaws  $g^{22}$  and  $g^{23}$  and upwardly to the position shown in Fig. 20, so that the revolution of the head  $g^2$  brings the pin  $g^{25}$  above the wire which is resting on the tapered end of head  $g^2$  and jaw  $g^{22}$ . When the collar  $g^4$  is drawn back by the action of the cam-groove  $g^{13}$  the pin  $g^{25}$  acting on the wire draws the wire down between the jaws  $g^{22}$  and  $g^{23}$  and the further revolution of the head brings the wire into the position shown in Fig. 21. In this way the bent end is thrown up to join the longer section of the wire between the clamps  $h$ ,  $h'$ . The clamps are timed to close at this point in the operation, thereby clamping the wires so that the continued revolution of the head  $g^2$  twists the head of the bale-tie in the manner shown in Fig. 22. When the head of the tie is completed the cam-slot  $g^{13}$  is so adapted that the collar  $g^4$  may be drawn backward by the spring  $g^{26}$  bringing the pin

$g^{25}$  between the inclined planes  $g^{24}$  and so throwing downward the completed tie-head as shown in Fig. 23.

The clamps  $h$ ,  $h'$  are actuated in the following manner: Clamp  $h$  is fixed in bracket  $h^2$  adjustably by means of the set screw  $h^3$ . The clamp  $h'$  is movable in the bracket  $h^4$  being attached to lever  $h^5$  pivoted upon pin  $h^6$  and held against cam  $h^8$  of cam wheel  $d$  by spring  $h^9$ . Clamps  $h$  and  $h'$  are equipped with fins  $h^{10}$  and  $h^{11}$  to guide the downward moving wire and clamp  $h'$  is beveled in front to guide the bent end of wire as it moves backward. The bent end of the wire is discharged from star-wheels  $e^{22}$  and dropped down on the bent arms  $e^{26}$  from which it is dropped into horns  $e^{27}$  to form bundles of any desired number.

What I claim is:

1. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, a support for the wire carried by said head, a reciprocatory bending member carried by said head, means for moving same, and a projection on said member adapted to engage the wire resting on said support, whereby when said member is withdrawn said projection engages the wire and bends said wire over said support to form a loop.

2. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, a support for the wire carried by said head, a reciprocatory and upwardly movable bending member, means for operating said member, and a projection on said member adapted to engage the wire on said support, whereby when said member is withdrawn said projection engages the wire and bends said wire over said support and a loop is formed.

3. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, jaws carried by said head, one of said jaws forming a support for the wire, a reciprocatory and upwardly movable bending member, means for operating same, a projection on said member adapted to engage the wire resting on said jaw, whereby said wire is drawn between said jaws by the movement of said member to form the loop.

4. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, jaws carried by said head, one of said jaws forming a support for the wire, a reciprocatory bending member having a cam-slot, a pin on said head engaged by said cam-slot, and a projection on said member adapted to engage the wire resting on said jaw, whereby the wire is bent over said jaw and drawn between said jaws to form a loop.

5. In a bale-tie or like machine, the combination of a rotary head, means for rotating

the same, jaws carried by said head, one of said jaws forming a support for the wire, a longitudinally movable slide in said head, means for moving said slide back and forth, a bending member pivotally connected to said slide, said bending member having a cam-slot, a pin on said head engaged by said cam slot, and a projection on said bending member adapted to engage the wire resting on said jaw, whereby upon the withdrawal of said bending member the wire is bent over said jaw and drawn between the same to form a loop.

6. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, jaws carried by said head, one of said jaws forming a support for the wire, a longitudinally movable slide in said head, a collar on said head slidable thereon and adapted to rotate therewith and connected to said slide, means for moving said collar, a bending member pivotally mounted on said slide having a slot, a pin on said head engaged by said slot, and a projection on said bending member adapted to engage the wire, whereby the wire is bent over said jaw by the withdrawal of said member to form a loop.

7. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, jaws carried by said head, one of said jaws forming a support for the wire, a longitudinally movable slide in said head, a collar on said head, a pin connecting said collar slide and head, said head having a slot through which said pin passes, levers having projections engaging an annular groove in said collar at opposite sides thereof, a projection on one of said levers, a rotary cam having a groove which said projection engages, a bending member pivotally mounted on said slide having a cam-slot, a pin on said head engaged by said cam slot, and a projection on said member adapted to engage the wire, whereby the wire is bent over said jaw by the withdrawal of said member to form the loop.

8. In a bale-tie or like machine, the combination of a rotary head, means for rotating same, a reciprocatory bending member carried by said head, a projection on said bending member, a support for the wire, a projection on said bending member adapted to engage the wire on said support, whereby upon the withdrawal of said member the wire is bent over said support to form a loop, and an inclined face on said head in the path of the loop on the withdrawal of said bending member to force the loop over said projection on said bending member.

9. In a bale-tie or like machine, the combination with suitable feeding mechanism, of a guide for the wire having a slot, a plate adapted to close said slot, a lever engaging

said plate, and a rotary member having an enlargement thereon adapted to engage said lever to move said plate.

5      10. In a bale-tie or like machine, the combination with suitable feeding mechanism, of a guide for the wire having a slot, a movable plate adapted to close said slot, said plate having diagonal slots, pins engaging said slots, a lever engaging said plate, and  
10 a rotary member having an enlargement thereon adapted to engage said lever.

15      11. In a bale-tie or like machine, the combination of a suitable feeding, cutting, and bending and twisting mechanism, with a series of spring-actuated arms adapted to receive the wire, a rod on which said arms are mounted, a lever connected to said rod, a rotary cam engaging the outer edge of said le-

ver, means for rotating said cam, and a receptacle below said arms. 20

12. In a bale tie or like machine, the combination with suitable feeding and cutting mechanism, of a wire guide, a rotary member, a yielding finger on said member, pins on said rotary member, a star wheel in the path of said pins, a yielding finger on said member adapted to hold a wire between said finger and one of said pins adjacent thereto, and a stop in the path of said finger. 25

In testimony whereof, I the said WILBER EMERY have hereunto set my hand. 30

WILBER EMERY.

Witnesses:

VIOLA PROUSE EMERY.  
AGNES McELROY.

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