

1,400,937.

Patented Dec. 20, 1921.

4 SHEETS—SHEET 1.

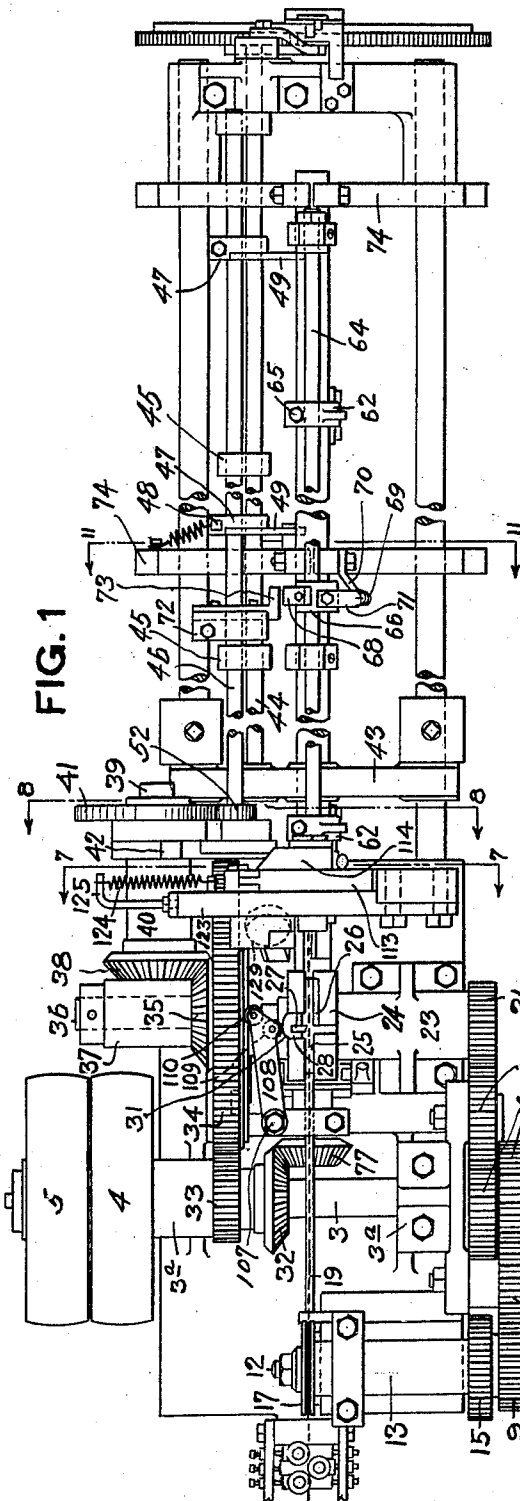


FIG. 1

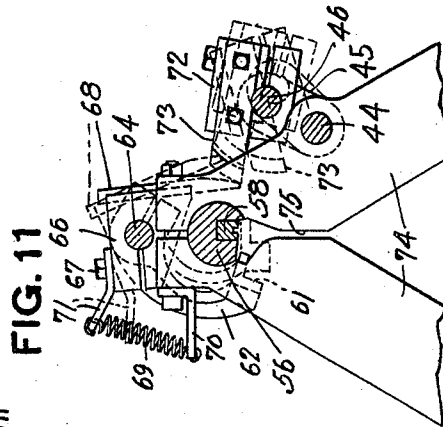


FIG. 11

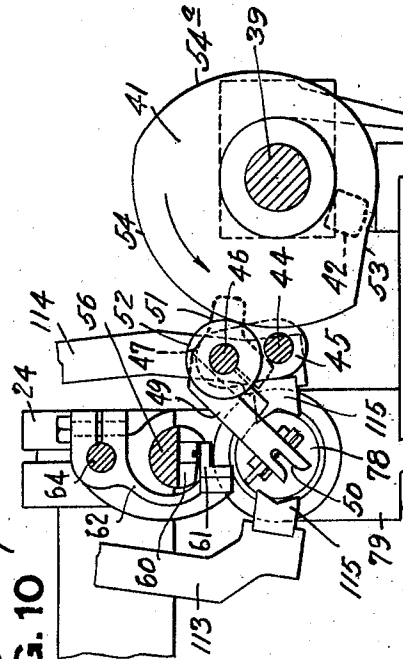


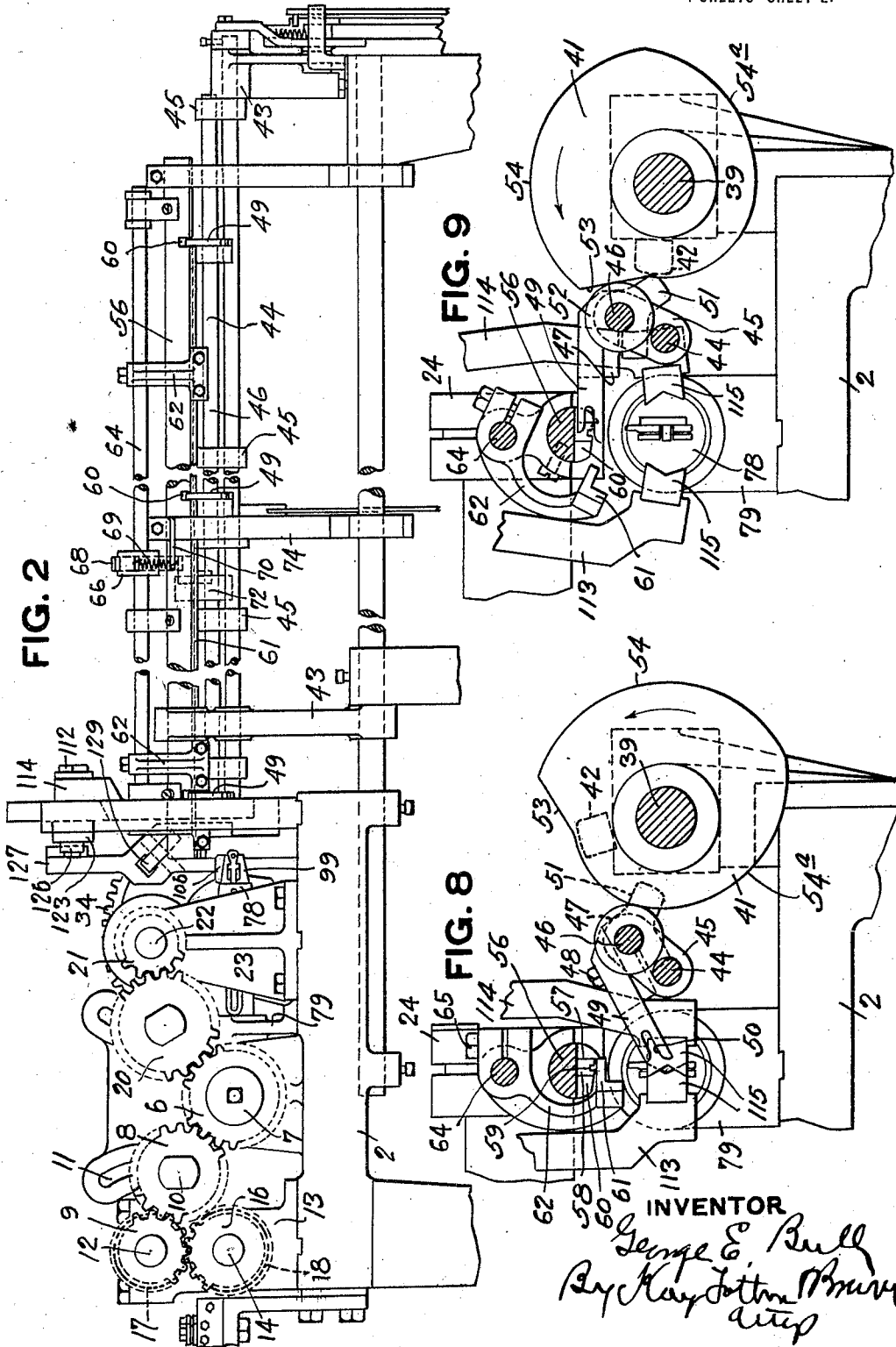
FIG. 10

INVENTOR  
*George E. Bull*  
*By Ray J. Johnson*  
*attorney*

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4 SHEETS—SHEET 2.



INVENTOR  
George E. Bull  
By Kay J. Bull  
attorney

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4 SHEETS—SHEET 3.

FIG. 3

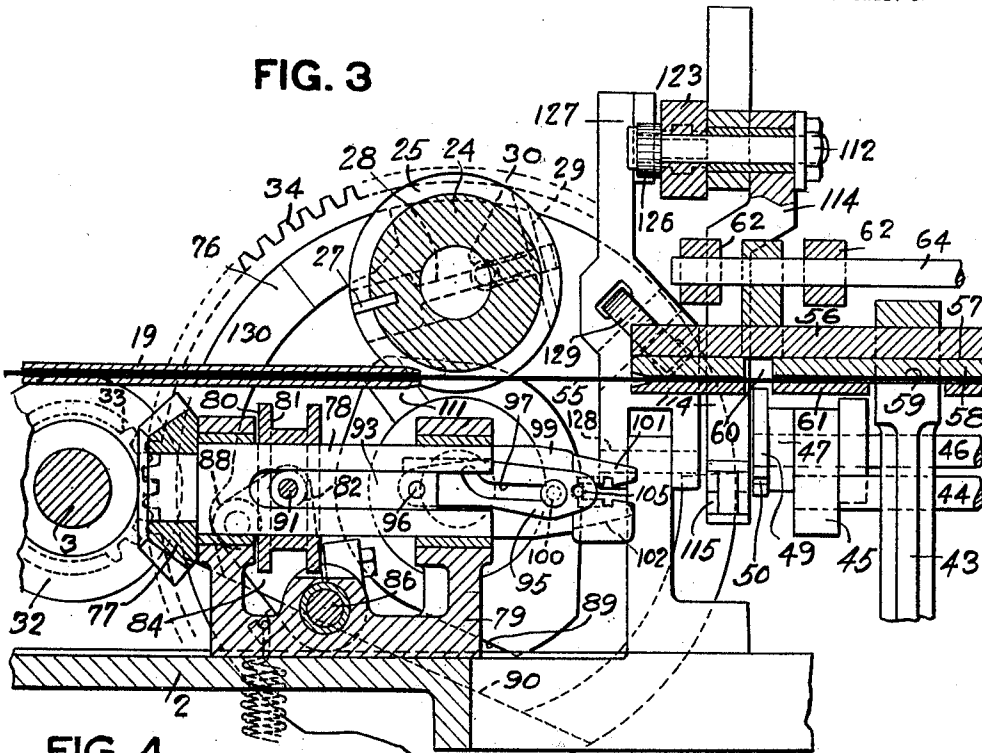


FIG. 4

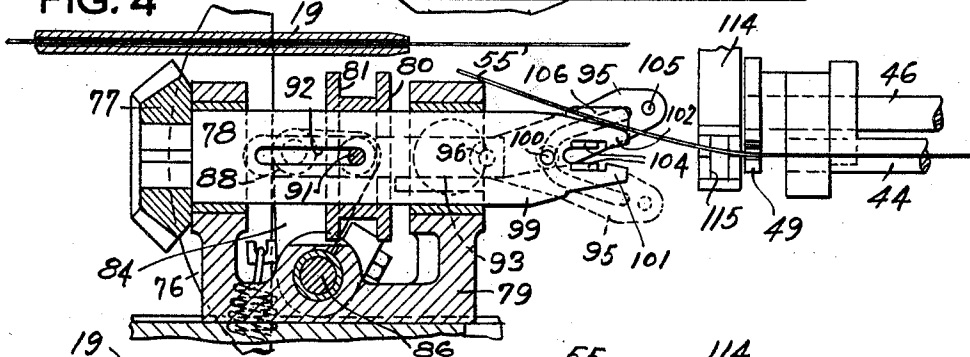
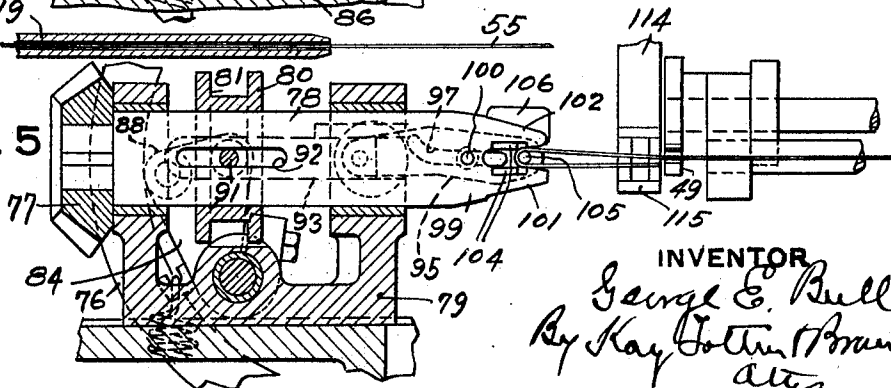


FIG. 5



INVENTOR

George E. Bull  
By Kay J. G. Brown  
attor

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4 SHEETS—SHEET 4.

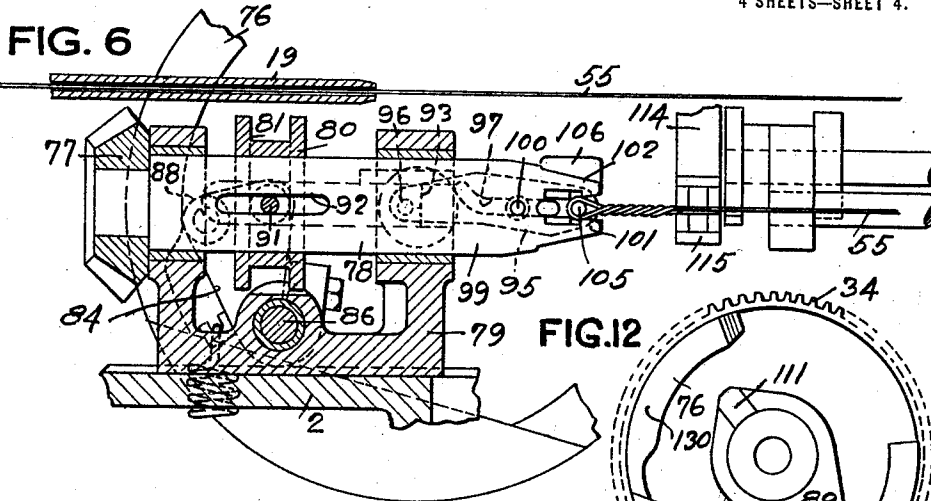
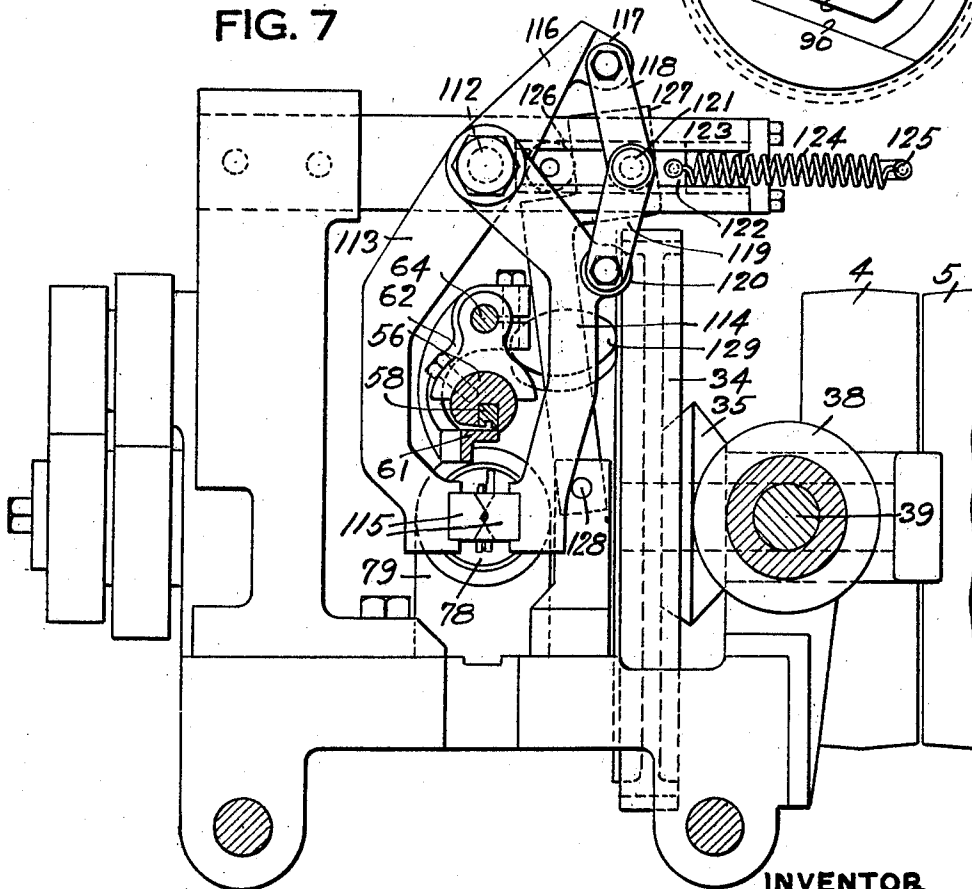


**FIG. 7**



INVENTOR

*George E. Bull*  
 By *Ray J. Tatum* *Attorney*

# UNITED STATES PATENT OFFICE.

GEORGE E. BULL, OF MONESSEN, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH STEEL COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## BALE-TIE MACHINE.

1,400,937.

Specification of Letters Patent. Patented Dec. 20, 1921.

Application filed July 17, 1920. Serial No. 396,970.

*To all whom it may concern:*

Be it known that I, GEORGE E. BULL, a citizen of the United States, and resident of Monessen, in the county of Westmoreland and State of Pennsylvania, 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 operations of looping and twisting being done with great accuracy and rapidity insuring the continuous operation of the machine without interruptions due to failure of the parts to operate in unison, and so produce defective ties.

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

In the accompanying drawings, Figure 1 is a plan view of my improved machine partly broken away. Fig. 2 is a side elevation partly broken away; Fig. 3 is an enlarged sectional view of the bending and twisting mechanism; Figs. 4, 5 and 6 are details of the bending and twisting mechanisms showing the steps of the operation; Fig. 7 is an enlarged section on the line 7—7, Fig. 1; Fig. 8 is an enlarged section on the line 8—8, Fig. 1; Fig. 9 is a similar view to Fig. 8 showing the parts in a different position; Fig. 10 is a view similar to Fig. 8 showing the parts in a still different position; and Fig. 11 is an enlarged section on the line 11—11, Fig. 1; and Fig. 12 is a face view of the cam for operating the clamping jaws and the wire cutting device.

In the drawings, the numeral 2 designates a suitable stand or frame on which the machine is mounted. The shaft 3 is the main power-shaft mounted in suitable bearings 3<sup>a</sup>, said shaft having the tight and loose pulleys 4 and 5. Any suitable power may, of course be employed to drive the machine.

At the outer end of the shaft 3 is the double gear 6 which is arranged to be slipped on a feather key and is retained in position by the washer 7. Different

sized gears 6 may be employed in making of different lengths of bale-ties. The gear 6 transmits motion through the intermediate gear 8 and the gear-wheel 9. The intermediate gear 8 revolves on the pin 10 which is adapted to be moved in the segmental slot 11, for adjustment of said gear. The gear 9 is mounted on the shaft 12 of the wire-feeding mechanism.

The standard 13 forms a bearing for the shaft 14 which receives motion from the shaft 12 through the gears 15 and 16. The shafts 12 and 14 carry the feed-rolls 17 and 18 which operate continuously into a suitable guide 19. The wire may be fed, however, by any suitable mechanism and as the feeding forms no part of my invention, it will not be necessary to refer to the same in further detail.

The double-gear 6 meshes with the gear-wheel 20 and said gear-wheel 20 meshes in turn with the gear-wheel 21. In this manner, motion is transmitted to the cutter-head shaft 22 which is supported in the standard 23 of the bed, and said shaft carries at its forward end the cutter-head 24. This cutter-head 24 has a slot 25 cut in its periphery, and the smaller diameter of said cutter-head is the same as that of the feed-rolls 17 and 18, said cutter head being so geared as to make the same, or practically the same, number of revolutions as said feed-rolls.

A fixed cutter 26 is inserted in the cutter-head, and the coacting cutter 27 is fixed in the block 28, (see Fig. 3,) which is pivotally mounted on the pin 29. The spring seated in the cutter-head and bearing against the block 28 acts to hold the cutter 27 normally out of engagement with the cutter 26. The block 28 has the lug 31 projecting beyond the rim of the cutter-head, and, through the mechanism acting on said lug to be hereafter explained, the cutter 27 is moved forward to coact with the cutter 26.

On the shaft 3 is the miter-gear 32 with the spur gear pinion 33 which meshes with the gear-wheel 34, said gear-wheel making a revolution to each bale-tie formed. The gear-wheel 34 is secured to the hub of the miter-gear 35 which is fixed on the short shaft 36 supported in bearing 37. The miter-gear 35 meshes with the miter-gear 38 fixed on the short shaft 39 which is sup-

ported in the bearing 40. On the opposite end of the shaft 39 is the cam 41 carrying the lug 42. Mounted in suitable bearings 43 is the shaft 44. Secured to said shaft 44 are the arms 45 and loosely mounted in the outer ends of said arms is the rocker-shaft 46. Secured to the shaft 46 at intervals are the split-blocks 47 secured to said shaft by the bolts 48. Mounted on the blocks 47 are the fingers 49 with the outer bifurcated ends 50. One of said fingers has the lug 51 at its inner end which is in the path of movement of the lug 42 of the cam 41. Mounted on the rocker-shaft 46 is the roller 52, which is engaged by the straight portion 53 of the cam 41, and the curved portion 54 for the purpose more fully hereinbefore set forth.

The wire 55 which is fed into the machine by the feed-rolls 17 and 18 is passed through the guide 19 under the cutter-head 28 and into the holder 56. This holder is provided with the slot 57 to receive the removable member 58 having the groove 59 formed therein to receive the wire 55. The holder 56 is slotted transversely at intervals as at 60 to permit of the entrance into said slots of the fingers 49.

To close the groove 59 and retain the wire therein, I provide the movable cover-pieces 61 which are arranged between the cut-away portion 60 on the holder 56, and said cover-pieces are mounted on the hanger-arms 62 which are secured at intervals to the rocker-shaft 64 by means of the bolts 65.

Mounted on the rocker-shaft 64 is the split-block 66 secured in place by the bolt 67, (see Fig. 11). This block 66 carries the finger 68. A spring 69 is secured at one end to a bracket 70 on the frame, the opposite end of said spring being connected to the projection 71 on the block 66. This spring 69 acts to normally hold the finger 68 in the position indicated in dotted lines.

Mounted on the rocker-shaft 46 is the split-block 72 which carries the trip-finger 73 which is adapted to engage the finger 68. When the trip-finger 73 is in engagement with the finger 68, and said trip-finger 73 is advanced by the action of the cam 41 engaging the roller 52, the finger 68 will be moved into the position indicated in full lines Fig. 11, whereupon the shaft 64 will be rocked and the hanger-arms 62 moved outwardly so as to withdraw the cover-pieces to permit the wire to be withdrawn by the fingers 49 from the holder 56, all as more fully hereinafter set forth.

Between the frame-pieces 74 is formed the guide 75 which is in alinement with the groove 59 of the wire-holder, and the wire is held by the fingers 49 in said guide during the twisting operation, as will more fully hereinafter appear.

Referring to Fig. 3, the bevel-gear 32 on

the shaft 3 meshes with the bevel-gear 77 which is keyed on the end of the bending and twisting-head 78 which is supported in the bracket 79, and carries the collar 80 with an annular-groove 81 formed therein. Pins 82 on the levers 84, (only one of the levers being shown), enter the groove of the collar 80 and said levers are keyed on opposite ends of the shaft 86 which has a bearing in the bracket 79. The levers 84 with the pin 86 form substantially a yoke. The lever 84 carries the roller 88 which is adapted to roll on the groove 89 in the cam 90 formed on the inside of the gear-wheel 34. A pin 91 passes through the collar 80 and is fastened to same, and said pin passes through an elongated slot 92 in the head 78, said slot permitting the pin with the collar 80 attached to move lengthwise on the head 78, but said collar and said pin must rotate with said head. The pin 91 also passes through a hole in the slide 93, which slides in a groove in the side of the head 78. The slide 93 carries on its forward end the bending-member 95 pivoted on the pin 96 fixed in the slide 93. The bending-member 95 has the irregular or cam-slot 97. The head 78 is tapered at its front end and partly cut away. Under the bending member 95 is inserted the fixed plate 99 which carries the pin 100 extending through the groove 97. The plate 99 has the jaws 101 and 102 and inclined planes 104. The plate 95 carries at its front end the pin 105. The above described bending and twisting mechanism forms no part of my present invention but is the twisting and bending mechanism illustrated and described in a patent to Wilber Emery No. 1,163,902, Dec. 14, 1915.

A guard 106 is provided to keep the wire in position on the tapered end of the head 78 and jaw 102.

Pivoted on the frame at 107 is the arm 108 provided with the anti-friction rollers 109 and 110. The roller 109 is adapted to engage the projecting portion 31 of the lever 28, and the roller 110 is adapted to be engaged by the cam 111 in the gear wheel 34. The operation of parts is so timed that upon each rotation of the gear wheel 34 the cam 111 will act through the lever 108 to operate the cutter.

Mounted on the pivot 112 are the clamping levers 113 and 114 carrying the clamping jaws 115. The clamping lever 113 has the extension member 116 provided with the lug 117. Links 118 and 119 connect the lug 117 with the lug 120 on the clamping lever 114. The pivotal pin 121 connecting the links 118 and 119 is mounted on a block 122 moving in the guide 123. A spring 124 is connected to the block 122 and to a stationary support 125.

At the opposite end of the block 123 is the roller 126 which is engaged by the up-

per end of the lever 127, said lever being pivoted at 128 to the frame. This lever carries the roller 129 which engages with the face 130 of the cam 76 and said cam acts through said lever to open and close the clamping jaws 115.

In the operation of the machine, the wire is fed continuously by the feed rolls 17 and 18 to the guide 19 and from the guide passes into the groove 59 in the holder 56. As soon as the wire has been fed to the length required, the cutting mechanism operated by the cam 111 acts on the lever 108 to operate the cutter. Immediately the wire is cut, the lug 42 on the cam 41 acts in contact with the lug 51 of one of the fingers 49, whereupon the shaft 43 is rocked so that the fingers 49 are brought up into a horizontal position, and at the same time the roller 52 engages the straight face 53 of the cam 41 and the rock shaft 46 is moved over to the left, as indicated in Fig. 9, carrying with it the fingers 49 until the bifurcated ends 50 of said fingers pass through the cut-away portions 60 of the holder, as indicated in Fig. 9. As the straight face 53 of the cam 41 continues to bear against the roller 52, the roller will be moved still farther to the left and the rock shaft likewise, so that the trip fingers 73 is advanced bearing against the finger 68 and acting to rock the shaft 64 carrying the hanger arms 62 thereby moving the cover-pieces 61 out of the way as indicated in dotted lines Fig. 11. Just as soon as the cover-pieces are withdrawn, the lug 42 of the cam 41 loses contact with the lug 51 and the fingers are free to move to the position indicated in Fig. 10 carrying the wire down into the guides 75. The inner end of the wire drops into the position indicated in Fig. 4 and the bending operation then takes place by which the wire is bent into position indicated in Fig. 5. The gripping jaws 115 are then brought into position to grip the wire by the action of the cam 130 operating on the lever 114 which throws the clamping jaws into closed position, as indicated in Fig. 7. With the wire clamped in this manner, the twisting action takes place and the wire is twisted as indicated in Fig. 6. Just as soon as the gripping jaws take hold of the wire, the fingers 49 are freed from the wire, as the roller 52 passes from the face 54 to the receding portion 55 54<sup>a</sup> of the cam 41. This brings the fingers back to normal position, as indicated in Fig. 8.

What I claim is:

1. In a bale-tie machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, clamping mechanism comprising pivotally mounted clamping members, toggle-links connecting said members, a guide, a block in said guide, said toggle-links being connected to said

block, a lever engaging said block, and a continuously rotating cam-member adapted to engage said lever.

2. In a bale-tie machine, the combination of feeding mechanism, cutting mechanism, bending and twisting mechanism, clamping mechanism comprising pivotally mounted clamping members, toggle-links connecting said members, a guide, a block in said guide to which said toggle-links are connected, a spring connected to said block and to permanently support a lever engaging said block, and a continuously rotating cam-member adapted to engage said lever.

3. In a bale-tie machine, the combination of feeding mechanism, a rod having a longitudinal slot formed therein to receive the wire, sectional cover-pieces for said slot, means for withdrawing said cover-pieces, and fingers adapted to engage the wire as said cover-pieces withdraw to support and lower the same into position for bending and twisting.

4. In a bale-tie machine, the combination of feeding mechanism, a rod having a longitudinal slot therein to receive the wire, movable sectional cover-pieces for said slot, means for withdrawing said cover-pieces, and means for supporting and lowering the wire after said cover-pieces are withdrawn into position for bending and twisting.

5. In a bale-tie machine, the combination of feeding mechanism, a rod having a longitudinal slot therein to receive the wire, movable sectional cover-pieces for said slot, means for withdrawing said cover-pieces, transverse slots formed in said rod, and fingers adapted to enter said slots to support and lower the wire as said cover-pieces are withdrawn into position for bending and twisting.

6. In a bale-tie machine, the combination of feeding mechanism, a rod having a longitudinal slot therein to receive the wire, swinging cover-pieces for said slot, a shaft, arms on said shaft, a rocker-shaft loosely mounted on said arms, fingers secured to said rocker-shaft, a lug on one of said fingers, a rotary cam, a lug on said cam adapted to engage said first named lug, the periphery of said cam engaging said rocker-shaft, whereby said fingers are lifted to engage said wire when said cover-pieces are withdrawn to support said wire and lowered to bring said wire into position for bending and twisting.

7. In a bale-tie machine, the combination of feeding mechanism, a rod having a longitudinal slot therein to receive the wire, a rock shaft, hanger mounted on said shaft, cover-pieces carried by said hanger adapted to close said slot, a spring actuated finger on said shaft, a trip-finger engaging said first named finger, means for moving said trip-finger whereby said cover-pieces are with-

drawn from said slot, and means for supporting said wire when said cover pieces are withdrawn.

8. In a bale-tie machine, the combination  
5 of feeding mechanism, bending and twisting  
mechanism, a rod having a longitudinal slot  
therein to receive the wire, a cover for said  
slot, means for withdrawing said cover, a  
series of transfer-fingers, a rod upon which  
10 said fingers are mounted, and means for giving  
said rod a combined movement of rotation  
and translation to remove the wire from  
said slot and transfer it to said bending and  
twisting mechanism.

15 9. In a bale-tie machine, the combination

of feeding mechanism, bending and twisting  
mechanism, a rod having a longitudinal  
slot therein to receive the wire, a cover for  
said slot, means for withdrawing said cover,  
a rod, transfer-fingers mounted on said rod, 20  
means for lifting said transfer fingers, advancing  
and lowering same to remove wire  
from said slot and transfer it to said bending  
and twisting mechanism.

In testimony whereof, I, the said GEORGE 25  
E. BULL, have hereunto set my hand.

GEORGE E. BULL.

Witnesses:

ROBT. D. TOTTEN,  
JOHN F. WILL.