

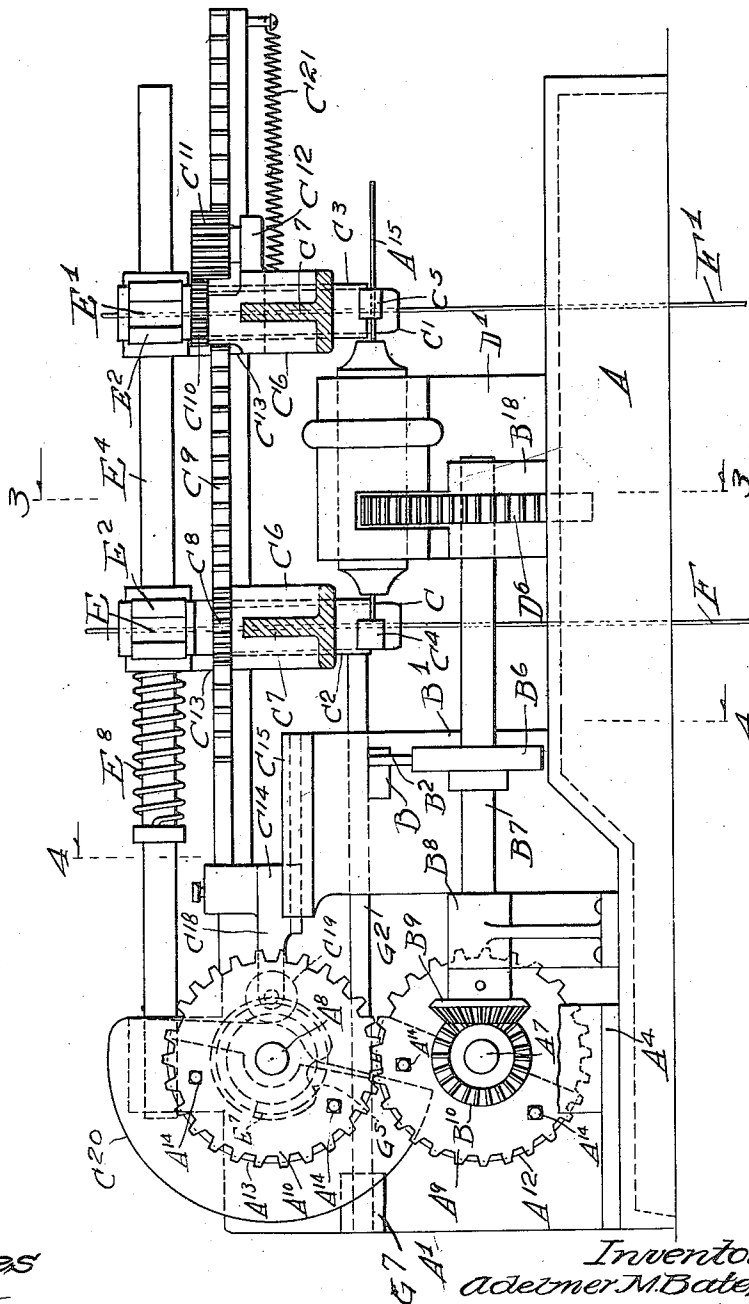
A. M. BATES.
WIRE TIE FORMING MACHINE.
APPLICATION FILED APR. 16, 1914.

1,212,437.

Patented Jan. 16, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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Laurel M. Doremus

Inventor:
Adelmer M. Bates

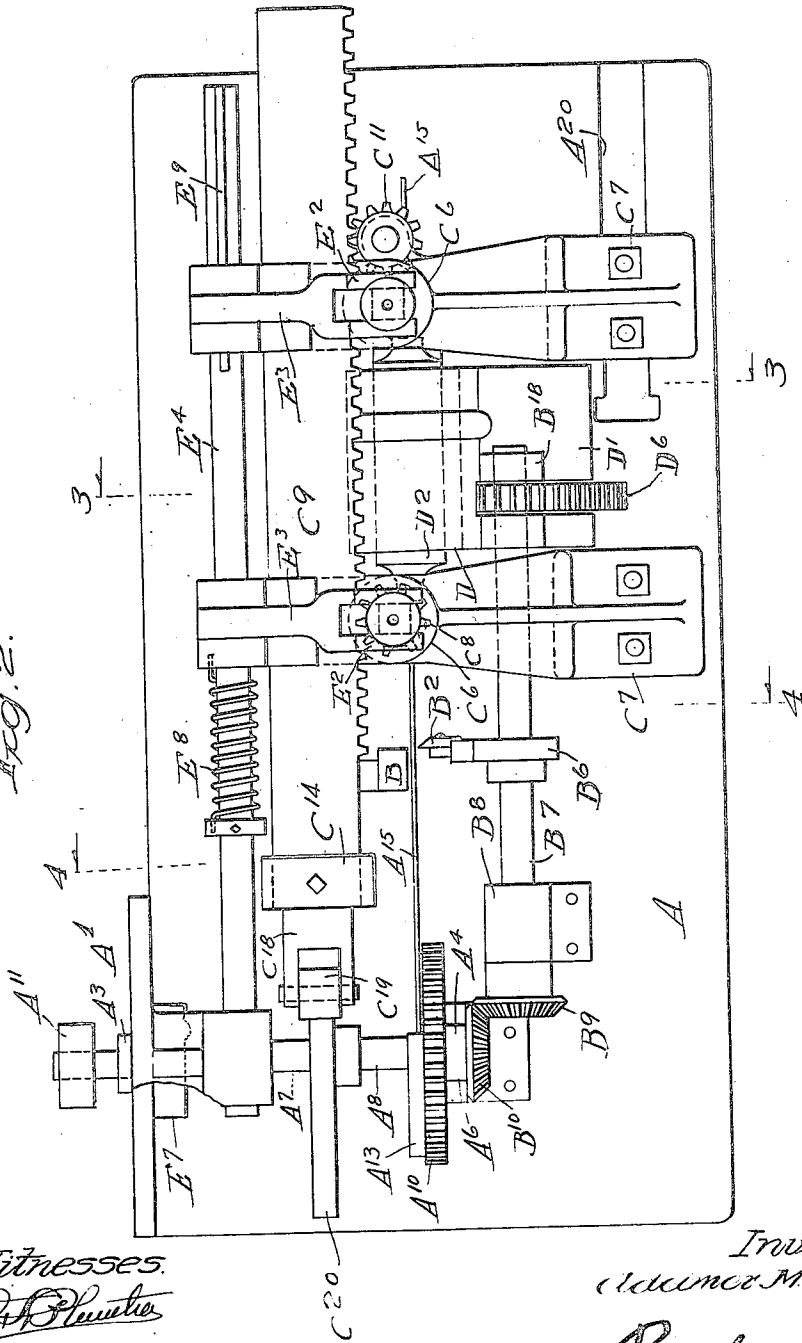
by *Parsons & Co.*
his Attys.

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4 SHEETS—SHEET 2.

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Fig. 2.



Witnesses.

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4 SHEETS—SHEET 3.

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Fig. 3.

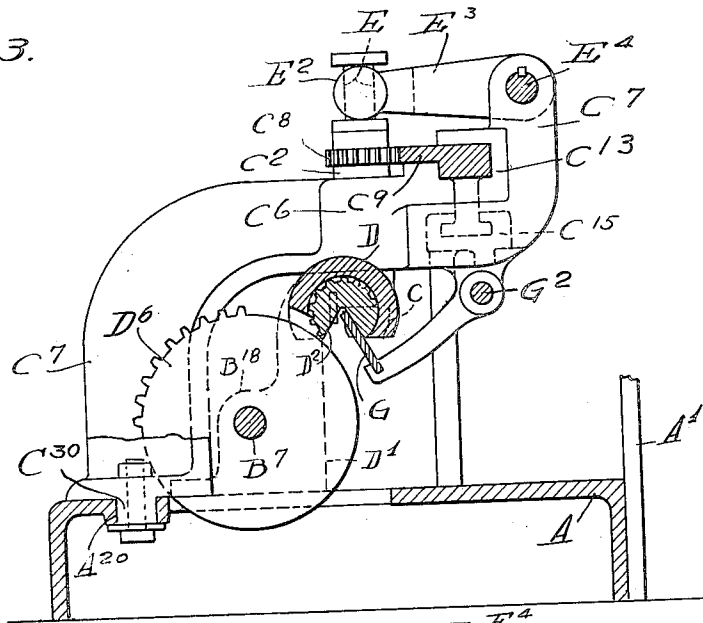
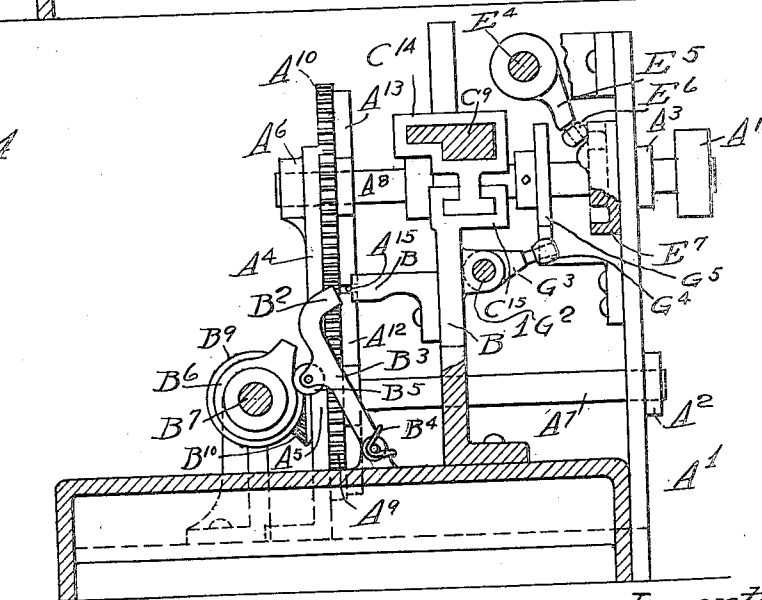


Fig. 4.



Witnesses:
W. H. Hunter
Lancel M. Baumer

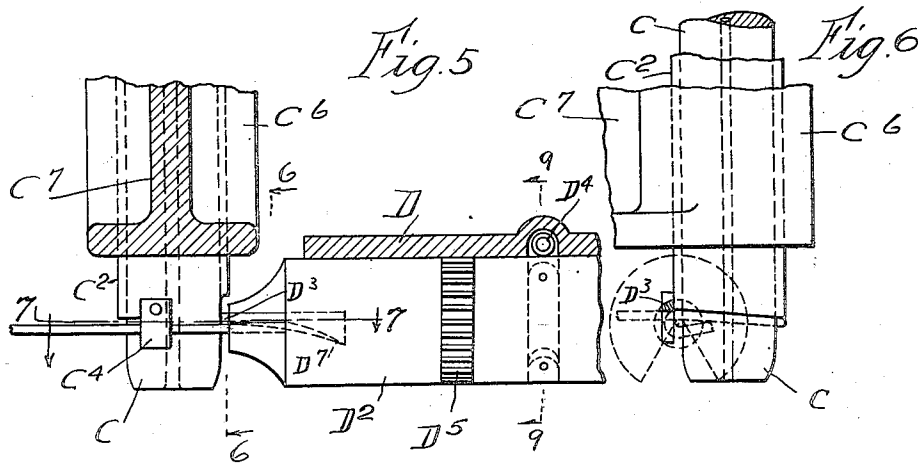
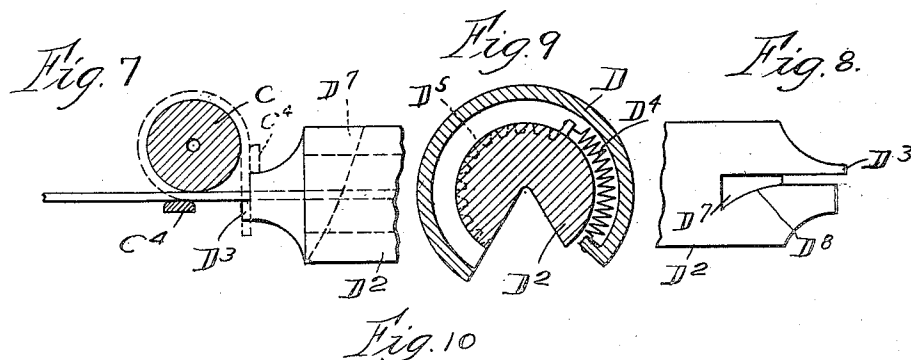
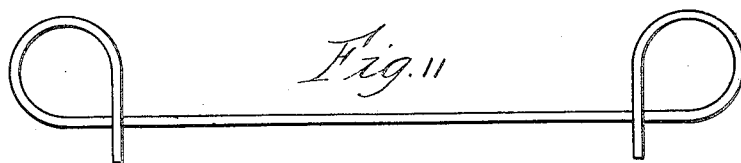
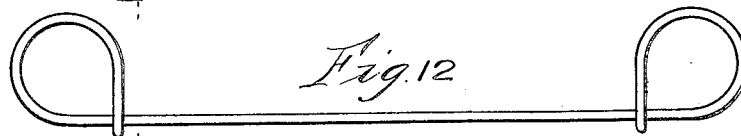
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4 SHEETS—SHEET 4.



Witnesses
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UNITED STATES PATENT OFFICE.

ADELMER MARCUS BATES, OF CHICAGO, ILLINOIS, ASSIGNOR TO BATES VALVE BAG COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

WIRE-TIE-FORMING MACHINE.

Specification of Letters Patent. Patented Jan. 16, 1917.

1,212,437.

Application filed April 16, 1914. Serial No. 832,148.

To all whom it may concern:

Be it known that I, ADELMER M. BATES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Wire-Tie-Forming Machines, of which the following is a specification.

My invention relates to improvements in machines for bending and forming wire ties and is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation; Fig. 2 is a plan view; Fig. 3 is a section on the line 3—3 of Figs. 1 and 2; Fig. 4 is a section on the line 4—4 of Figs. 1 and 2; Fig. 5 is a detail part in section and part in elevation of a portion of the twisting means; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a section on the line 7—7 of Fig. 5; Fig. 8 is a detail elevation of a portion of the twisting means; Fig. 9 is a section on the line 9—9 of Fig. 5; Fig. 10 is an elevation of the wire tie blank; Fig. 11, a view of the wire tie when partially completed; Fig. 12, a view of the completed tie; and Fig. 13 is a section on the line 13—13 of Fig. 12.

Like parts are indicated by like characters throughout the several figures.

A is a supporting base or frame adapted to rest upon the bench or to be supported in any other suitable manner as desired.

A¹ is a bracket projecting upwardly from the base or frame A and carrying the bearings A² A³.

A⁴ is a further bracket parallel with the bracket A¹ projecting upwardly from the frame A and carrying the bearings A⁵ A⁶. In the bearings A² A⁵ and A³ A⁶ are mounted respectively the parallel gear shafts A⁷ A⁸ which carry the gears A⁹ A¹⁰ in mesh one with the other, the shaft A⁸ being driven from any suitable source of power applied to the pulley A¹¹. On the gears A⁹ A¹⁰ are adjustably mounted the wire feeding segments A¹² A¹³ being held in position by suitable bolts A¹⁴ as indicated. These wire feeding segments have between them sufficient clearance to enable them to grip the wire A¹⁵ as it passes between them.

The wire A¹⁵ which is fed from any suitable source not shown passes through the wire feeding device to and beyond the cutting device which consists in an anvil B supported

on a bracket B¹ on the frame A in opposition to a cutting knife B² mounted on a knife lever B³ pivoted on the base A on the spring B⁴. A cam roller B⁵ on the knife lever B³ is held by this spring B⁴ in engagement with the cam B⁶ on a cam shaft B⁷. This cam shaft B⁷ is rotatably mounted on the bearings B⁸, B¹⁸ in the frame A and is provided with a miter gear B⁹ in mesh with the miter gear B¹⁰. The relative angular positions of the feeding cams or segments and the cutting cam are such that the cutting cam operates to cut off the wire only after the feeding cams have fed the wire forward a suitable distance.

The wire as it is fed forward beyond the cut-off apparatus passes across the ends of the anvil bars C C¹. These anvil bars have rotatably mounted thereon sleeves C² C³ which sleeves carry twisting fingers C⁴ C⁵ projecting down beyond the wire to leave room for the wire between them and the anvils. These sleeves C² C³ are journaled in bearings C⁶ supported on the frame brackets C⁷. The sleeve C² is provided with a gear C⁸ in mesh with the sliding rack C⁹; and the sleeve C³ is provided with a gear C¹⁰ in mesh with the gear C¹¹ which gear is in mesh with the rack C⁹ and rotatably mounted on the lug C¹² projecting from one of the brackets C⁷. The rack is slidably mounted on the guides C¹³ on the brackets C⁷ and has at one end a cross head C¹⁴ to which it is adjustably attached. This cross head reciprocates in the guide C¹⁵ on the bracket B¹ and carries an arm C¹⁸ which arm is provided with a cam roller C¹⁹ in engagement with the cam C²⁰ on the shaft A⁸. This cam is so angularly positioned with respect to the feed cams A¹² A¹³ that a reciprocation of the rack takes place only after the wire has been fed in a suitable distance and cut off. The gear C¹¹ is provided in order that the two twisting fingers may rotate in opposite directions in response to the movement of the rack. The spring C²¹ is provided for the purpose of yieldingly holding the rack always against the cam.

Intermediate the anvil bars C C¹ and loop forming mechanism is located the mutilated sleeve D supported on a bracket D¹ projecting upwardly from the base A. This sleeve is closed for substantially its entire periphery but opened through an angle of approximately 60° at the bottom. In this

sleeve is rotatably mounted a twisting head D² which head is substantially solid except for an angular slot forming an arc of approximately 60° and extending slightly beyond the center thereof to permit passage of the wire A¹⁵. This twisting head extends outwardly beyond either end of the sleeve D terminating in tongues D³. A spring D⁴ is fastened at one end to the sleeve D and at the other to the head D² to yieldingly hold the twisting head in position shown in Fig. 9. Teeth D⁵ are cut in the periphery of the head D² and are in mesh with the mutilated gear D⁶ on the shaft B⁷ which mutilated gear is toothed for such a distance as to rotate the twisting head through approximately 180°. The two ends of the twisting head D² are slotted as indicated in Figs. 5, 7 and 8. The slot is normally narrow but enlarged or deepened as at D⁷ on the side of the head toward the anvils C C¹ and is provided with a cam surface D⁸ to guide the end of the twisted wire toward the rectangular narrow portion of the slot so that the end of the wire A¹⁵ as it is carried about by the finger C⁴ will be guided upwardly by the cam slide D⁸ and assume the position shown in dotted lines in Fig. 7 when the result will be that shown in Fig. 11. The rotation of the head D² engaging the end of the wire by means of the projections D³ will twist the ends of the wire about the body of the wire to form a loop shown in Figs. 12 and 13.

The anvil bars C C¹ are slidable in the sleeves C² C³ and are provided at their upper ends with the reduced portions E E¹ respectively which reduced portions are engaged by the forks E² E² on the rocker arms E³. These rocker arms are keyed to the shaft E⁴ journaled on the brackets C⁷ and on the bracket A¹. This shaft E⁴ is provided with a cam arm E⁵ carrying a cam roller E⁶ in opposition to a cam E⁷ on the shaft A⁸, the roller being held against the cam by a spring E⁸. As the shaft A⁸ rotates the cam E⁷ being angularly arranged so as to operate subsequently to the forming of the tie will rotate the shaft E⁴ and lift up the lever E³ and thus pull up on the anvil bars and free them from the tie. The wire subsequent to its being cut off and prior to the final twisting movement is held in the head D² by the plate G which projects into the slot to hold the wire in position, and is mounted on the rock shaft G² and adapted to be controlled by the lever G³ provided with a cam roller G⁴ in opposition to the cam G⁵, which is carried by the shaft A⁸.

In order to provide for increased length of wire tie one of the brackets C⁷ is slidably mounted on the base A and the holding bolts travel in the slot A²⁰ so they may be loosened to give any suitable length of wire. When this is done it is only necessary to replace

the twisting head D² without interfering with the operation. The shaft E⁴ is provided with a key-way E⁹ to which is splined one of the arms E³ to enable the shaft E⁴ to lift the anvil. The rack is of sufficient length to provide for this adjustment and since the movement of the rack is the same at all points along it the operation of the twisting anvils will be the same no matter what the length of the ties produced. The bracket C⁷ in order to hold it rigidly in position when locked or bolted is provided with a tongue C³⁰ and assists in anchoring the bracket C⁷.

The anvils or mandrels C C¹ are longitudinally apertured or drilled to engage the wires or rods F F¹ which pass down through the base and thus pass through the centers of the two wire loop ends when formed, so that as the wire ties are shed from the machine they drop along through the base of the machine and are held in fixed position and easily fed to a tying machine.

The use and operation of my invention are as follows: The wire is fed into the machine from any suitable source of supply, not here indicated, by the rotation of the two feeding cams which grip the wire and once each revolution feed it forward a distance equal to the peripheral distance during which they are in opposition, which distance may be said to be anything from zero to the total periphery of the cam, namely, one-half the circumference, by merely adjusting the angular position of the two cams with respect one to the other. When this feeding forward has ceased owing to the feeding cams having passed out of engagement with the wire, the wire cutting cam will cause the wire cutting arm to swing forward toward the wire and the anvil against the yielding pressure of the spring to cut the wire. This wire will in the meanwhile be held in position in the downwardly open V-shaped groove in the turning mandrel by the holding plate shown at G in Fig. 3. While the wire is here held and subsequent to the cutting off of the wire cam C²⁰ will force the rack C⁹ to the right in Fig. 1, rotating the two vertically disposed twisting mandrels through substantially 270 degrees, the pressure of the pin C⁴ on the mandrel against the wire will as this pin rotates, cause the pin to slide along the wire and fold or bend it into the shape shown in Fig. 11. The wire will then be gripped on the mandrel and the support of the leaf G will no longer be needed. This leaf is then allowed to drop down and the mandrel D² is rotated, bending the ends of the wire about the body of the wire to produce the result shown in Figs. 12 and 13.

Attention is called to the peculiar shape of the slot D⁷ shown in Fig. 8. This slot is broad at the point where the wire enters it

in order that there may be no possible chance of the wire missing the slot. It narrows down, however, as the wire is rotated to bring the end of the wire from below firmly up against the body of the wire when it reaches the part D³. Subsequent to this twisting movement the spring D⁴ draws the mandrel D² back to the position shown in Fig. 9 and the cam E⁷ rocks the shaft E⁴ to lift up on the bell cranks E³ and raise the wire engaging portions of the anvil bars C, C¹ to draw them out of engagement with the wire tie and permit the tie to fall freely into any suitable receptacle. All these acts are performed during the half revolution from the time when the feeding cam lets go of the wire to the time when it is ready to again commence feeding the wire into the machine, although, of course, there may be a slight amount of lag, as no harm would result so long as the end of the wire has not quite reached the first mandrel before it returns to its normal position.

I claim:

1. A wire twisting machine comprising a longitudinally slotted mandrel, means for feeding a length of wire into said slot, means for holding it there, and means for cutting it off and bending the free ends of the wire about the body of the wire to form an open loop.

2. A wire twisting machine comprising a longitudinally slotted mandrel, means for feeding a length of wire into said slot, means for holding it there, means for cutting it off and bending the free ends of the length of wire thus cut off about the body of the wire to form an open loop, and means for rotating the mandrel to twist the free ends about the body of the wire to close the loop.

3. In a wire twisting machine, means for feeding out a fixed length of wire, means for cutting it off, means for holding it in position, means for bending the free ends of the length of wire thus cut off back across the body of the wire and rotating the free ends to twist them around the body to form a closed loop.

4. In a wire twisting machine, a longitudinally slotted rotatable mandrel, means for feeding a length of wire into said mandrel, means for cutting it off and means for bending the free ends of the length of wire thus cut off back across the body of the wire adjacent the two ends of the mandrel, fingers on the mandrel, and means for rotating it to bring said fingers into engagement with the free ends of the wire to twist them about the body of the wire.

5. In a wire bending machine, a rotatably mounted longitudinally slotted mandrel, a pair of forming heads located one at either end of the mandrel, means for feeding out a length of wire through said slot, means for cutting it off and means for twisting

the free ends of the length of wire thus cut off about the forming heads to form open loops at either end thereof.

6. In a wire bending machine, a rotatably mounted longitudinally slotted mandrel, a pair of forming heads located one at either end of the mandrel, means for feeding out a length of wire into said slot, means for cutting it off and means for twisting the free ends of the length of wire thus cut off about the forming heads to form open loops at either end thereof, means for twisting the mandrel, and means carried by the mandrel for engaging the ends of said wire length and twisting them about the wire in response to the rotation of the mandrel.

7. In a wire bending machine, a rotatably mounted longitudinally slotted mandrel, a pair of forming heads located one at either end of the mandrel, means for feeding out a length of wire into said slot, means for cutting it off and means for twisting the free ends of the length of wire thus cut off about the forming heads to form open loops at either end thereof, means for twisting the mandrel, and means carried by the mandrel for engaging the ends of said wire length and twisting them about the wire in response to the rotation of the mandrel and means for freeing said loops from the forming heads.

8. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel.

9. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel, and a fixed housing having an open bottom corresponding with the said slot to hold the mandrel and furnish a bearing therefor.

10. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel, a fixed housing having an open bottom corresponding with the said slot to hold the mandrel and furnish a bearing therefor, and means for rotating the mandrel in the housing.

11. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel, a fixed housing having an open bottom corresponding with the said slot to hold the mandrel and furnish a bearing therefor, means for rotating the mandrel in the housing, and yielding means for returning the mandrel to its normal position of rest.

12. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein

- being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel, a fixed housing having an open bottom corresponding with the said slot to hold the mandrel and furnish a bearing therefor, means for rotating the mandrel in the housing, means for feeding a length of wire to be twisted into said slot along the axis of rotation of the mandrel, means for cutting it off and means for holding it in position.
13. In a wire twisting machine, a longitudinally slotted mandrel, the slot therein being V-shaped and having its apex substantially coincident with the axis of rotation of the mandrel, a fixed housing having an open bottom corresponding with the said slot to hold the mandrel and furnish a bearing therefor, means for rotating the mandrel in the housing, means for feeding a length of wire to be twisted into said slot along the axis of the rotation of the mandrel, means for cutting it off, and means for holding it in position, said holding means comprising a wire contacting bar, a lever upon which it is mounted, and means for rocking said lever to cause the bar to penetrate the slot and clamp the bar in the apex thereof.
14. The combination with a rotatably mounted twisting mandrel, of a slidably and rotatably mounted loop forming head, means for feeding a wire longitudinally through the mandrel and along the side of the head, means for rotating the head to twist the wire, and means for holding the wire and means for twisting the mandrel to lock the loop.
15. The combination with a rotatably mounted twisting mandrel, of a slidably and rotatably mounted loop forming head, means for feeding a wire longitudinally through the mandrel and along the side of the head, means for rotating the head to twist the wire, and means for holding the wire and means for twisting the mandrel to lock the loop and means for releasing the wire.
16. In a wire twisting machine, a loop forming means comprising a rotatable twisted head, a finger carried by and parallel with said head, means for feeding a wire between the finger and the head, means for holding the wire in position and twisting the head to rotate the finger, draw it along the wire and twist the wire around the head.
17. In a wire twisting machine, a loop forming means comprising a rotatable twisted head, a finger carried by and parallel with said head, means for feeding a wire between the finger and the head, means for holding the wire in position and twisting the head to rotate the finger, draw it along the wire and twist the wire around the head, and means for subsequently twisting the wire to form a locked loop.
18. In a wire twisting machine, a loop forming means comprising a rotatable twisted head, a finger carried by and parallel with said head, means for feeding a wire between the finger and the head, means for holding the wire in position and twisting the head to rotate the finger, draw it along the wire and twist the wire around the head, and means for subsequently twisting the wire to form a locked loop, said means comprising a wire twisting mandrel having a finger thereon to engage the free end of the wire.
19. In a wire twisting machine, a wire holding mandrel, twisting heads at either end thereof, means for feeding wire through the mandrel, means for cutting it off, means for holding it in position and means for twisting the heads simultaneously in opposite directions to form loops on either end of the wire.
20. In a wire twisting machine, a wire holding mandrel, twisting heads at either end thereof, means for feeding wire through the mandrel, means for cutting it off, means for holding it in position and means for twisting the heads simultaneously in opposite directions to form loops on either end of the wire, means for twisting the mandrel to twist the free ends of the cut off wire to lock said loops.
21. In a wire twisting machine, a wire holding mandrel, twisting heads at either end thereof, means for feeding wire through the mandrel, means for cutting it off, means for holding it in position and means for twisting the heads simultaneously in opposite directions to form loops on either end of the wire, means for twisting the mandrel to twist the free ends of the cut off wire to lock said loops, and means for releasing said loops from said heads.
22. In a wire twisting machine, a longitudinally V-slotted mandrel rotatably mounted, means for feeding wire into said mandrel along the apex of said slot, means for holding the wire in the mandrel, means for cutting it off, forming heads at either end of the mandrel, means for twisting the free ends of the cut off wire about said heads, fingers upon said mandrel in opposition to the free ends of the wire for twisting said ends about the body of the wire to lock the loop, means for freeing the loop, and means for returning the mandrel to its normal position.
23. In a wire tie forming machine, a slotted mandrel, one of said slots being longitudinal and extending from end to end of the mandrel in the form of a V extending inward from the periphery substantially as far as the axis thereof, the other slots being transverse, one at either end and located

in a plane at right angles to a plane bisecting said V slot, means for feeding a length of wire into said V slot and means for twisting the projecting ends of the wire into loops in the plane of the wire and the transverse slots, and means for rotating the mandrel subsequent to its twisting to lock the projecting ends about the body of the wire.

24. A wire twisting machine comprising a mandrel longitudinally slotted, means for feeding a length of wire into said slot, means for holding it therein, means for cutting it off and means for bending the free ends of the wire back across the body thereof to form a loop and means for rotating the mandrel to twist the free ends to close the loop.

25. In a wire twisting machine, means for feeding out a fixed length of wire, means for cutting it off, means for manipulating the free end of the wire to partially form a loop while holding the body of the cut off pieces of wire in position, and means for subsequently holding the loop thus partially formed in position and manipulating the free end of the wire to complete the loop.

26. In a wire twisting machine, a mandrel apertured to admit the wire, means for introducing wire into said aperture and means for cutting it off, wire engaging members on the ends of the mandrel, and means for twisting the free ends of the wire into engagement with said members.

27. In a wire twisting machine, a mandrel apertured to admit the wire, means for introducing wire into said aperture and means for cutting it off, wire engaging members on the ends of the mandrel, means for twisting the free ends of the wire into engagement with said members, and means for rotating the mandrel after the free ends of the wire have been twisted to loop them around the body of the wire to form a loop.

28. In a wire twisting machine, a mandrel, a finger carried thereby, means for introducing a length of wire into the space between the mandrel and the finger, means for holding the wire in position, and means for rotating said mandrel to bend the wire about said mandrel between it and the finger to form a loop.

29. In a wire twisting machine, a mandrel, a finger carried thereby, means for introducing a length of wire into the space between the mandrel and the finger, means for holding the wire in position, means for rotating said mandrel to bend the wire about said mandrel between it and the finger to form a loop, and means for subsequently twisting the free ends of the wire around the body of the wire to close the loop.

30. A wire twisting machine comprising a pair of parallel mandrels, twisting fingers carried thereby, means for feeding and

holding a wire blank against said mandrels between them and said fingers, and means for rotating the mandrels and fingers to bend the free ends of the wire into a loop about the mandrels.

31. A wire twisting machine comprising a pair of parallel mandrels, twisting fingers carried thereby, means for feeding and holding a wire blank against said mandrels between them and said fingers, means for rotating the mandrels and fingers to bend the free ends of the wire into a loop about the mandrels, and means carried by said wire holding means for twisting the free ends of said wire about the body of the wire between the body of the wire and the loop to close the loop.

32. A wire twisting machine comprising a slotted rotatable mandrel, means for feeding a length of wire into said slot along the axis of rotation of the mandrel, slots at either end of the mandrel at right angles to the main longitudinal slot, a pair of parallel rotatable and reciprocable mandrels at either end of the slotted mandrel, wire engaging fingers projecting therefrom and parallel with the surface thereof, the effective wire engaging portions of the fingers of the mandrel being in line with the axis of rotation of the slotted mandrel and tube to engage the wire, means for twisting said mandrels and fingers through an angle of 270° to bring the free ends of the wire into engagement with the transverse slots in the rotatable slotted mandrel, means for rotating the slotted mandrel to bend the free ends of the wire about the body of the wire, and means for reciprocating the parallel mandrel to release the loop thus formed therefrom.

33. A wire twisting means comprising a mandrel slotted longitudinally and transversely, means for feeding a length of wire longitudinally through said slot until its two ends project outwardly beyond each end of the mandrel, and means for forming each of said outwardly projecting ends into a loop.

34. A wire twisting means comprising a mandrel slotted longitudinally and transversely, means for feeding a length of wire longitudinally through said slot until its two ends project outwardly beyond each end of the mandrel, said transverse slots having enlarged inner portions below the position occupied by the wire, means for twisting the free ends of the wire section to form loops at either end immediately adjacent the ends of the mandrel, the free ends of the wire passing through said slots as the twisting takes place, and fingers projecting from the ends of said mandrel at each side of said transverse slots and in engagement with said free ends of the wire at one side thereof.

35. A wire twisting machine comprising a

mandrel slotted to permit passage of the wire, two vertical twisting heads one at either end of the mandrel, wire engaging fingers carried by said heads, a driving and
5 timing member, a driving connection between the twisting heads and the timing member, means for holding the wire in the mandrel, and a connection between such means and the timing device, and means car-
10 ried by the timing device for feeding out

wire into the mandrel, together with means operated by the timing device for cutting off the wire.

In testimony whereof, I affix my signature in the presence of two witnesses this 7th 15 day of April, 1914.

ADELMER MARCUS BATES.

Witnesses:

LAUREL M. DOREMUS,
GENEVA HIRTH.