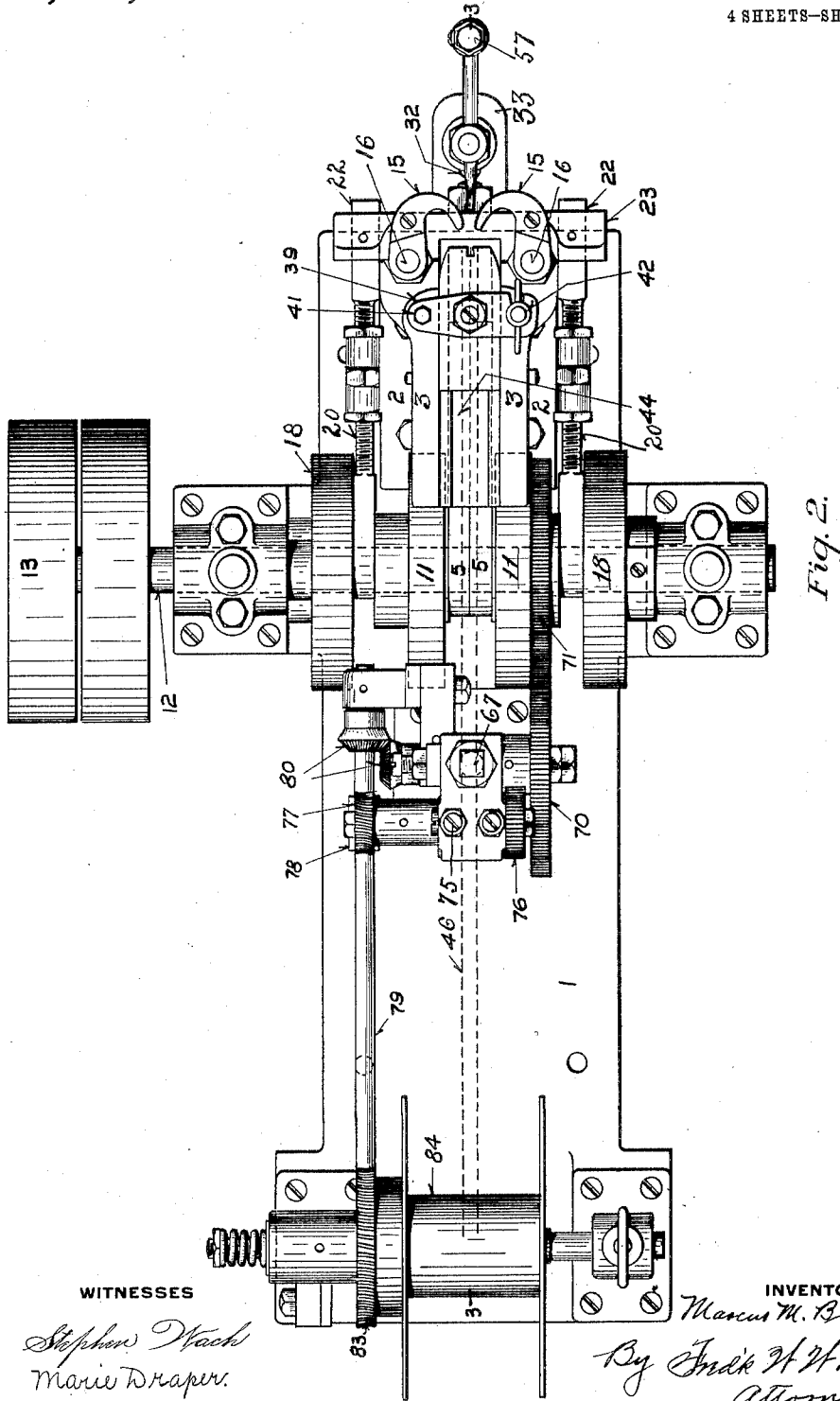


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APPLICATION FILED MAR. 5, 1909.

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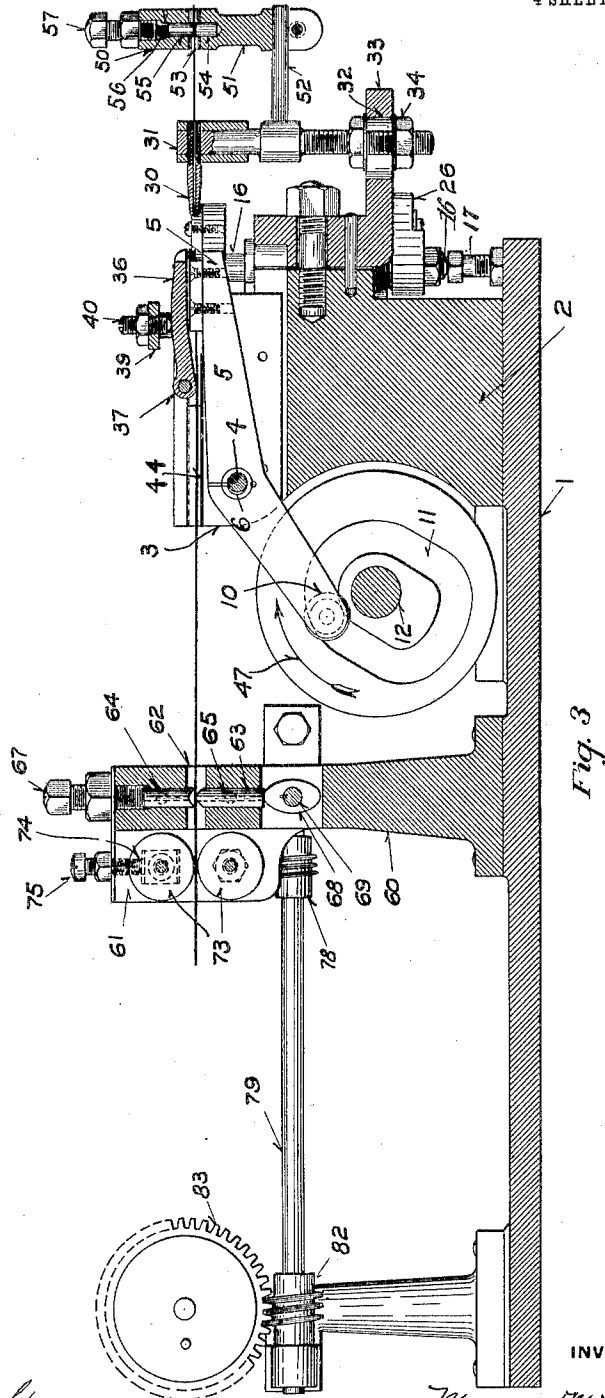


Fig. 3

WITNESSES

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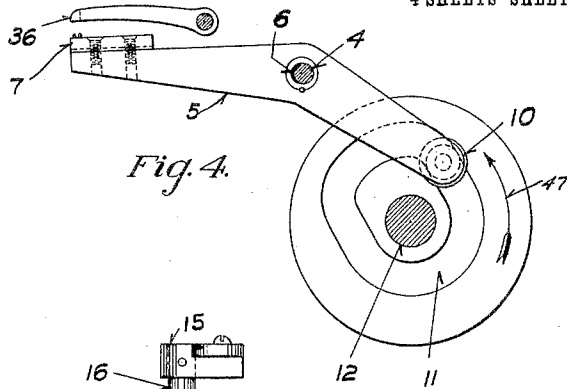


Fig. 4.

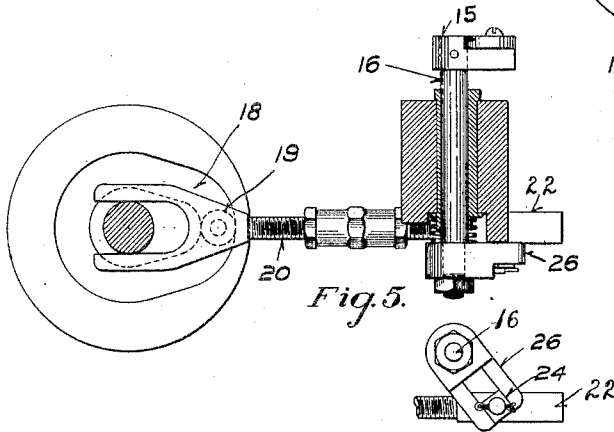


Fig. 5.

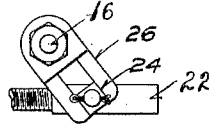


Fig. 6.

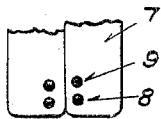


Fig. 8.

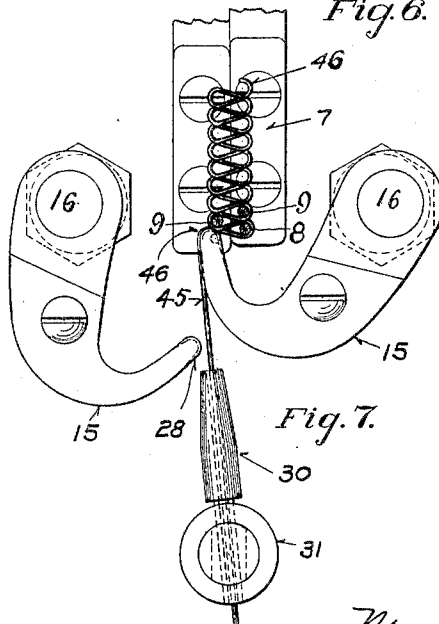


Fig. 7.

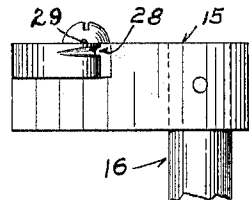


Fig. 9.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING WIRE CORSET-STAYS.

1,009,823.

Specification of Letters Patent.

Patented Nov. 28, 1911.

Application filed March 5, 1909. Serial No. 481,496.

To all whom it may concern:

Be it known that I, MARCUS M. BEEMAN, a resident of Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Machines for Making Wire Corset-Stays, of which the following is a specification.

This invention relates to machines for bending wire back and forth into successive loops disposed oppositely and side by side and slightly overlapping, and designed particularly for corset stays, and preferably concaved transversely to increase the rigidity and resiliency of the stay.

The invention is an improvement upon the machines shown in Patents No. 761,640, June 7, 1904, to George G. Annable, and No. 820,510, May 15, 1906, to Francis W. Mallett.

The object of the present invention is to improve machines of the character above named in various features so as to render the same simple and strong in construction, efficient and durable in operation, and as near noiseless as possible.

Specific features of the invention relate to an improved arrangement for feeding the wire through the machine, an improved tension device, improved loop forming means, improved straightening means, and a simplification and strengthening of the operating means for the loop forming and bending mechanism.

The invention comprises the construction, combination and arrangement of parts hereinafter described and claimed.

In the accompanying drawings Figure 1 is a side elevation of the improved machine, the frame being partly broken away to show details of the mechanism; Fig. 2 is a plan view of the same; Fig. 3 is a central vertical section on the line 3—3, Fig. 2, through the tension device, the loop forming mechanism and the straightening mechanism; Fig. 4 shows the loop forming mechanism of Fig. 3 in a different position; Figs. 5 and 6 illustrate the mechanism for actuating the wire bending fingers; Fig. 7 is an enlarged plan view illustrating the operation of bending the wire; Fig. 8 is a plan view of the two pin carriers with other parts removed to show the positions of the pins; and Fig. 9 is a front view of one of the bending fingers.

The machine is provided with a suitable base 1 upon which are erected a pair of vertical parallel metal plates or walls 2 between which the loop forming members are mounted. Cheek plates 3 are suitably secured to the inner faces of these plates or walls to take the wear and are removable so that they can be renewed. Supported by the vertical plates or walls 2 is a transverse rod or bar 4 forming the fulcrum for the loop forming levers 5—5. These levers are fulcrumed intermediate their ends as shown and the holes therethrough are slightly elongated to form slots as shown at 6 to allow said levers to have a slight longitudinal movement in addition to their oscillatory movement on the pivot bar 4. The front or outer end of each of the levers is formed as, or provided with, a pin block 7 each of which is provided with a pair of upwardly projecting pins 8—9 disposed one in front of the other and a short distance from the end of the pin block. Preferably the forward pins of the two pin blocks are slightly farther apart than the rear ones as shown in Fig. 8 for a purpose herein-after stated.

The rear end of each of the levers 5 has rotatably mounted thereon a roller 10, which rollers engage respectively with a pair of grooved cams 11 oppositely arranged and rigidly mounted on the driving shaft 12 which extends transversely through the frame plates 2, being mounted in suitable bearings therein and provided with a pulley 13 or other suitable driving means. The cams 11 are preferably grooved or closed so as to positively actuate the levers 5 in both directions. These cams are arranged in reverse relation to each other so as to alternately actuate the levers 5 and cause the pin block of one lever to rise while that of the other lever descends, as will be readily apparent. It will be noted that the pin block carrying levers are connected directly to their actuating cams. This simplifies the construction, reduces the number of parts to a minimum, reduces cost, and to a great extent obviates the wear and annoying and injurious rattling due to the use of additional parts for operatively connecting the levers to their cams, as in the Annable and Mallett patents.

The wire is bent around the loop forming pins 8—9 by means of a pair of oppositely arranged oscillatory fingers 15. These fingers are rigidly attached to the upper ends of vertical shafts 16 mounted at opposite sides of the front ends of the levers 5 and being vertically adjustable by means of screws 17 upon which said shafts are stepped. This permits of adjustment to raise or lower the fingers 15 and bring them in proper operative position with reference to the pin blocks. The finger shafts 16 receive oscillatory motion from reversely disposed grooved cams 18 fixedly mounted on the driving shaft 12. In each of the grooved cams is a roller 19 rotatably mounted on a pitman or connecting rod 20 so that the latter receives reciprocating motion from the cam. The front ends 22 of the pitman rods extend through longitudinal guides formed in a transverse plate 23 secured to the frame of the machine, or to the parallel longitudinal plates 2. To each pitman is pivoted a block 24 which is engaged by a slotted or bifurcated arm 26 secured to the lower end of a finger shaft 16. The longitudinal movements of the pitman rods are thus transmitted to the shafts 16 so as to oscillate the latter and give a corresponding motion to the bending fingers 15 carried by said shafts. The guide 22 and the slotted or bifurcated arm 26 connecting the pitman to the finger carrying shaft serve to maintain a strict rectilinear movement of the pitman and thus prevent straining the pitman and its connections.

Each of the fingers 15 is provided on its end with an inclined or spiral groove 28 so as to provide above the same a spiral or inclined lip 29 for carrying the wire underneath a previously formed loop. The wire is guided to the fingers by means of an oscillating tubular guide 30 carried by a vertically adjustable post 31. This post is adjustable toward and from the bending fingers and also vertically by being extended through a slot 32 in the frame plate 33 and being threaded and provided with nuts 34 both above and below said frame plate. Both the axis of the wire guide and the grooves 28 in the bending fingers are below the plane of the tops of the pin blocks when in their elevated positions, as shown in Fig. 3, so that in carrying the wire transversely while bending around a pin the fingers also bend the wire downwardly over the edge of the pin block and thereby impart a transverse dishing or concaving on the lower face of the fabric. The spiral arrangement of the grooves in the bending fingers insures that the wire will be engaged when the fingers swing across the path of the wire notwithstanding the relatively lower position of the wire guide with refer-

ence to the pin block holding the previously formed loop. Above the pin blocks and co-operating therewith is a presser foot 36 in the form of a plate lying between the plates or walls 2 and preferably pivoted thereto, as at 37, and so positioned as to allow the looped wire to pass underneath it but having its front end rigidly held in such position that the pin blocks when in their elevated position firmly clamp the loops against said presser foot. This presser foot is held by means of a cross bar 39 carrying an adjusting screw 40 bearing against the presser foot and pivoted at one end on post 41 and at its opposite end being slotted and engaging post 42 and held by winged nut 43. Between the walls or plates 2 is a horizontal plate 44 forming a guide for the bent or looped wire from the loop forming mechanism toward the rear end of the machine.

The operation of the machine so far described is as follows: The wire 45 passes from the guide 30 to the pin blocks, being looped around the forward pin 8 of one of said blocks. These blocks alternately rise and fall, and the block which is in elevated position clamps the looped wire 46 tightly against the presser foot 36. The oscillating finger 15 on that side of the machine on which the pin block is elevated then swings across the end of the pin block and by its groove 28 engages the wire and carries the same across over the opposing pin block and underneath a previously formed loop on that side of the machine. In so carrying the wire across the finger, on account of its groove being located lower than the top surface of the elevated pin block, the wire is bent down over the edge of said elevated pin block and as this is repeated alternately from opposite sides the looped fabric is concaved slightly transversely. The oscillating finger pushes the wire well under the previously formed loop and then recedes. The depressed pin block then ascends and catches the wire which was just carried transversely between its two pins 8 and 9, the space between said pins being only about equal to the diameter of the wire. The pin 9 enters a previously formed loop or eye, and as there is always a certain amount of recoil after bending, the pins 9 are set closer together or slightly nearer the contiguous edges of the pin blocks than the pins 8 so as to be sure to enter the previously formed eyes even after recoil and without undue friction, while on the other hand the pins 8 are spaced apart the maximum distance for the width of the looped fabric or stay being formed. After this pin block has fully ascended and clamped the looped fabric against the presser foot the other pin block descends, and then the finger 15 on the side of the machine on which the

pin block is now elevated swings across and carries the wire back across and over the now lowered pin block and under a previously formed loop on that side of the machine. This operation is repeated alternately as will be readily understood, so forming a looped fabric in which the wire is alternately bent back and forth in zigzag fashion and forming a series of oppositely disposed loops arranged side by side and overlapping and also concaved transversely. The wire fabric is fed through the machine as formed by the longitudinal movement of the pin blocks due to the slots 6 on which levers 5 are mounted. The cams for actuating the pin block levers rotate in the direction of the arrows 47, that is, toward the pin blocks. Consequently when a pin block is in lowermost position and the lever is entirely idle or without pressure thereon, the forward movement of the cam pushes the lever forward and thus advances the pin block, as shown in Fig. 4, and it is still in this forward position when it is fully elevated and grips the fabric against the presser foot. When so gripped it has a tendency to remain in the forward position because of the friction caused by the looped fabric which is clamped between the pin block and the presser foot. When the oscillating finger, however, loops the wire around the pin on the pin block and pushes it back under a previously formed loop, a very material pressure is exerted which overcomes the friction caused by the looped fabric and pushes the pin block and its lever backwardly as far as allowed by the slot 6 in the lever, as shown in Fig. 3. This carries the looped fabric backwardly or through the machine and constitutes the feeding motion. The pin block remains in this rearmost position as long as it still grips the looped fabric, as there is little tendency at this time to disturb the pin block on account of the roller on the end of the lever moving in a concentric portion of the cam groove. As soon, however, as the cam lowers the pin block so as to relieve the latter from the friction of the clamped fabric the forward thrust of the cam which is now acting on the lever by an eccentric portion pushes the lever forward as far as allowed by the slot 6, and it is held in this forward position while coming up until another loop is formed around its pin, whose forming stress again pushes the lever backwardly.

The wire fed to the machine is put under tension by means of a tension device 50 comprising a post 51 which is clamped to a stud 52 carried by the wire guide post 31, so that the tension device and wire guide are always in the same relation to each other. The tension post 51 is provided with a vertical opening intersected by a horizontal

opening 53 through which the wire passes. In the vertical opening is a bottom tension block 54 and a top tension block 55, the former being stationary and the latter being pressed down on the wire by means of a spring 56 whose tension can be adjusted by screw 57 entering the upper end of the vertical opening.

The looping of the wire in the manner described is liable to give it such stresses that it will coil and make the straightening of the fabric difficult. To overcome this there is provided a suitable straightening device mounted on a suitable stand 60 rising from the bed of the machine. In this stand is a vertically arranged opening which is intersected by a horizontal opening 62 through which the looped fabric passes. In the vertical opening is a bottom plunger 63 and an upper plunger 64, these being provided respectively with concave and convex meeting faces, as shown in Fig. 3. These plungers are held against rotation so as to preserve their convex and concave faces in proper relation to each other, by being provided with grooves for receiving pins or the like 65 to hold them against turning. Both plungers are free to move vertically in the opening in the stand, but if desired the upper plunger may be fixed in position. The upper plunger is abutted by a screw 67 which limits the upward movement of said plunger and converts the same into a stationary anvil to receive the impact of the lower plunger. The lower plunger is actuated by means of a cam 68 shown as of oval form mounted on shaft 69 which is provided with gear 70 meshing with gear 71 on driving shaft 12. The looped fabric is in this manner hammered between the two plungers which tends to straighten it and take out the coil. In the arrangement shown the top plunger always rests on the looped fabric, but if desired it may be fixed in position.

To the rear of the straightening device are a pair of rolls 73 also mounted in stand 60 in suitable journal boxes which are held together by springs 74 bearing against the boxes of the upper roll and held by adjusting screws 75 in the stand or frame. These two rolls are provided with intermeshing gears 76 so that they rotate in unison. One of said rolls is provided with a worm wheel 77 engaged by a worm 78 on longitudinal shaft 79 driven from transverse shaft 69 by bevel gears 80. The longitudinal shaft 79 at its rear end is provided with worm 82 meshing with worm wheel 83 which has a frictional engagement with reel 84 upon which the looped fabric is wound. This frictional connection is or may be the same as that described in the Mallett patent above referred to. The guide for the wire, how-

ever, is dispensed with and the reel receives its rotary motion from the same shaft which actuates the cam for the straightening device and the feeding rolls. This simplifies the machine and reduces wear and friction.

By using an oval shaped cam for actuating the straightening plunger the pounding and noise incident to straightening the fabric is largely overcome. The gearing of the machine is very simple and particularly the worm gearing for driving the rolls and reels, producing smooth and noiseless motion. The machine as a whole is simple, durable, strong and efficient, and practically noiseless in operation.

What I claim is:

1. In a wire bending machine, the combination of pin carriers mounted to oscillate vertically and reciprocate longitudinally, cams arranged to alternately oscillate said carriers and advance the same horizontally, oscillating fingers arranged to move across the ends of said carriers and bend the wire around the pins on said carriers and to simultaneously retract the carriers, and mechanism for alternately oscillating said fingers.

2. In a wire bending machine, the combination of pin carriers mounted to move vertically and also horizontally, means arranged to alternately move said carriers up and down and to advance them horizontally, and benders arranged to move across the ends of said carriers and bend the wire around the pins thereon and to simultaneously retract the carriers horizontally.

3. In a wire bending machine, the combination of pin carriers mounted to oscillate vertically and to reciprocate horizontally, cams arranged to alternately oscillate said carriers and advance the same horizontally and being so formed as to permit recession of said carriers when in fully elevated position, benders arranged to move across the ends of said carriers and bend the wire around the pins on the same and simultaneously push the carriers backward, and mechanism for alternately operating said benders.

4. In a wire bending machine, the combination of pin carriers mounted to oscillate vertically and reciprocate horizontally, a presser foot above said carriers and arranged to have the wire clamped against the same by said carriers, cams arranged to alternately oscillate said carriers and advance the same horizontally, oscillating fingers arranged to move across the ends of said carriers and bend the wire around the pins thereon and simultaneously push the carriers backwardly, and mechanism for alternately oscillating said fingers.

5. In a wire bending machine, the combination of pin carriers mounted to oscillate

vertically and reciprocate horizontally, cams arranged to oscillate said carriers and moving toward the pins whereby the carriers are advanced horizontally when in idle position, a presser foot cooperating with said carriers, and oscillating fingers arranged to move across the ends of the carriers and bend the wire around the pins thereon and simultaneously push the carriers backwardly.

6. In a wire bending machine, the combination of pin carriers mounted to oscillate vertically and reciprocate horizontally, a single cam for each of said carriers arranged to both oscillate and reciprocate the same, and means for bending the wire around the pins on said carriers alternately.

7. In a wire bending machine, the combination of pin carriers mounted to oscillate vertically and reciprocate horizontally, a single cam for each of said carriers arranged to both oscillate the same and advance the same horizontally, and benders arranged to bend the wire around the pins on said carriers alternately and simultaneously push the carriers backward.

8. In a wire bending machine, the combination of loop forming pins, carriers therefor arranged to raise and lower the same alternately, and oscillating fingers arranged to bend the wire around said pins, said fingers being each provided with an inclined or spiral lip for passing the wire to said pins and carrying the same under a previously formed loop.

9. In a wire bending machine, the combination of alternately oscillating pin carriers, and alternately oscillating wire bending fingers movable across the ends of said carriers and provided with inclined lips for engaging the wire and bending the same around the pins and carrying the same under a previously formed loop.

10. In a wire bending machine, the combination of alternately oscillating pin carriers, alternately oscillating wire bending fingers provided with spiral grooves for engaging the wire and bending the same around said pins, and a wire guide, said wire guide and the inclined grooves in the fingers being in a plane below the tops of the pin carriers when in elevated position.

11. In a wire bending machine, the combination of alternately oscillating pin carriers each provided with a pair of pins arranged one in advance of the other, the forward pins on said carriers being located farther apart than the rearward pins, and benders arranged to loop the wire around said pins alternately.

12. In wire looping mechanism, the combination of a guide for the looped wire, a power-actuated plunger arranged to act against the lower face of the looped wire,

an opposing plunger arranged above the looped wire, and an adjustable abutment for said upper plunger.

13. In wire looping mechanism, the combination of a guide for the looped wire, a plunger arranged to act against the lower face of the looped wire, an oval cam for actuating said plunger, and an opposing plunger disposed above the looped wire.

14. In wire looping mechanism, the combination of a guide for the looped wire, a plunger arranged to act against the lower face of the looped wire, and an opposing plunger disposed above the looped wire, said plungers being provided with convex and concave faces, and means for preventing said plungers from rotating.

15. In a wire bending machine, the combination of pin carrying blocks, levers on which said blocks are mounted, and reversely disposed cams each having operative engagement directly with one end of one of said levers.

16. In a wire bending machine, the com-

bination of a frame, bending fingers secured to oscillatory shafts, arms attached to the finger shafts and slotted longitudinally, blocks engaging said slots, reciprocating rods on which said blocks are pivotally mounted, longitudinal guides on the frame engaging said reciprocating rods, and cams for reciprocating said rods.

17. The combination of a reel, wire straightening mechanism, a pair of rolls between the reel and said straightening mechanism, an actuating shaft for said straightening mechanism, a longitudinal shaft connected to the actuating shaft by bevel gears, worms on said longitudinal shaft, and worm wheels on said reel and on said rolls and meshing with said worms.

In testimony whereof, I have hereunto set my hand.

MARCUS M. BEEMAN.

Witnesses:

J. H. PARDEE,
F. W. WINTER.