

F. L. O. WADSWORTH.
MACHINE FOR MAKING GARMENT STAYS.
APPLICATION FILED SEPT. 25, 1914.

1,250,252.

Patented Dec. 18, 1917.

3 SHEETS—SHEET 2.

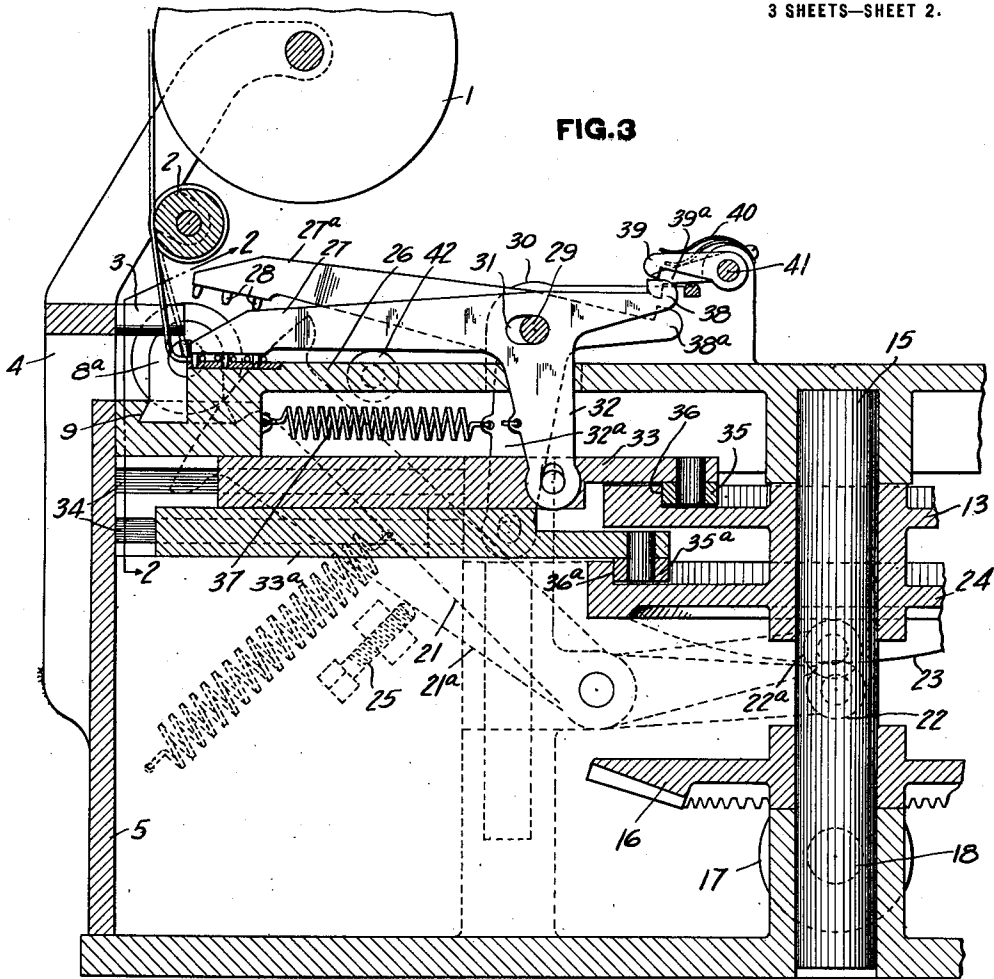


FIG. 4

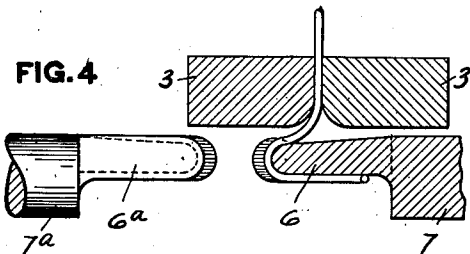
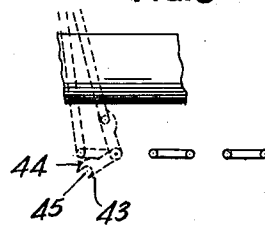


FIG. 5



WITNESSES

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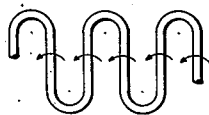


FIG. 6



FIG. 7

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3 SHEETS—SHEET 3.

FIG. 10

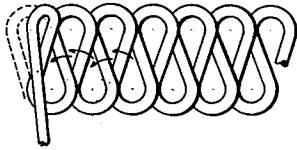


FIG. 11

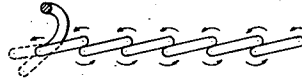


FIG. 8

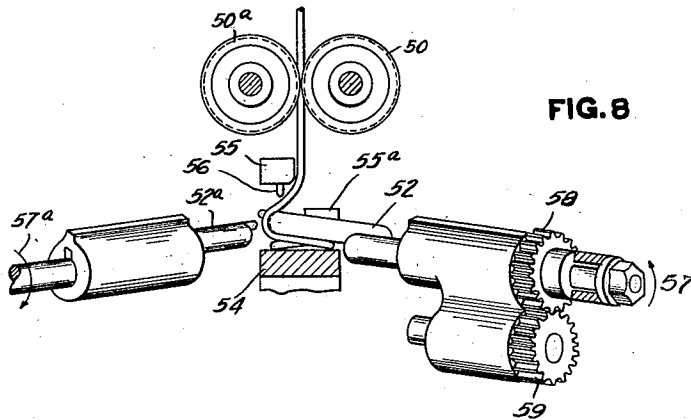
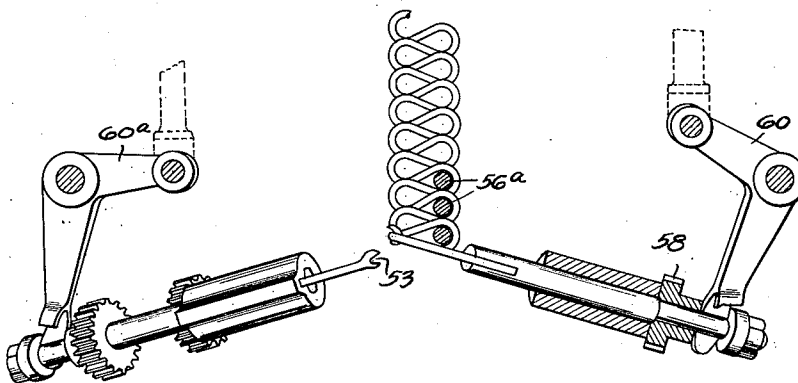


FIG. 9



WITNESSES

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING GARMENT-STAYS.

1,250,252.

Specification of Letters Patent.

Patented Dec. 18, 1917.

Application filed September 25, 1914. Serial No. 863,595.

To all whom it may concern:

Be it known that I, FRANK L. O. WADSWORTH, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Making Garment-Stays, of which the following is a specification.

This invention relates to a machine for making wire garment stays, and particularly to that form of stay which is made up of wire bent back and forth alternately in opposite directions to form two series of oppositely disposed loops or eyes lying along the edges of the stay and connected by a series of intermediate transverse portions or crossings lying at or nearly at right angles to the length of the stay.

One object of the invention is to provide an improved machine of the character described which forms wire garment stays in such manner that they are not only rendered stiffer in one flatwise direction than in the other but also possess an increased resiliency and increased ability to withstand short bends and avoid taking permanent bends or sets, as compared with such stays as heretofore constructed.

A further object of the invention is to provide a machine for forming wire garment stays in which the wire is bent back and forth alternately to form oppositely disposed loops or eyes and in such manner as to form the plane of each loop or eye at an angle to the plane of the finished stay as a whole, and then twist or tilt each loop or eye out of the plane in which it is formed in order to bring its plane nearer to the plane of the stay as a whole.

The apparatus of this application is designed particularly to carry out the method forming the subject matter of my prior patent for method of making garment stays, granted January 5, 1915, No. 1,123,822.

In the drawings, which represent machines embodying the invention, Figure 1 is a partial plan view of one form of machine with a portion of the top plate broken away to show the driving cams; Fig. 2 is a sectional elevation on the line 2-2, Fig. 3; Fig. 3 is a partial longitudinal sectional elevation on the line 3-3, Fig. 1; Figs. 4 and 5 are enlarged views of the bending and twisting fingers of the mechanism; Figs. 6

and 7 are enlarged views of two different forms of product; Fig. 8 is a partial end elevation of another form of machine embodying the invention; Fig. 9 is a partial plan view thereof; and Figs. 10 and 11 are plan and edge views of the product during the process of its formation by the mechanism of Figs. 8 and 9.

In the machine shown in Figs. 1 to 5 inclusive the wire is led from a reel or spool 1 downwardly over a stationary guide roll 2 and through or between guiding fingers 3, all of these parts being solidly mounted upon a column or upright 4 carried by the main frame 5, which is of any suitable configuration, depending upon the arrangement of the parts of the particular machine. Each loop is formed by the longitudinal movement of one of a pair of reciprocating bending fingers 6, 6^a, which are mounted to slide transversely of the machine, and the ends of which engage with the wire just below the guide fingers 3. Each finger by its advancement first bends the wire in a vertical plane to form an open loop or eye, as shown for example, at the right in Fig. 4. When this movement is completed the bending finger and the loop in engagement therewith, are rotated through the desired angle of twist, as shown in Fig. 2, which tilts or twists the loop out of the plane in which it is formed and nearer to the general horizontal plane of the stay as a whole. This imparts a twist or permanent torsional set to the crossing portion of the wire which connects the loop or eye being formed to the finished portion of the stay. Preferably, the twisting movement is carried below the plane of the finished stay (see dotted lines of Fig. 5) so as to compensate for the recoil of the twisted loop when the bending finger is withdrawn.

The bending fingers 6 and 6^a may be of any suitable shape and design. In the drawings they are shown as provided at their free ends with two prongs or arms 43, 44, with a notch or groove therebetween, and which receives the wire as the bending finger moves inwardly. As shown the arm 44 is slightly longer than the arm 43, as it should be stronger in order to effectively resist the strain of the wire in twisting or tilting the loop nearer to the plane of the stay as a whole.

The bending fingers 6, 6^a, are carried on the inner end portions of shafts or rods 7, 7^a, which are journaled in solid heads 8 and 8^a, having their lower portions slidable in guideways 9 of the main frame. These heads are reciprocated transversely of the machine by oscillating levers 10 carried by suitable shafts journaled at 11 in suitable brackets or supports carried by the main frame and whose rear arms are provided with rollers 12 traveling on the periphery of a cam 24 and held against it by tension springs 14. The cam 24 is mounted on and rotates with the vertical main operating shaft 15, which is driven in any suitable manner, as by being provided with a bevel gear 16 meshing with a cooperating bevel gear 17 upon a horizontal shaft 18 extending out to one side of the machine, and rotated by driving pulleys or a motor thereon.

The heads 8, 8^a, are bifurcated to receive pinions 19, 19^a, fixed to rotate with the shafts 7, 7^a, and made of such length as to mesh continually, throughout the entire transverse range of movement of the bending fingers, with operating gear segments 20, 20^a, on the ends of levers 21, 21^a which are pivotally mounted upon suitable supports carried by the main frame, and whose other ends are provided with rollers 22, 22^a, that travel on and are held by suitable springs in contact with a cam track 23 upon the lower face of the cam 24. The movement of said levers in one direction is limited by the height of the cam track 23, and in the other direction by suitable stops, such as the adjustable screws 25 threaded into convenient portions of the fixed frame, and which contact with said levers.

During the formation of the successive loops or eyes the finished portion of the stay is held down against the upper surface of the top plate 26 by suitable anvil members or blocks 27, 27^a, which are shown as levers arranged to rise and fall alternately, and which are each provided with a plurality of pins 28 which enter the loops or eyes of the stay as formed, and by means of which the finished stay is fed longitudinally through the machine, as formed. The levers are pivotally mounted upon a cross shaft 29 carried by standards or supports 30 and are provided with elongated slots 31 through which said shaft passes, so that the blocks can move longitudinally of the machine, in order to feed the stay fabric therethrough, as well as rise and fall alternately. They are provided with depending arms 32, 32^a, which respectively are pivotally connected to slides 33, 33^a, movable longitudinally of the machine along its central line, in guideways 34. The rear end of the slide 33 is provided with a roller 35 which is held by a tension spring 37 against the periphery of an inner cam track 36 of a cam 13 also carried by the

main operating shaft 15, while the slide 33^a is provided with a roller 35^a which is likewise held against the face of an inner cam track 36^a on the cam 24 by a similar tension spring 37. The rear ends of the levers 27, 27^a, are provided with dogs or hooks 38, 38^a, adapted in one position to be engaged by latches 39, 39^a, held downwardly by suitable yielding means, such as the springs 40, and pivotally mounted, as at 41, upon a convenient portion of the fixed frame. The downward movement of the anvil members or pin-blocks toward the upper surface of the top plate 26 is limited by rollers 42, 42^a, journaled in the upper portion of the frame.

Let us assume that the right-hand bending finger 6 is retracted and in a position ready to begin the formation of another loop or eye. At this time the position of the cams 13 and 24 is such that both pin-blocks 27, 27^a, are held downwardly against the stay, but in staggered relation, the block 27 being in the forward position with its dog 38 out of engagement with the latch 39 and the block 27^a in its rearward position with its dog 38^a in engagement with the latch 39^a. The bending finger 6 moves inwardly and bends a loop, as shown in Fig. 4, and then is twisted by the lever 21 to tilt said loop nearer to the horizontal plane of the finished stay. Bending finger 6 is then retracted and returned to normal position. During this retractile movement, and when the notch in the bending finger is disengaged from the wire, the left-hand pin-block 27^a is allowed to rise from the stay by a hollow portion 48 of the cam track 36^a. The pin-block rises without horizontal movement until the dog 38^a is fully disengaged from the latch 39^a, and therefore during the first portion of the movement of said block there is no liability of the pins thereon moving the finished stay longitudinally. When the dog 38^a is fully released from the latch 39^a the pin-block 27^a moves forwardly a distance equal to one half the interval between successive loops or eyes along one edge of the stay, the extent of movement being controlled by the length of the slot 31 in the block. A lobe of the cam track 36 now engages the roller 35 and moves the pin block 27 rearwardly a distance equal to one half the interval between successive loops or eyes along one edge of the stay, or the full length of the slot 31 in said block, thereby feeding the stay longitudinally through the machine, and when said pin-block reaches its rearmost position the latch 39 moves in behind the dog 38. A lobe of the cam track 36^a then engages the roller 35^a and swings the left-hand pin block 27^a downwardly until it engages its roller 42, but without moving said block rearwardly, so that it now is in advance of the right-hand pin block. The parts are now in reversed position ready for the formation of the next

loop or eye along the other edge of the stay, which is formed by the left-hand bending finger 6^a, which moves in, bends the wire and then rotates to tilt it downwardly nearer
 5 to the horizontal plane of the stay as a whole. The stay bending finger is then withdrawn and returned to initial position, whereupon the right-hand pin block 27 rises and moves forward to its original position,
 10 and the left-hand pin block is moved rearwardly to feed the stay through the machine, the left-hand pin block being then depressed and reengaged with the fabric. This finishes one complete cycle of operations, which cycle
 15 is then repeated to form additional loops or eyes.

In the machine described the bending fingers 6, 6^a, move in laterally along lines which are normal to the length of the completed stay, so that the crossing portions
 20 of the wire in the finished product lie in lines which are substantially normal to its length, as shown in Fig. 6. By moving said bending fingers inwardly along lines which
 25 are inclined to the length of the stay, the crossing portions of the wire may be somewhat inclined, so that the loops or eyes, instead of being substantially U-shaped, as in Fig. 6, are substantially pear-shaped, as
 30 shown in Fig. 7, and if desired, the inclination may be carried to such an extent that successive loops or eyes longitudinally of the stay overlap each other slightly. Figs. 8
 35 and 9 illustrate a machine for forming a stay of this character.

In this machine the wire is fed substantially normal to the plane of the stay by suitable guide rollers 50, 50^a, and, if desired, between guiding fingers like those
 40 shown at 3, Fig. 4. The unformed portion of the wire is caught alternately by the reciprocating bending members 52, 52^a, which come in endwise at an oblique angle and alternately from opposite sides. These
 45 bending members are provided on their ends with notches or grooves 53, as in the machine before described, and carry the wire across the width of the stay being formed and at an angle to its length and bend the
 50 same into a loop whose general plane is substantially normal to the general plane of the finished portion of the stay, as in Fig. 8. The bending members may be reciprocated by any suitable mechanism, the drawings
 55 showing for this purpose oscillating levers 60, 60^a. During this movement the previously formed portion of the stay is held clamped between an anvil or presser member 54 and vertically reciprocating anvil
 60 blocks 55, 55^a, which are provided with pins 56, 56^a, which engage and hold the previously formed loop or eye.

We will assume that the block 55 is elevated and the block 55^a is depressed to clamp
 65 the formed portion of the wire against the

anvil 54 with the unformed portion of the wire caught by the bending member 52. This member is then advanced in a straight line and carries the unformed portion of the wire across the width of the stay to form a
 70 loop. When fully advanced it is given a partial rotation in the direction of the arrow 57, Fig. 8, and thereby brings the loop portion last formed into the plane of the
 75 previously formed loop and in position under the forward pin in the elevated pin block 55. The bender is then retracted and returned to its normal position and the pin block 55 descends and catches the newly
 80 formed loop on its forward pin 56. Immediately thereafter the pin block 55^a rises and the pin block 55 is moved backwardly a distance equal to one half the interval between adjacent eyes so as to bring the depressed pin 56 opposite the position previously
 85 occupied by the depressed pin 56^a. The opposite bending member 52^a now advances, catches the unformed part of the wire and bends it back toward the opposite edge of the stay and forms a loop around the
 90 pin 56. As before, this loop will lie in a plane substantially normal to the plane of the previously formed loop. The bending member 52^a is then rotated in the direction of the arrow 57^a, Fig. 8, thereby bringing
 95 this newly formed loop portion into the plane of the previously formed loops and into position under the forward pin 56^a of pin block 55^a, whereupon said bending member 52^a is retracted and turned back to its
 100 forward position, after which the pin block 55^a is lowered and catches the newly formed loop behind its forward pin 56^a, when the foregoing operations are repeated.

The bending members 52 and 52^a can be
 105 rotated as above described by any suitable mechanism, the drawings merely showing diagrammatically such rotating mechanism as consisting of sleeve gears 58 in which the bending members 52 are splined so that
 110 they can slide therein but must be rotated therewith, and which gears 58 mesh with other gears 59 which will be intermittently rotated or oscillated back and forth, by any suitable mechanism, such for example, as
 115 that shown in Figs. 1 and 3.

The machines described can be adapted for forming a stay having any desired form of loops or eyes and having any desired
 120 form of cross section, that is to say, the loops or eyes may be pear-shaped, U-shaped, or of any other shape, and they may be brought entirely into the plane of the stay to form a perfectly flat stay, as shown in
 125 Fig. 6, or may be allowed to overlap and remain slightly out of the plane of the stay, as shown in Figs. 10 and 11.

In every case, the effect of tilting each loop or eye from the original position in which it is formed toward the plane of the
 130

stay is to impart a very considerable twist or torsional set to the transverse or crossing portion connecting the loop or eye being formed to the previously formed portion of the stay. Consequently, these transverse crossing portions of the wire will resist a tendency to twist or rotate them farther in the direction in which they are already twisted, more strongly than they resist a tendency to twist or rotate them in the opposite direction. The twists or torsional sets in all of the crossings, viewing the completed stay as a whole, run in the same direction. Consequently, the stay is much stiffer in one flatwise direction than it is in the other, so that by properly placing it in a garment, such as a corset, it is enabled to resist to a maximum the stresses to which such stays are subjected in use, while leaving it very flexible in the opposite direction. This initial twist or torsional set has the further effect of increasing the elasticity or resiliency of the wire in both directions and, as a consequence, the stay can be bent to very short radii of curvature without taking a permanent set or bend, and shortly recovers its original or normal form. Hence, a garment provided with such stays will retain its form much more effectively than with stays similarly constructed but having no initial twist or torsional set.

What I claim is:—

1. Wire bending apparatus, comprising means for bending the wire to form a loop or eye lying in a plane at an angle to the plane of the stay as a whole, and means for twisting or tilting each loop or eye as soon as formed in said plane, to thereby bring its plane nearer to the plane of the stay as a whole.

2. Wire bending apparatus, comprising means for bending the wire alternately back and forth to form a series of loops or eyes, each loop or eye as formed having its plane at an angle to the plane of the stay as a whole, and means for twisting or tilting each loop or eye as soon as formed and before forming the next loop or eye, to thereby bring its plane nearer to the plane of the stay as a whole.

3. Wire bending apparatus, comprising means for bending the wire to form a loop or eye lying in a plane at an angle to the plane of the stay as a whole, and means for twisting the crossing portion of said loop or eye to impart a torsional set thereto and thereby tilting said loop or eye to bring its plane nearer to the plane of the stay as a whole.

4. Wire bending apparatus, comprising means for bending the wire back and forth to form a series of loops or eyes, each loop or eye as formed having its plane at an angle to the plane of the stay as a whole, and means for successively twisting the crossing

portions of the stay to impart a torsional set thereto and thereby twist or tilt each loop or eye to bring its plane nearer to the plane of the stay as a whole.

5. In a wire bending machine, the combination of anvil members arranged to rise and fall alternately, laterally movable bending members arranged to bend the wire back and forth into loops or eyes, and means for moving said bending members after formation of each loop or eye to impart a torsional set to the crossing portion of the wire.

6. In a wire bending machine, the combination of anvil members arranged to rise and fall alternately, laterally movable bending members arranged to bend the wire back and forth into loops or eyes, and means for rotating each of said bending members about an axis after formation of each loop or eye to impart a torsional set to the crossing portion of the wire.

7. In a wire bending machine, the combination of anvil members arranged to rise and fall alternately, means for feeding the wire at an angle to the plane of the finished stay, laterally movable bending members arranged to bend the wire back and forth into loops or eyes, and means for moving said bending members after formation of each loop or eye to impart a torsional set to the crossing portion of the wire and tilt the loop or eye being formed nearer to the plane of the stay as a whole.

8. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, means for feeding the wire at an angle to the plane of the stay as a whole, laterally movable bending members arranged to bend the wire back and forth, and means for rotating each bending member about a horizontal axis to impart a torsional set to the crossing portion of the wire and tilt the loop or eye being formed nearer to the plane of the stay as a whole.

9. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, bending members movable laterally in straight lines and arranged to bend the wire back and forth, and means for rotating said bending members to impart a torsional set to the crossing portion of the wire.

10. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, reciprocating bending members movable alternately from opposite sides of the machine and arranged to bend the wire back and forth, and means for rotating said bending members to impart a torsional set to the crossing portion of the wire.

11. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, laterally movable bending members arranged to bend the wire back and forth and form successive loops or eyes in

a plane inclined to the horizontal, and means for successively tilting the loops or eyes to bring their planes nearer to the horizontal plane.

5 12. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, bending members movable in straight lines and arranged to bend the wire back and forth, and means for oscillating
10 each of said bending members about an axis parallel with its line of movement to impart a torsional set to the crossing portion of the wire.

15 13. In a wire bending machine, comprising anvil members arranged to rise and fall alternately, laterally movable bending members arranged to bend the wire back and forth, and means for holding both of said anvil members against the wire while the
20 same is bent.

14. In a wire bending machine, comprising anvil members arranged to rise and fall alternately and having pins normally lying in staggered relation with the pins of one
25 member in advance of the other, laterally movable bending members arranged to bend the wire back and forth, and means for holding both of said anvil members against the formed portion of the wire while bending
30 a new loop or eye.

15. In a wire bending machine, comprising anvil members arranged to rise and fall alternately and having pins normally lying in staggered relation with the pins of one member in advance of the other, laterally
35 movable bending members arranged to bend the wire back and forth, means for holding both of said anvil members against the formed portion of the wire while bending a new loop or eye, and means for advancing
40 one of said anvil members and elevating and retracting the other between bending operations.

16. In a wire bending machine, comprising anvil members arranged to rise and fall
45 alternately, laterally movable bending members arranged to bend the wire back and forth, said anvil members being provided with pins normally lying in staggered relation, means for reversing the positions of
50 the anvil members between bending operations, and means for preventing longitudinal movement of each anvil member as it is disengaged from the stay being formed.

In testimony whereof, I have hereunto set
55 my hand.

FRANK L. O. WADSWORTH.

Witnesses:

WILLIAM B. WHARTON,
ELBERT L. HYDE.