F. L. O. WADSWORTH.

MACHINE FOR MAKING GARMENT STAYS.

APPLICATION FILED SEPT. 25, 1914.

1,254,455.

Patented Jan. 22, 1918.

2 SHEETS—SHEET 1.

FIG. 1

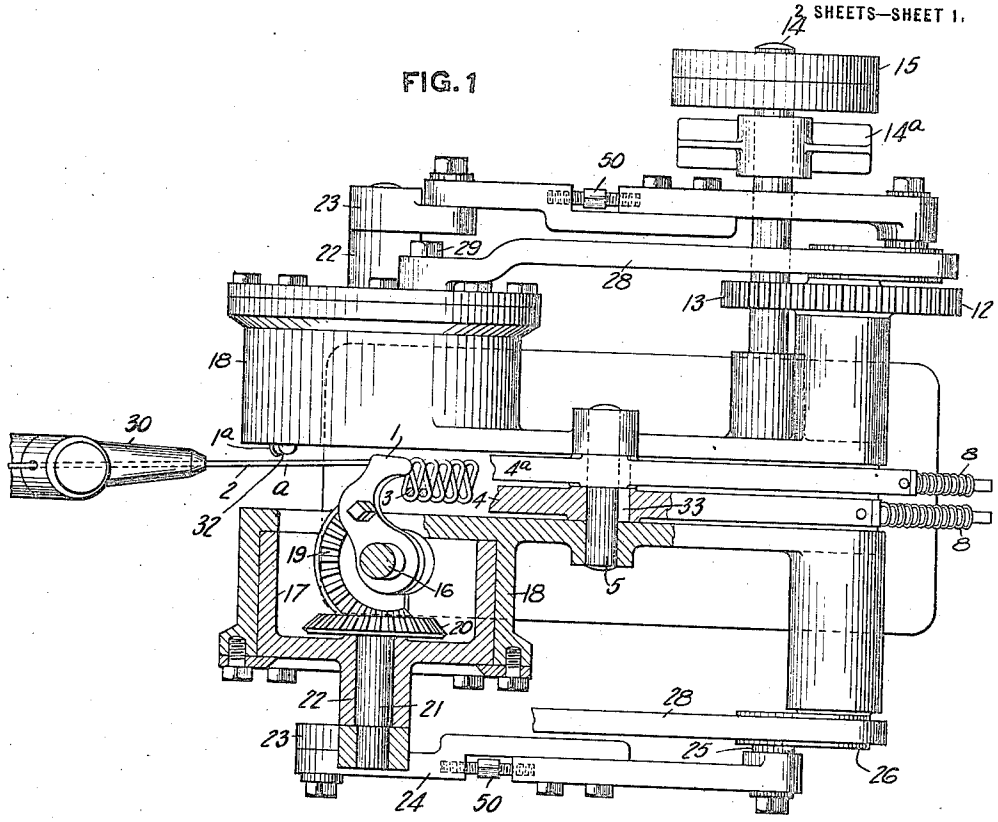


FIG. 6

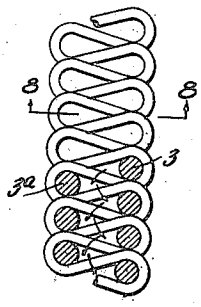
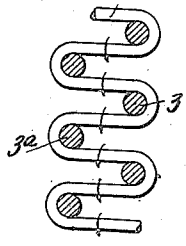


FIG. 7



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3

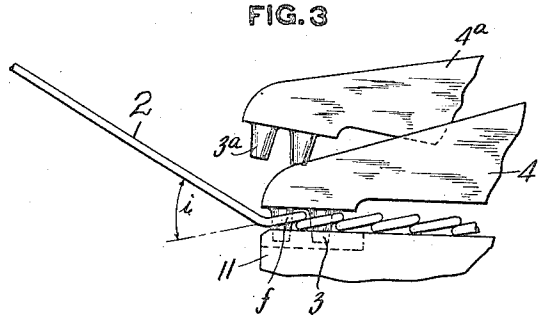


FIG. 4

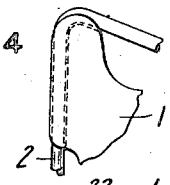


FIG. 5

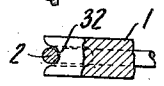


FIG. 6

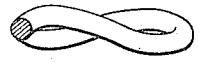
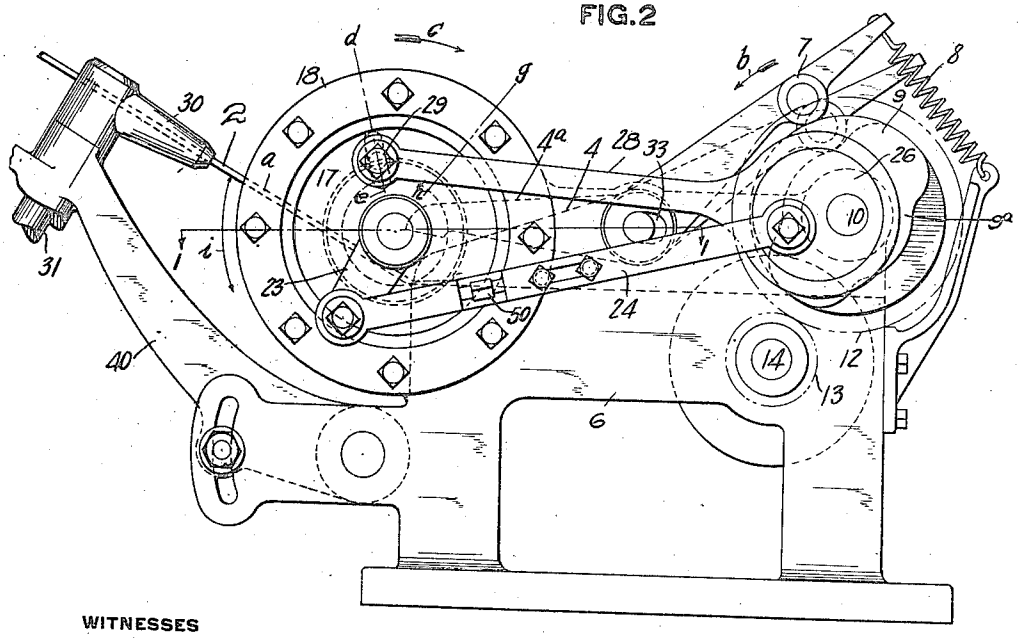


FIG. 2



WITNESSES

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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING GARMENT-STAYS.

1,254,455. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed September 25, 1914. Serial No. 863,596.

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 the manufacture of wire garment stays, and particularly to that form of stay in which the wire is 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 united by a series of intermediate transverse portions or crossings lying at or nearly at right angles to the length of the stay. In such stays the resistance to flatwise bending is due almost entirely to the torsional stiffness of the transverse portions or crossings, while the resistance to edgewise bending is due almost entirely to the lateral stiffness, or the resistance to bending of those portions of the wire which form the edge loops. Usually such stays are subjected to much more severe bending stresses in a flatwise direction than they are in an edgewise direction. It is, therefore, particularly important to form the stays in such a manner that the torsional stiffness and resiliency of the crossing portions of the wire may be as great as possible.

The particular objects of the invention are to provide improved apparatus for forming stays of the character described, whereby such stays 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.

It is well known that when wire is subjected to twisting stresses sufficient to impart a permanent torsional set thereto, the torsional resistance of the wire against a further twist in the same direction is greatly increased and the elastic limit or resiliency of the wire is likewise increased. The present machine is therefore so arranged as to take advantage of this characteristic of wire and to form the stays in such a manner that each crossing or transverse portion of the wire is twisted during the formation of the stay to a sufficient degree to impart a permanent set thereto, the twisting operation being so performed that in the finished stay all of the crossings are twisted or set in the same direction.

The apparatus is particularly designed to carry out the method forming the subject matter of my patent for method of making garment stays, granted January 5, 1915, No. 1,123,821.

In the drawings, which illustrate one form of apparatus embodying the invention, Figure 1 is a plan view, with a portion thereof in section on the line 1—1, Fig. 2; Fig. 2 is a side elevation thereof; Fig. 3 is a detail view of the forming members and their supporting blocks; Figs. 4 and 5 are detail views of one of the bending fingers; Figs. 6 and 7 are plan views, showing two forms of stay which can be manufactured with the machine; and Fig. 8 is a transverse section on the line 8—8, Fig. 6.

The mechanism illustrated in the drawings comprises two oscillating or swinging bending fingers 1, 1^a, which not only reciprocate to bend the wire to the desired configuration in a manner somewhat similar to that illustrated and described in Patent No. 1,009,823, granted November 28, 1911, to Marcus M. Beeman, but which have, furthermore, an oscillatory rotary movement to impart the necessary twist to the transverse or crossing portions of the wire while it is being bent. These bending fingers 1 and 1^a are arranged to engage alternately with the unformed portion 2 of the wire and bend the same around suitable forming members, shown as pins 3, 3^a, secured in two vertically reciprocating or oscillating blocks 4, 4^a, which are alternately raised and lowered by any suitable mechanism. In the present apparatus the blocks are in the form of levers fulcrumed at 5 in a suitable portion of the fixed frame 6, and carrying rollers 7 held by springs 8 against suitable cams 9, 9^a, on the main driving shaft 10. The cams 9, 9^a, are oppositely placed on the shaft 10 so that the pin-blocks are alternately raised and depressed, the block 4 being down or in the position shown in Fig. 3 when the bending finger 1 is engaged with the wire, and the pin block 4^a being down when the opposite bending finger 1^a is engaged with the wire. These pin-blocks coöperate with a suitable

anvil block or presser member 11, which may be attached to or form part of the main frame. The driving shaft 10 may be rotated in any suitable manner, such as by being provided with a gear 12 meshing with a gear 13 on an operating shaft 14 journaled in the main frame and in a suitable bearing 14^a at one side thereof, said shaft 14 being provided with the fast and loose driving pulleys 15.

Each of the bending fingers 1 and 1^a is mounted to swing freely on an axis, one of which is shown at 16 in Fig. 1, said axes being journaled centrally in rocking supports, shown as sleeves or cylinders 17 which are rotatably mounted in sleeve bearings 18 attached to or forming part of the main frame of the machine. Each bending finger is provided with a segmental miter gear 19 meshing with a miter gear 20 secured to a shaft 21 rotatably mounted in a hub 22 on the cylinder or sleeve member 17 and having secured to its outer end a crank arm 23 which is connected by link 24 to a crank pin 25 on an eccentric disk 26 keyed to the main driving shaft 10. This arrangement is provided for both bending fingers. The eccentrics 26 are connected by eccentric straps and links 28 to crank pins 29 adjustable radially in slots in the cylinder or sleeve members 17. The consequence is that not only is an oscillatory or swinging movement imparted to the bending fingers 1 and 1^a around their axes 16, but a second oscillatory or rocking movement is imparted to the sleeve or cylinder members 17, which consequently changes the angle of the axes of the bending fingers, thereby imparting to the gripping ends of the bending fingers a partial rotary or oscillatory movement to give the necessary twist to the transverse or crossing portions of the wire as it is being bent to form the stay.

The unformed portion of the wire is fed to the machine through a suitable guide 30 pivoted on an inclined axis 31 in a suitable bracket 40 pivotally adjustable on the main frame of the machine, and this unformed portion is alternately engaged by deep notches or grooves 32 in the ends of the bending fingers 1 and 1^a, at or near the points marked *a* in Figs. 1 and 2. In the position of the parts shown in the drawing, the bending finger 1 has just reached the extremity of its movement and has completed the bending of the wire around the outermost pin 3 of the depressed pin-block 4. As the shaft 10 and its attached parts continue to revolve in the direction of the arrow *b*, Fig. 2, the bending finger 1 is retracted by the backward pull of the link 24 on the crank 23, and as this bending finger retracts the sleeve 17 and the bending finger axis 16 carried thereby are rotated in the direction of the arrow *c*, Fig. 2, by the eccentric 26 and link 28. In the position shown in Figs. 1 and 2, the axis 16 of the bending finger 1 is parallel to the dotted line *d*—*e*, Fig. 2, and the plane of the bending finger, which is at right angles to the axis 16, is substantially parallel with the plane of the last formed loop *f*, Fig. 3. At the other extreme movement of the parts, the axis 16 of the bending finger 1 is parallel with the line *g*—*h*, Fig. 2, and the plane of the bending finger, in this position, is nearly parallel to the unformed inclined portion of the wire 2, Fig. 2. The eccentric and crank pins which actuate the opposite bending finger 1^a are arranged at 180 degrees to the position of the parts which actuate the bending finger 1, and hence as the finger 1 retracts the finger 1^a advances and engages the unformed portion of the wire at or near the point *a*. In the meantime, the rotation of cam 9^a has lifted the rear end of the pin-block arm 4^a and has depressed the front arm of said pin-block to bring the pins 3^a into coöperation with the anvil block or presser member 11. As the pin-block arm 4^a is oscillated, it is also slid forward slightly by the advancing pressure of the cam 9^a on the cam roller, which is allowed on account of the slight elongation of the opening in said arms through which the fulcrum pin 5 passes, as shown at 33, Fig. 2, thus bringing the pin 3^a into proper engagement with the last formed loop. The opposite pin-block 4 is now raised by the joint action of the cam 9 and spring 8 and as the movement of the parts is continued the bending finger 1^a carries the wire around the now depressed pin 3^a and the pressure of the bent wire on this pin forces the pin-block 4^a to the rear,—to wit, to a position parallel with that of the raised pin-block 4, thereby feeding the stay fabric through the machine a distance equal to one half the interval between the loops. As the bending finger 1^a moves forward, the axis on which it oscillates rocks or rotates from a position parallel to the line *g*—*h* to a position parallel to the line *d*—*e*, and thereby twists the crossing portion just formed through an angle *i*, Figs. 2 and 3, corresponding to the angle between the unformed portion of the wire 2 and the plane of the last formed loop *f*.

The angle through which the crossing portions of the wire are twisted can be varied to any extent desired either by altering the throw of the eccentrics 26, as by substituting eccentrics having a different throw for those shown, or by altering the position of the adjustable crank pins 29 on the sleeves 17, so as to alter the angle between the lines *d*—*e* and *g*—*h*, and correspondingly altering the position of the guide 30 by adjusting it about its pivot, so as to bring the unformed portion of the wire into proper position to be engaged by the grooves in the

ends of the bending fingers 1 and 1ª at the beginning of their bending motions. Any desired amount of twist can therefore be imparted to the wire by the simultaneous oscillatory and rocking motion of the bending finger.

The machine may also be arranged so as to cause the adjacent loops or eyes at the adjacent edges of the stay to overlap, as shown in Fig. 6, or they may be spaced so far apart that the loops or eyes remain open, as shown in Fig. 7. The amount of overlap is determined by the positions of the bending fingers at the ends of their inward or bending movement. This position may be controlled in any suitable manner, and in the present case the links 24 are formed in two sections adjustable longitudinally with reference to each other by oppositely threaded bolts 50 and connected by bolts passing through longitudinal slots therein.

The oscillating motion of the bending fingers serves to bend the wire around a pin of the depressed pin-block and simultaneously carry the formed portion of the stay backward half a loop, while the rocking or rotary motion of the bending fingers serves to twist each successively depressed portion of the wire through the desired angle.

What I claim is:—

1. In wire bending apparatus, the combination of forming members around which the wire is bent, of bending members arranged to move alternately from opposite sides to bend the wire around said members, and means for rotating or rocking said bending members as they move.

2. In wire bending apparatus, the combination with forming members around which the wire is bent, and oppositely arranged bending members having a simultaneous oscillatory and rotating or rocking movement.

3. In wire bending apparatus, the combination of forming members around which the wire is bent, and coöperating oppositely arranged bending members mounted to oscillate on axes inclined to the plane in which the formed portion of the wire lies.

4. In wire bending apparatus, the combination with forming members around which the wire is bent, of oppositely arranged oscillatory members coöperating therewith, and means for varying the angle of the axis of oscillation of said bending members.

5. In wire bending apparatus, the combination with forming members around which the wire is bent, of oppositely arranged bending members movable alternately from opposite sides to bend the wire about said members, and supports for said bending members mounted to rock about transverse axes.

6. In wire bending apparatus, the combination with forming members around which the wire is bent, of oppositely arranged supports arranged to rock about transverse axes, bending members carried by said supports and arranged to oscillate to bend the wire around said members, means for oscillating said bending members, and means for rocking said supports.

7. In wire bending apparatus, the combination with forming members around which the wire is bent, of oppositely arranged bending members movable alternately from opposite sides to bend the wire about said members, supports for said bending members mounted to rock about transverse axes, and a wire guide arranged to hold the unformed portion of the wire at an angle to the plane in which said bending members move.

8. In wire bending apparatus, the combination with forming members around which the wire is bent, of oppositely arranged supports arranged to rock about transverse axes, bending members carried by said supports and arranged to oscillate to bend the wire around said members, means for oscillating said bending members, means for rocking said supports, and a wire guide arranged to hold the unformed portion of the wire at an angle to the plane in which said bending members move.

In testimony whereof, I have hereunto set my hand.

FRANK L. O. WADSWORTH.

Witnesses:
WILLIAM B. WHARTON,
ELBERT L. HYDE.

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