

(No Model.)

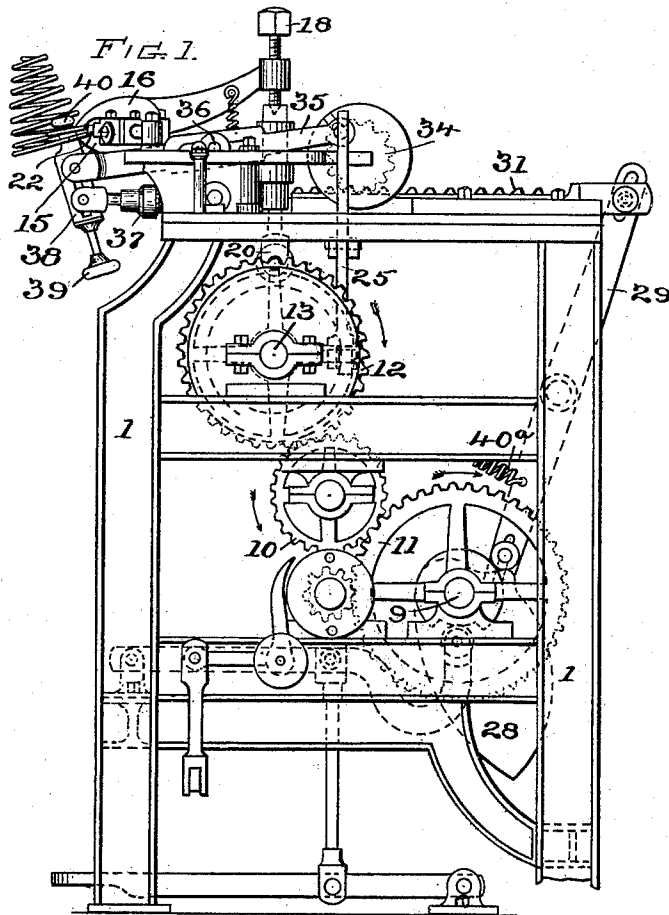
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J. H. MÜLLER.

MACHINE FOR KNOTTING THE ENDS OF SPIRAL SPRINGS.

No. 468,465.

Patented Feb. 9, 1892.



WITNESSES:

A. J. Tanner.
E. M. Newman

INVENTOR:

John H. Müller
by his atty *D. A. Hubbard*

(No Model.)

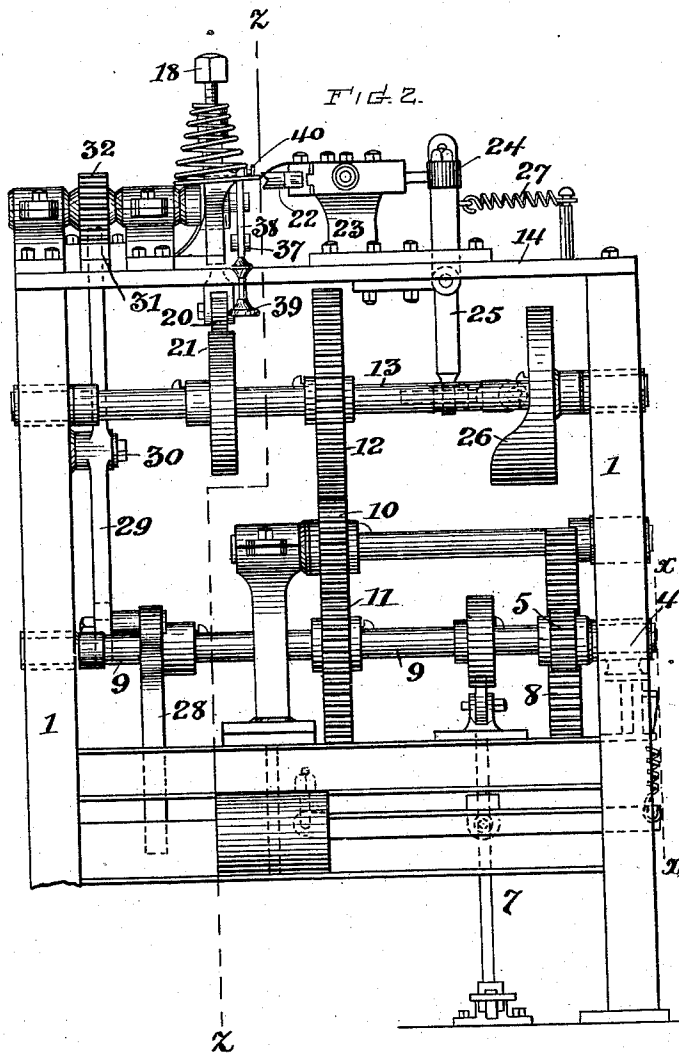
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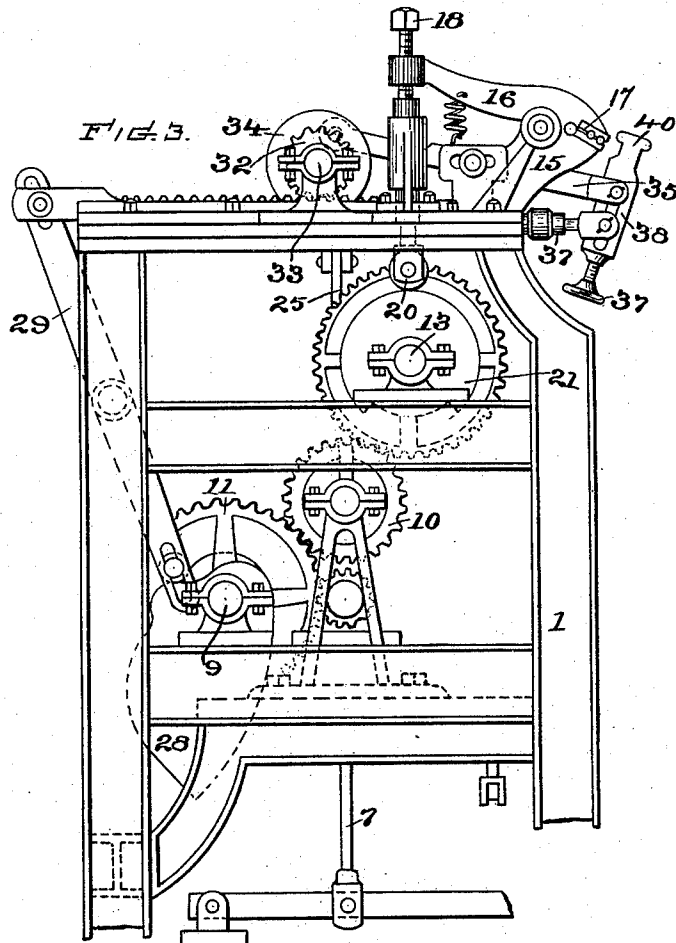
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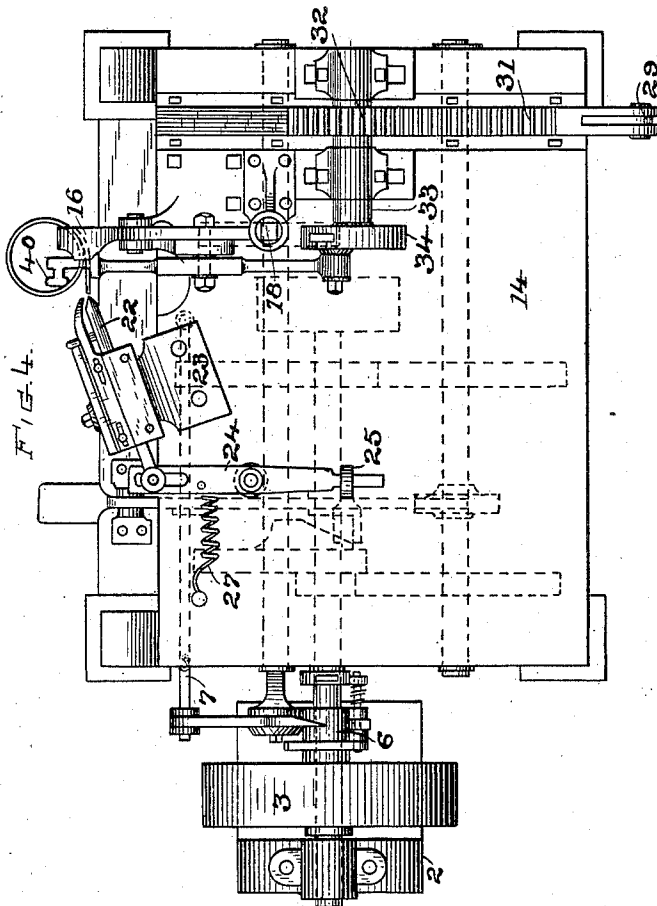
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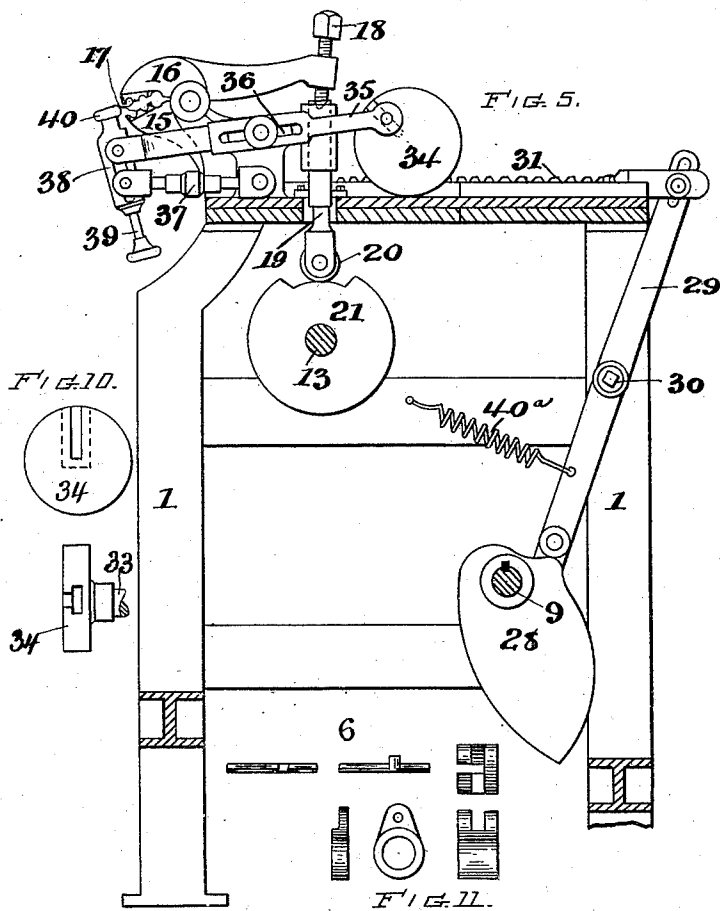
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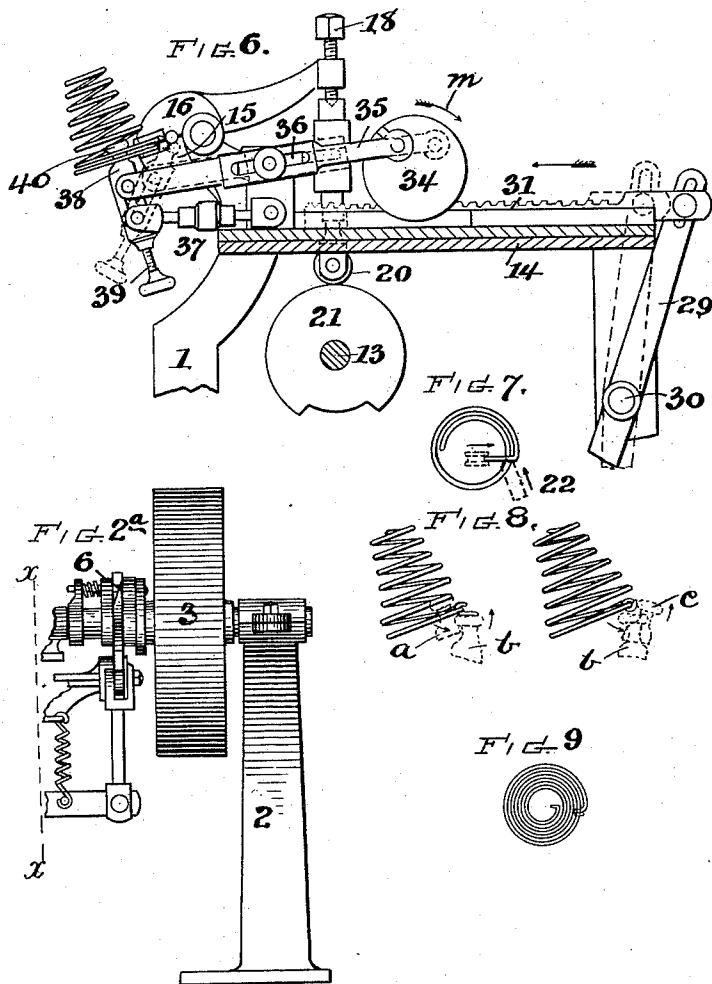
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UNITED STATES PATENT OFFICE.

JOHN H. MÜLLER, OF BROOKLYN, NEW YORK.

MACHINE FOR KNOTTING THE ENDS OF SPIRAL SPRINGS.

SPECIFICATION forming part of Letters Patent No. 468,465, dated February 9, 1892.

Application filed February 23, 1891. Serial No. 383,295. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. MÜLLER, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Knotting the Ends of Spiral Springs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable those skilled in the art to which it appertains to make and use the same.

My invention relates to certain novel and useful improvements in machines for knotting the ends of spiral springs, such as are used in upholstery, bedding, and the like; and its object is to provide a machine simple in construction and operation, whereby the extremity of the wire forming the spring may be knotted firmly about the wire of the coil next above it, the whole being performed automatically by suitable co-operating instrumentalities.

With these ends in view my invention consists in the construction and combination of elements hereinafter fully explained, and then recited in the claims, and particularly in the twister having the peculiar movement hereinafter described, the mechanism for operating said twister, and the bending-die whereby the initial rectangular bend is imparted to the wire.

In order that those skilled in the art to which my invention appertains may fully understand its construction and method of operation, I will describe these in detail, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a side elevation; Fig. 2, a front elevation; Fig. 2^a, a front elevation of the standard and clutch mechanism supported thereby, which form a part of the organized machine, but are omitted from Fig. 2 for lack of space. The line *xx* is the line of breakage. Fig. 3 is a side elevation opposite Fig. 1. Fig. 4 is a plan view. Fig. 5 is a section on the line *zz* of Fig. 2, looking toward the left. Fig. 6 is a detail of the parts shown at the upper part of Fig. 5, the full lines showing the position of the twister at the time of commencing its operation upon the end of the short length of wire which forms the knot and the dotted lines showing

its position at the end of the knotting operation. Fig. 7 is a detail plan view showing the two lower coils of the spring with the end bent in ready to be engaged by the twister. Fig. 8 shows in full lines the spring with its end partially and wholly knotted and different positions of the twister. Fig. 9 shows the spring in plan view and fully knotted. Fig. 10 shows details of the eccentric disk shown at Fig. 1, and Fig. 11 shows details of the several parts constituting the clutch shown at Fig. 2^a.

Like numerals denote the same parts in all the figures.

Three sets of mechanism constitute the complete machine: First, means for grasping the end of the wire which is to form the knot and also the lowermost full coil about which the end is knotted; second, means for imparting the initial inward bend to the extremity of the wire, and, third, means whereby the end so bent is tightly wound about the lowermost full coil.

1 denotes the frame of the machine, and 2 a standard at one side thereof which carries a driving band-wheel 3. In a bearing through the standard is journaled a short shaft, upon whose inner end close to the standard is mounted a small gear 5. (See Fig. 2.)

Between shaft 4 and the band-wheel is interposed a clutch mechanism 6 of any ordinary construction, which forms no part of my present invention and is actuated by means of a treadle-rod 7. Any ordinary clutch mechanism which will upon pressure of the treadle permit the machine to make a single revolution and then stop will answer the purpose. The small gear 5, just referred to, meshes with a large gear 8 upon a transverse shaft 9, which latter is journaled in the sides of the frame. The shaft 9 bears a gear 11, which, through an idler 10, communicates motion to a gear 12 on a shaft 13, which latter is above and in front of the shaft 9. These parts furnish the power for the whole machine.

Means for grasping and holding the spring during the bending and twisting operation is as follows: A gripping-vise is mounted upon the table or top 14. This vise consists of a stationary jaw 15, to which is fulcrumed a movable jaw 16. These jaws are provided with removable jaw-blocks 17, each having

two grooves, as shown at Fig. 5, the outer grooves co-operating to hold the lowermost full turn or coil and the inner groove to hold the end of the wire at a little distance from its extremity. It will be observed by reference to Fig. 5 that the meeting line of the jaws is at an angle. Therefore when the wire is in position the extremity thereof will be in a slightly higher plane than the full coil. The rear of the movable jaw carries a set-screw 18, by which the bite of the vise may be adjusted. Beneath this set-screw a plunger 19 has a sliding bearing. The lower end of the plunger carries a roll 20 and beneath this roll the shaft 13 bears a cam 21, whose shape is clearly shown at Figs. 5 and 6. When the machine is at rest, the roll rests upon the low point of the cam (see Fig. 5) and the jaws are distended. During the operation of the machine the full diameter of the cam abuts against the roll, whereby the plunger is raised and the vise-jaws shut down upon the wire.

The bending mechanism is more particularly shown at Figs. 2 and 4. It consists of a notched slide-rod 22 (see Figs. 2 and 4) mounted in a bearing 23, the line of movement of said rod being at a slight angle to the bed, as appears in plan view. To the rear of this slide-rod a horizontal lever 24 is connected by a slot and pin, and the rear end of this lever in turn is engaged by a vertical lever 25, fulcrumed at about the line of the top of the machine. Through a slide at the lower end of the lever 25 said lever is operated in proper time by means of a cam 26 on the shaft 13. This slide appears in dotted lines at Figs. 1, 2, and 4. At each revolution of the machine the cam, through the connections above specified, forces the slide-rod inward. After the passage of the high point of the cam a spring 27 withdraws the parts to their normal position. The end of this slide-rod is in the same horizontal plane in which is held the extremity of the wire which forms the spring. Since this portion of the wire is in a slightly higher plane than the full coil, the outward movement of the rod will bend the extremity of said wire inward alongside the jaws and over that portion of the wire which is held in the outer notches of said jaw. This is well shown at Fig. 7, the end of the rod 22 appearing in dotted lines.

The twisting mechanism is as follows: Referring now more particularly to Figs. 1, 2, 4, 5, and 6, 28 is a cam borne upon the end of the shaft 9. Said cam is of irregular outline and is adapted to impart a variably-timed movement to a lever 29, fulcrumed to the frame at 30. The upper end of this lever has a slotted connection with and drives in both directions a sliding rack 31, which latter runs in ways on top of the machine. This rack meshes with a gear 32, whose shaft 33 is mounted in bearings secured upon the bed at either side of the rack. One extremity of this shaft bears a disk 34, to which is cranked by an adjustable connection a lever 35, sup-

ported at its center upon a sliding fulcrum 36. Immediately beneath this lever 35 is a link 37, pivoted to the same standard which supports the sliding fulcrum. This link is rendered adjustable in length by a coupling in order to adapt the twister for operation upon wires of different diameter. This link and lever together serve to support the twister 38 by pivotal connections therewith. The twister is slightly adjustable as to its connection with the link by means of a set-screw 39, extending through the bottom. The upper end of the twister has formed thereon a laterally-projecting hook 40, which, while its shape is not strictly essential, is preferably of the shape in side and front elevation, which is shown at Figs. 1, 2, and 3—that is, its projecting part has a neck around it which engages with the end of the wire.

In the operation of my invention a wire spring is first placed in the jaws of the vise and the machine started. The timing of the machine is such that its first operation is to close down the jaws firmly upon the wire of the spring, holding it, as is most clearly shown at Figs. 4 and 6. Following immediately upon the closing of the jaws, the slide-rod 22 performs its forward movement, engaging the free end of the wire and bending it inward over the lowest full coil, as has been explained, and as is shown at Fig. 7. The bending-rod then returns to its position of rest. Up to this time the shape of the cam 28 has been such as only to slightly raise the head of the twister from the position shown at Fig. 5 to about the position shown at the dotted lines *a* of Fig. 8. The inwardly-turned end of the wire is at this time directly in the path of the grooved neck. As the cam 28 continues to rotate the disk 34 is revolved in the direction of the arrow *m*, (shown thereon at Fig. 6,) thereby drawing the twister inward and then downward toward the position indicated in dotted lines *b* at Fig. 8. During the first part of this motion the twister is pulling on the wire, but by the time the position *b* is reached its end has passed to a point beneath the end to be knotted. From the position *b* the movement imparted to the twister by its sliding pitman is still rearward, but at the same time upward until the position *c*, Fig. 8, is reached. After the high point of the cam 28 passes the roller through which it actuates the lever 29 a spring 40^a returns the lever to its normal position as fast as it is permitted to do so by the cam. This is shown at Fig. 5. When the machine has completed one full operation, it stops automatically by means of the clutch until again started by pressure of the foot.

The drawings show the machine operating upon the larger end of a tapered spiral; but it can be used in connection with the smaller ends of springs, or in other wire constructions where it is desired to knot an end or wire about another wire or about some point of its own length.

In this my invention I do not wish to be confined to the details of construction herein shown and described, since these may be varied in many respects without departing from the broad idea of my invention, as set forth in the clauses of the claim here following.

The presence of the bender as a part of the organized machine I do not deem essential, since it will be readily understood that, if required, the initial bend of the end of the wire might first be imparted thereto by independent means and then the spring inserted in the vise for the operation of the twister.

I claim—

1. In a machine of the character described, the combination, with the vise, whereby the spring is held, of the twister having an overhanging head for engagement with the bent end of the wire, and means, as described, for imparting to the twister a curvilinear movement, whereby its head is carried first downward, then outward, and then upward for the formation of the knot, substantially as and for the purpose set forth.

2. In a machine of the character described, a vise having doubly-grooved holding-jaws, one pair of grooves in a plane higher than the other, a laterally-movable bender in the plane of the higher grooves and adapted to carry the wire held therein outward across the other wire held in the vise, and means, as described, for engaging the bent end of wire and twisting it about the wire of the lowermost full coil of the spring.

3. In a machine of the character described, the vise and means for closing its jaws, in combination with the bender having movement at an angle to the vise-jaws, and the twister operating subsequently to the bender, said twister having an eccentric curvilinear movement alongside the vise-jaws and around the wire, substantially as and for the purpose set forth.

4. In a machine of the character described, the vise having doubly-grooved jaws with the inner grooves in a plane slightly above the plane of the outer grooves, a horizontal bending device in the plane of the upper grooves, and a twister operating in a curvilinear path parallel with the length of the vise-jaws.

5. In a machine of the character described, the combination, with the vise for holding the spring to be knotted, of a bender for impart-

ing the inward angular bend to the extremity of the wire, and the twister having a head adapted to engage the bent end of the wire, and means for moving said twister in a curvilinear path, commencing at the inside of the spring and passing downward, outward, and upward around the lowermost coil thereof, substantially as and for the purpose specified.

6. In a machine of the character described, and in combination with the bending and twisting devices, the vise provided with a pair of jaws meeting in a plane oblique to the table and provided with two pairs of grooves, and means, as described, for operating said vise in proper time with the other mechanism.

7. In a machine of the character described, the combination, with means for holding the wire, of the twister, a link whereon said twister is fulcrumed, and a lever having a sliding fulcrum connected to and adapted to operate the twister, and suitable connections for the operation of said lever.

8. In a machine of the character described, the combination, with the twister, of a link whereon the same is fulcrumed, a lever having a sliding fulcrum connected to said twister, a crank-disk engaging the other end of the lever, a gear for operating the crank-disk, and a sliding rack meshing with and adapted to drive the gear, substantially as and for the purpose set forth.

9. The combination, in a machine for knotting the ends of spiral springs, of the following instrumentalities, namely: a vise for holding the spring and means for closing the vise, a sliding bender arranged at an angle to the vise-jaws, and means for imparting to said bender its operative movement subsequent to the closing of the vise-jaws, and the twister, the link whereon the same is fulcrumed, and the lever and its connections for the operation of the twister, said twister being adapted to act immediately after the bending operation, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses. Signed at the city of New York, in the county of New York and State of New York, this 19th day of February, A. D. 1891.

JOHN H. MÜLLER.

Witnesses:

ROBERT M. MIZE,
MARTIN LYNCH.