

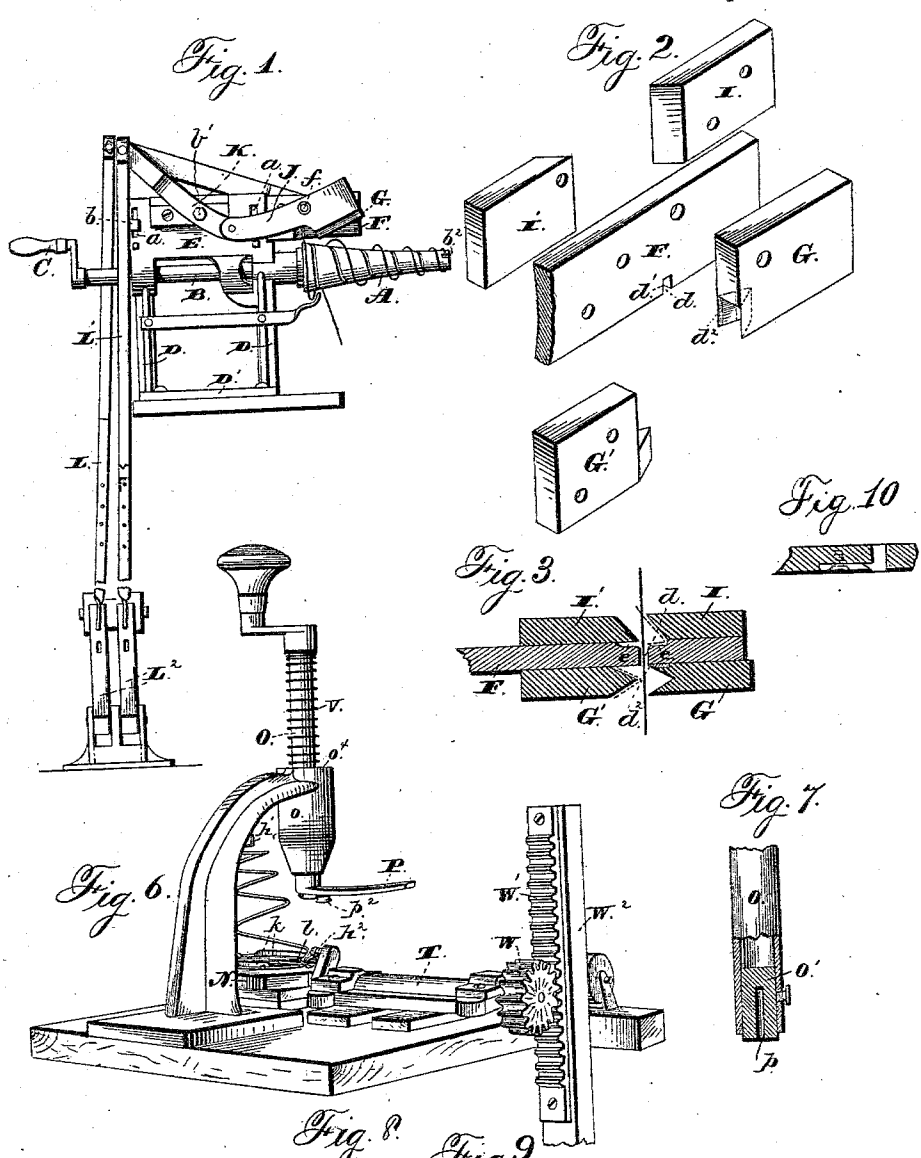
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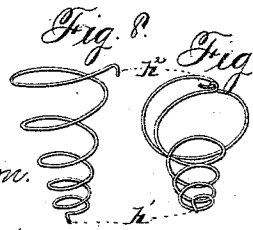
O. S. & W. S. FOSTER. MACHINE FOR MAKING SPIRAL SPRINGS.

No. 280,923.

Patented July 10, 1883.



Witnesses
 Jas. E. Hutchinson.
 S. G. Nottingham



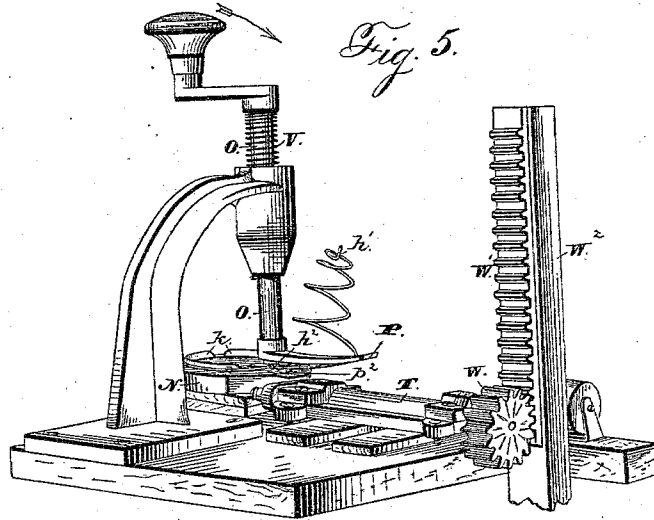
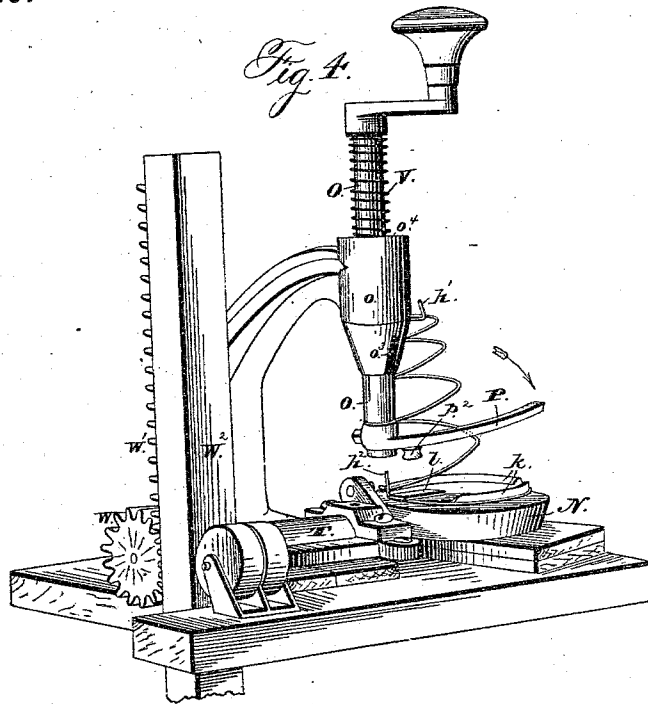
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 O. S. Foster.
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 By Suggatt & Suggatt atty.

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UNITED STATES PATENT OFFICE.

OSCAR S. FOSTER AND WILLIAM S. FOSTER, OF UTICA, NEW YORK.

MACHINE FOR MAKING SPIRAL SPRINGS.

SPECIFICATION forming part of Letters Patent No. 280,923, dated July 10, 1883.

Application filed May 14, 1883. (No model.)

To all whom it may concern:

Be it known that we, OSCAR S. FOSTER and WILLIAM S. FOSTER, of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Machines for Making Bed-Springs; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to an improvement in the apparatus for forming coiled springs, and more particularly spiral bed-springs, the object of the same being to provide a spring that will be strong and durable and well adapted for the purpose in view without increasing the cost of manufacture.

A further object is to provide improved mechanism for coiling the springs and cutting and bending the opposite ends thereof, and also for locking the lower end to the lower or base coil of the spring; and with these ends in view our invention consists in the several parts and combination of parts constituting the machine, hereinafter more fully described.

In the accompanying drawings, Figure 1 is a view in side elevation of our improved coiling, bending, and cutting device. Fig. 2 shows detached views of the cutting and bending mechanism. Fig. 3 is a horizontal longitudinal sectional view through the cutting and bending mechanism. Fig. 4 is a perspective view of our improved device for locking the lower bent end to the lower coil of the spring. Fig. 5 is a similar view from the opposite side of the machine, showing the parts in another position. Fig. 6 is a similar view of the same, showing the manner of bending the lower end of the spring around the loop or eye. Fig. 7 is a detached view of the vertical shaft, showing the lower end thereof in section. Fig. 8 is a view of the spring after it leaves the coiling, cutting, and bending mechanism. Fig. 9 is a view of the completed spring; Fig. 10, a longitudinal sectional view of the bar F, showing the preferred form of cutting-edge.

A represents the ordinary cone, provided with spiral grooves and mounted on the shaft B, provided with the handle C. This shaft B is journaled in the upright standards D, which are secured to or form a part of the base D'. The standards D support, at their upper ends,

the plate E, which latter is preferably cast integral with the standards and forms a part thereof. This face-plate is provided near its opposite ends with the vertical slots *a*, through which the screw-threaded bolts *b* pass, for the purpose of adjustably securing the flat bar F in position over the cone, so as to enable it to be elevated or lowered to adapt it to cones of different sizes. This flat bar F projects slightly over the cone, so as to enable the cutting, bending, and coiling mechanism, which are secured thereto, to occupy a position over or near the bars of the cone, and the lower edge of the said bar F is provided with a slot, *d*, the front edge, *d'*, of which is a cutting-edge, and acts in conjunction with cutting-edge *d''* of the movable bending and cutting jaw G. The cutting-edge *d'* of the bar F can be formed integral with the bar or separate and removable therefrom, as desired, the latter, however, being preferable, as it enables the cutting edge or blade to be removed for sharpening, or a new one to be substituted in case the old one should break. The bar F is provided on its front face, alongside of the open slot *d*, with the rigid jaw I and the movable jaw I'. The rigid jaw I is beveled, as shown in the drawings, while the movable jaw I' is also beveled in the opposite direction, so as to register with the jaw I, for the purpose of bending the end of the wire at the base of the spring inwardly toward the body of the spring. Portions of the bar F, alongside of the jaws I and I' and on opposite sides of the slot *d*, are cut away, as shown at *e*, for the purpose of forming a recess, in which the bent end of the coil-spring rests. The movable jaw G is rigidly secured to the lever J, which latter is pivotally secured by the bolt *f* to the bar F. The rear end of this lever is in turn pivotally connected to the lever K, which latter is secured by the pivot-bolt *b'* to either the face-plate or to the bar F. The rear end of this lever is connected to the upper end of the adjustable pitman L. On the opposite side of the bar F the combined shear and bending-jaws G and G' are secured. The movable jaw I' is pivotally secured to the bar F by the bolt *f*, and is provided with a rearwardly-extending arm, to which the pitman L' is pivotally secured. The jaw G is V-shaped in cross-section, and the inner edge, *d'*, of the same is adapted to act in conjunction with the edge *d'*

of the bar F for the purpose of severing the coiled spring from the main body of the wire. The rigid or fixed jaw G' is adapted to register with this V-shaped end of the jaw G and bend the end of the wire for the next spring. Both pitmen L L' are formed in two parts, to enable them to be readily adjusted to suit the jaws, and both are secured at their lower ends to the treadles L². These treadles are bolted or otherwise secured together, so as to move simultaneously, and each is provided, at suitable intervals apart, with mortises, into which the lower ends of the pitmen can be secured for the purpose of increasing or decreasing the stroke of the jaws. These mortises in the two treadles are formed side by side, so that both pitmen can be attached to the treadles the same distance from the fulcrum of the treadles, for the purpose of giving the same amount of throw to the two movable jaws, or at unequal distances therefrom, which would give unequal throw or stroke to the two movable jaws. This allowable variation in the treadles and pitmen enables us to give more or less bend to the wire on either or both sides of the bar F.

The operation of this portion of the device is as follows: The end of a continuous strip of wire is first bent, as shown at *h'*, by placing it between the jaws I and I', and is then introduced into the slot *b'* on the end of the cone, which latter was fully described in our Patent No. 264,071, dated September 12, 1872. The cone is then revolved in the proper direction by means of the handle, and the wire is guided into the groove in the cone by the operator. When enough wire has been coiled on the cone to form the spring, the rotary motion of the cone is discontinued and the pressure of the hand on the coil-spring is released. This allows the spring to partly unwind or widen, and the portion of the wire which is to form one end of the spring is introduced into the open slot *d* of the bar F. The treadles are now depressed, and the jaw G, together with the edge *d'* of the bar F, severs the coiled spring from the main body or strip of spring-wire. By continuing the pressure on the treadles the end of the coiled spring is bent inwardly or toward the body of the spring, while the end of the spring-wire, which is held between the jaws G and G', is bent to form the end 2 of the next spring. This finishes the first of the operation, and the coiled spring thus formed is then removed from the cone and placed on the base-plate N, which latter is provided with the elevated projections *k*, around which latter the base or lower coils of the spring is placed. This base-plate is also provided with the finger *l*, adapted to overlap the wire just behind the inwardly-bent end *h'* and hold the spring down in position, with the bent end *h'* directly under the vertical shaft O. This shaft is journaled in a suitable bearing, *o*, and is open or socketed at its lower end, into which the socketed plug O' is introduced. This plug is held in place by a set-screw, and

ordinarily rests flush with the lower end of the shaft O, and is provided with an opening or socket, *p*, into which the bent end *h'* rests when the shaft O is forced downwardly toward the base-plate. The shaft O is also provided at its lower end with the curved horizontal arm P, to the under side of which, and near its inner end, the roller *p'* is pivotally secured. The bearing *o* is provided with the open vertical slot *o'*, in which a small stud on the shaft enters, for the purpose of holding the arm P and roller *p'* in such position that the latter will engage the back or inner face of the second coil of the spring when the shaft is turned in the direction indicated by the arrow. The upper portion of the shaft O, between the handle and the bearing *o*, is encircled by a spiral spring, V, the tendency of which is to keep the arm P elevated. After the spring has been placed on the base-plate, the shaft O is depressed until the small stud thereon emerges from the slot *o'*. When the shaft has been depressed this distance, the end *h'* of the spring has entered the socketed plug O, and the roller *p'* rests on the inside of the second coil of the spring. The shaft O is then turned in the direction indicated, and the roller *p'* engages the second coil of the spring. The stud has then left the open slot *o'*, and bears against the under side of the bearing *o* and holds the shaft down to its work. By continuing the movement of the shaft, the roller *p'* carries all that portion of the spring above the base-coil and to the right of the bent end *h'* around with it, forming a complete eye or ring around the end *h'*. Necessarily the eye thus formed in this instance must be of the same size as the wire around which it was formed; but, if desired, the socketed plug *o'*, which is removable, and which can be made of different sizes, is adapted to be lowered below the edge of the shaft O, and the eye can be formed around it, instead of around the bent end *h'*. After the eye has been formed, the spring V forces the shaft up to its elevated position, and all that remains to be done is to lock or bend the projecting end over the eye for the purpose of locking the free end of the base-coil to the second coil of the spring. This is accomplished by the shaft T, the cranked end of which rests to one side of the bent end *h'*. This shaft is journaled to the base of the machine, and is provided on its outer end with the small pinion *w*, which meshes with the rack-bar *w'*, secured to the rod *w''*. This rod moves vertically between the pinion and guide-roller, and is held in an elevated position by a suitable spring or equivalent device, and is operated by a suitable treadle connected to the lower end thereof. From the foregoing it will be seen that by depressing the rod *w''* the cranked end of the shaft T is elevated and engages the upwardly-extending end *h'* of the spring and bends it down over or around the eye or loop and locks the parts together.

The mode which is now employed by manufacturers, as far as we can learn, is to form the

eye around a separate pin and make the hooks on the end of the wire separately, and then hook the hook into the eye. The advantages our methods possess over former methods are a great economy of time and a superior made spring.

It is evident that numerous changes in the construction and relative arrangement of parts might be resorted to without departing from the spirit of our invention; and hence we would have it understood that we do not confine ourselves to the exact construction shown and described, but consider ourselves at liberty to make such slight changes and alterations as fairly fall within the spirit and scope of our invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The process of forming a spring, consisting, essentially, in first coiling the spring and bending the end of the base-coil inwardly toward the body of the spring, then forming an eye in the second coil around the inwardly-bent end, and finally bending the said end down on the eye.

2. The combination, with suitable coiling mechanism, of combined cutting and bending mechanism placed in close proximity to the coiling mechanism and adapted to sever the coiled spring from the spring-metal strip, bend the end of the base-coil inwardly toward the body of the spring to form a hook, and bend the end of the strip to form the point for the next spring, the said cutting and bending mechanism consisting, essentially, of a bar having an open slot and a fixed cutting-blade, a movable bending-jaw, and a combined cutting and bending movable jaw secured to the opposite sides thereof and adapted to be operated by independent levers, and rigid bending-jaws secured to opposite sides of the bar and respectively in front of the said movable jaws, substantially as set forth.

3. In a machine for forming bed-springs from a continuous piece of wire, the combination, with a grooved cone, of movable and fixed combined cutting and bending jaws situated in close proximity to the cone and disposed, respectively, diagonally to each other, and adapted to sever the spring from the strip, bend the end of the spring inwardly toward the body of the spring, and bend the end of the strip to form the point for the next spring, substantially as set forth.

4. The combination, with a cone, of an adjustable bar situated above the cone, and combined cutting and bending jaws secured to the face-plate.

5. The combination, with a cone, of an adjustable bar situated above the cone, of mova-

ble bending and cutting jaws pivotally secured to the bar, and jaws rigidly secured to the said bar and adapted to act in conjunction with the movable jaws.

6. The combination, with a revolving cone and a bar situated above the same, and provided with an open slot and a fixed cutting blade or edge, of the rigid and removable jaws, the arms and levers connected thereto, and the adjustable pitmen and treadles, all of the above parts combined and adapted to operate as described.

7. The combination, with a base-plate for supporting the spring, of devices for forming an eye around the upwardly-projecting end thereof, and devices for bending the said end down over or on the eye, substantially as set forth.

8. The combination, with a base-plate, of a shaft the lower end of which is provided with a socket or opening for the reception of the upwardly-projecting end of the spring, horizontal arm secured to said shaft, and a roller secured to the said arm, substantially as set forth.

9. The combination, with a base-plate, constructed as described, of a revolving shaft having a socketed lower end and arm secured to said shaft, a roller secured to the arm, and devices for bending the end of the spring down over the eye formed by bending the wire around the said end, substantially as set forth.

10. The combination, with the base-plate, the bearing, provided with the open slot, of the shaft provided with the stud, a spring encircling the shaft, an arm secured to the lower end of the shaft, a roller secured to the arm, and a device for bending the end of the spring over the eye formed by the roller.

11. The combination, with the base-plate, bearing, shaft, arm, and roller, of the cranked shaft and devices for operating the same, substantially as set forth.

12. The combination, with the base-plate, shaft, and the removable plug adjustably secured within the lower end of the shaft, of the cranked shaft and devices for operating it, substantially as set forth.

13. The combination, with the base-plate, shaft, spring, arm, and roller, of the crank-shaft provided at its outer end with a pinion, all of the above parts combined and adapted to operate as described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

OSCAR S. FOSTER.
WILLIAM S. FOSTER.

Witnesses:

HENRY A. DOOLITTLE,
S. F. MERRY.