(No Model.)

4 Sheets—Sheet 1.

G. NORWOOD.

MACHINE FOR FORMING SPRINGS.

No. 301,261. Patented July 1, 1884.

Fig. 1

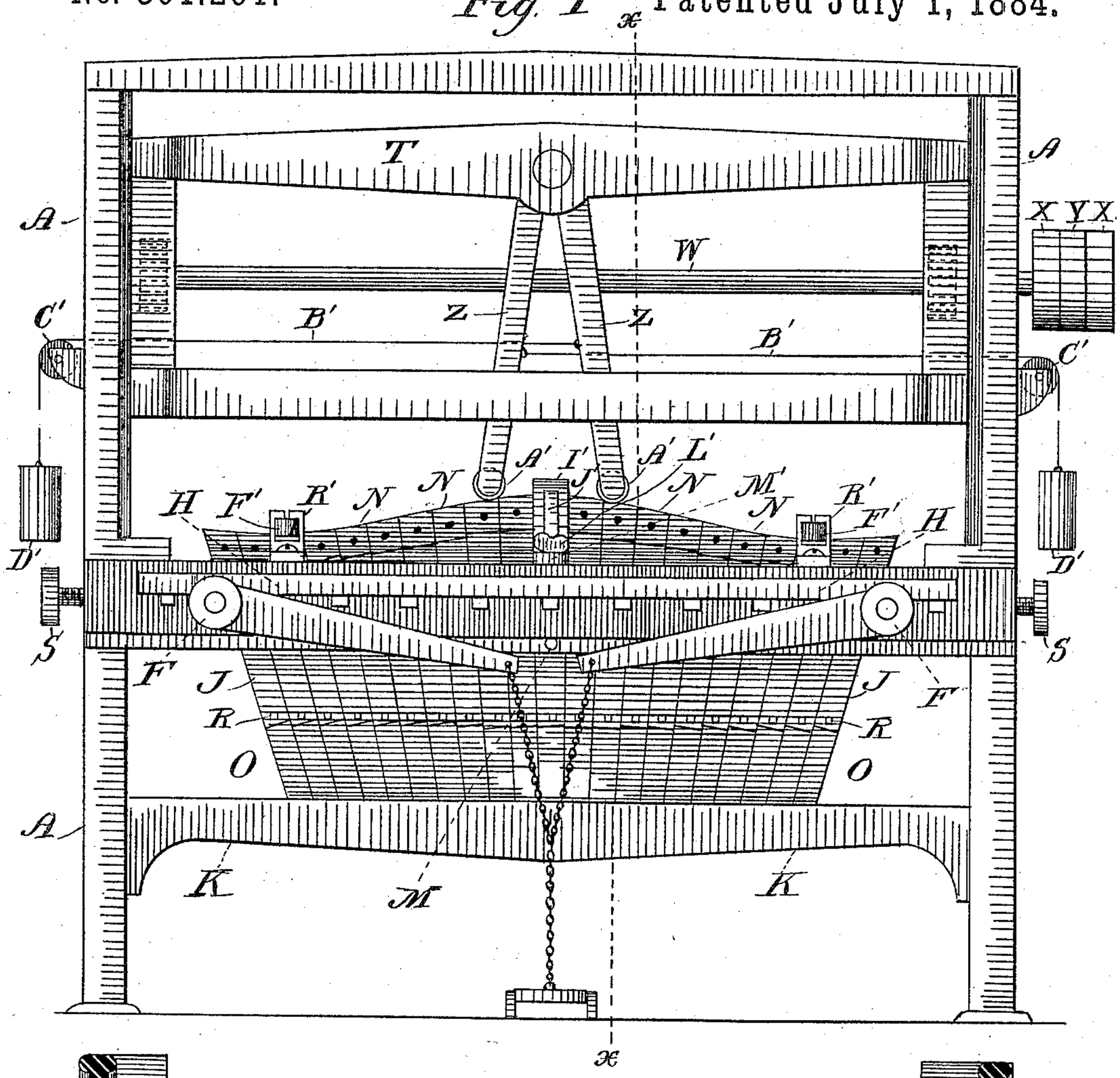
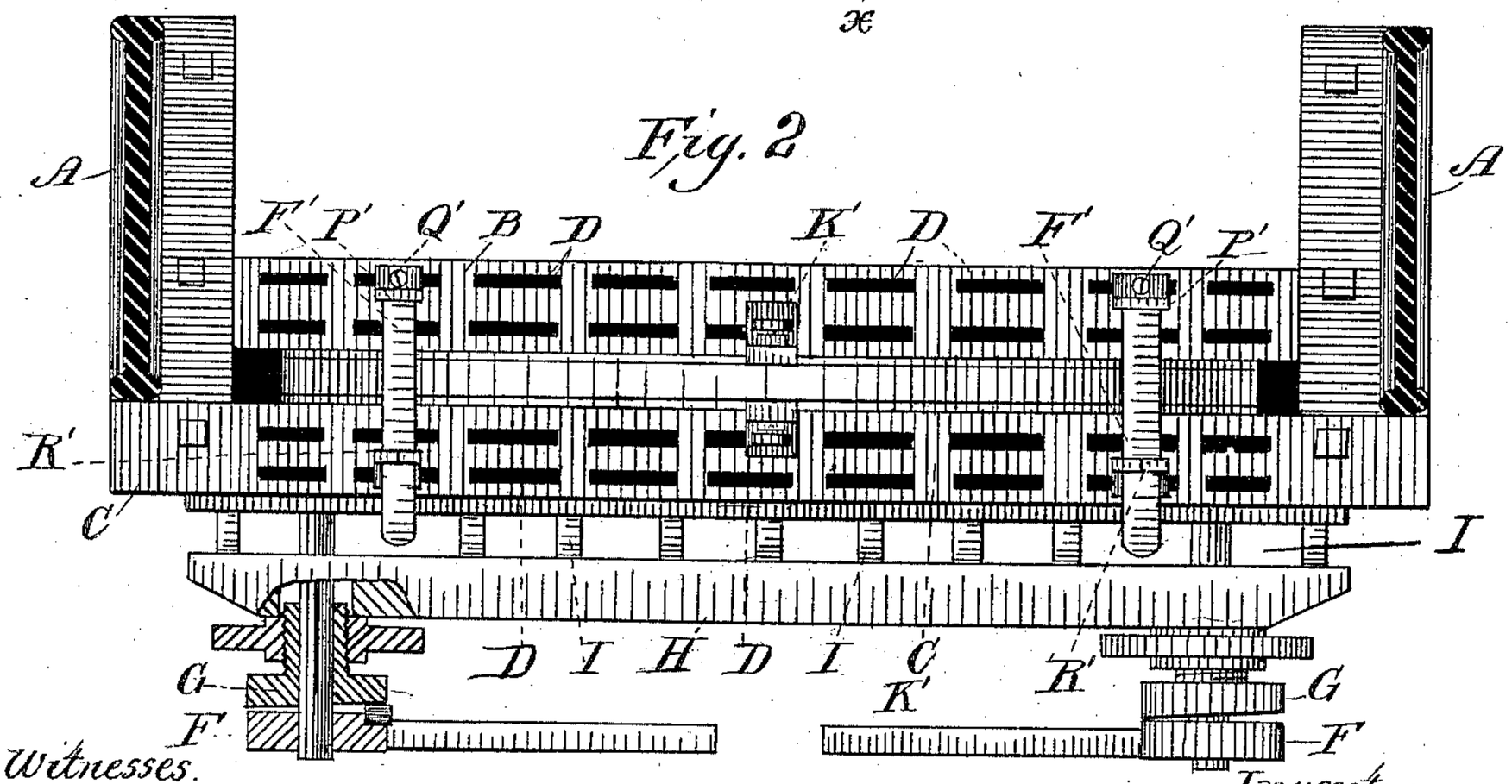


Fig. 2



Witnesses.
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(No Model.) 4 Sheets—Sheet 2.

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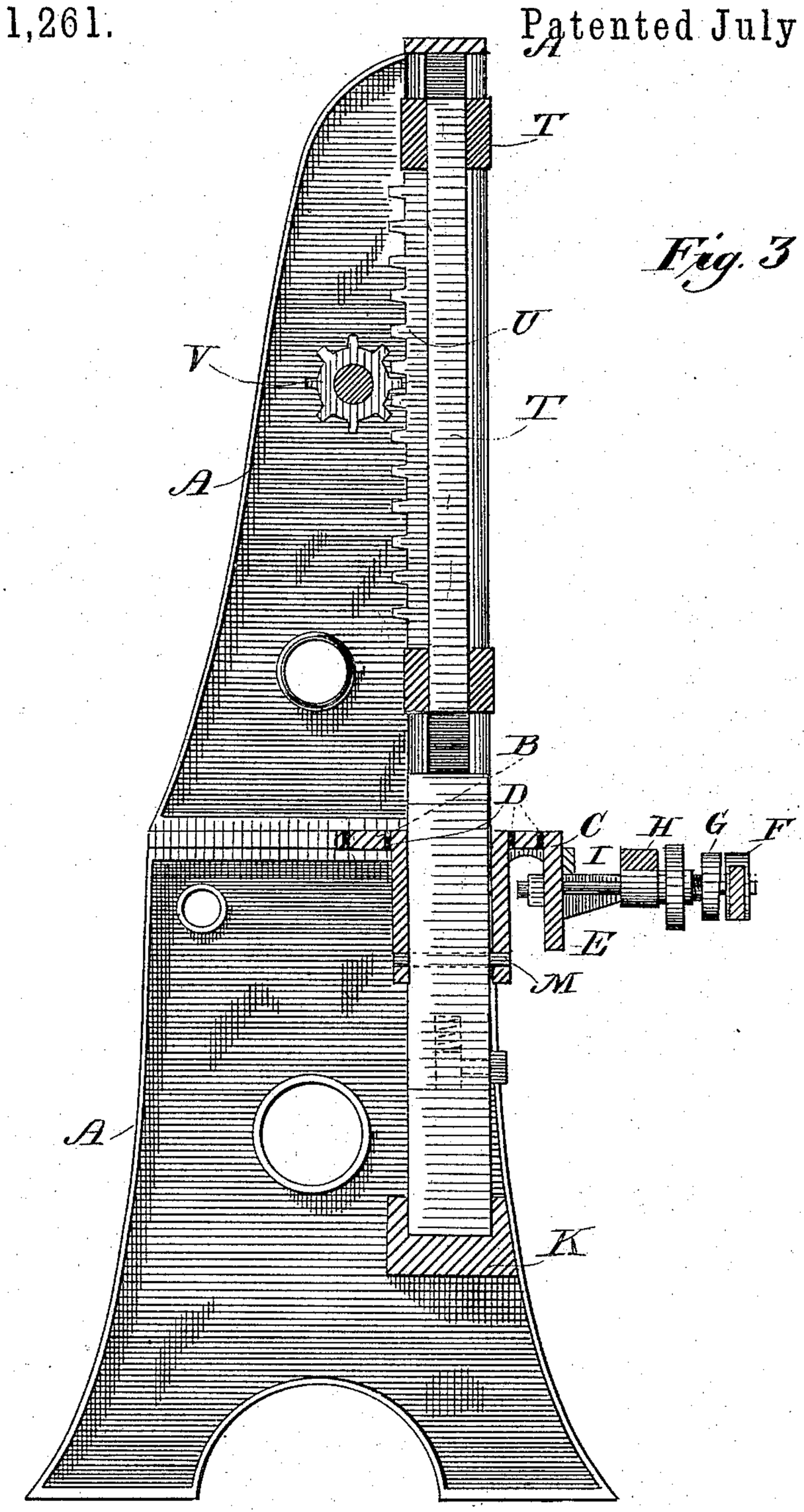

Fig. 3

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(No Model.) 4 Sheets—Sheet 3.

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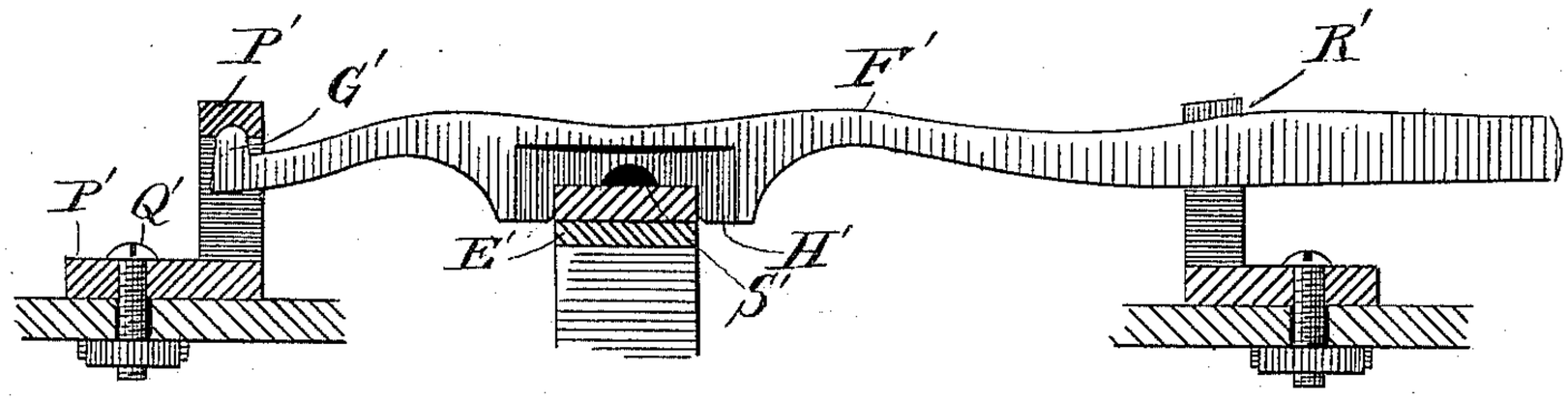
Fig. 4



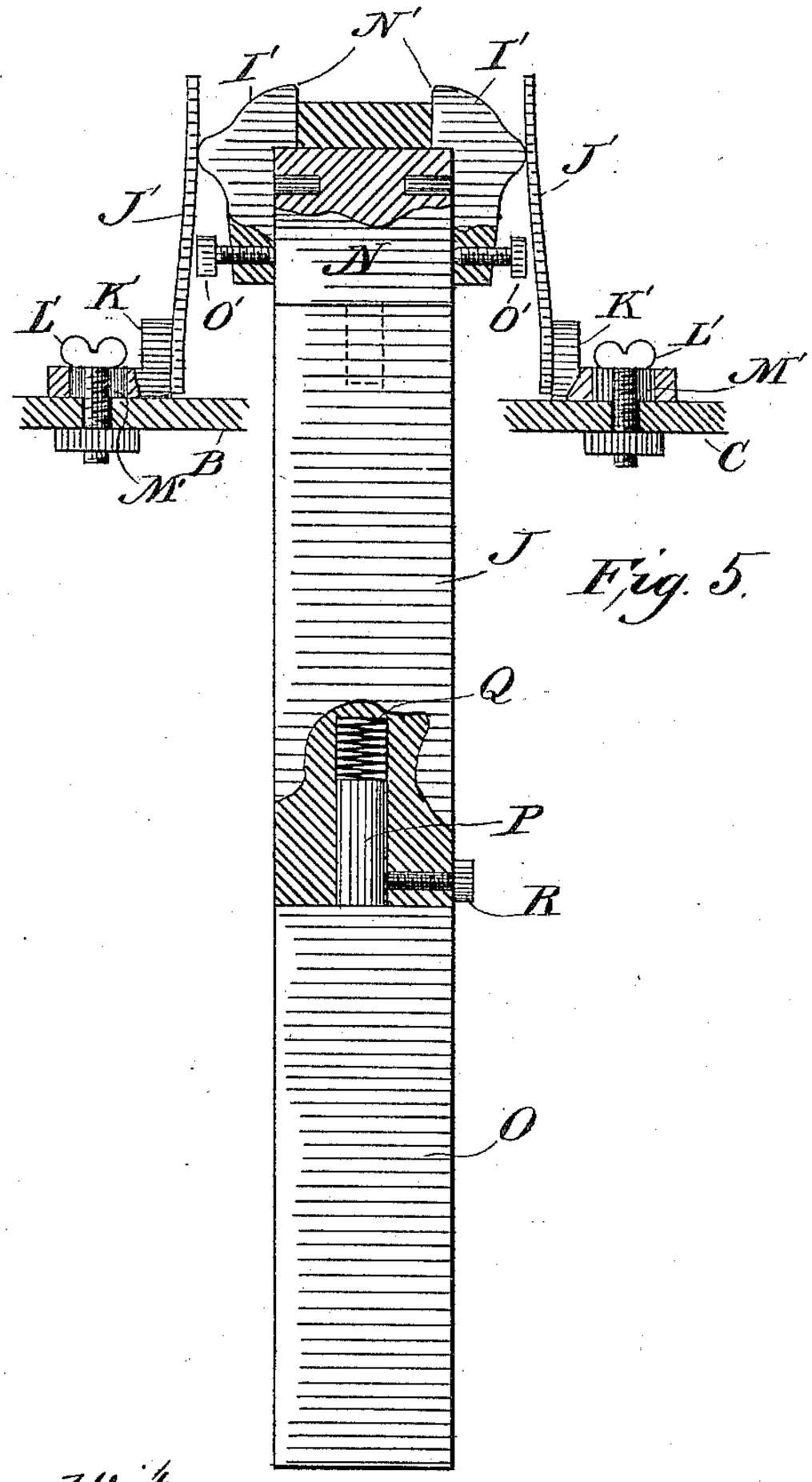
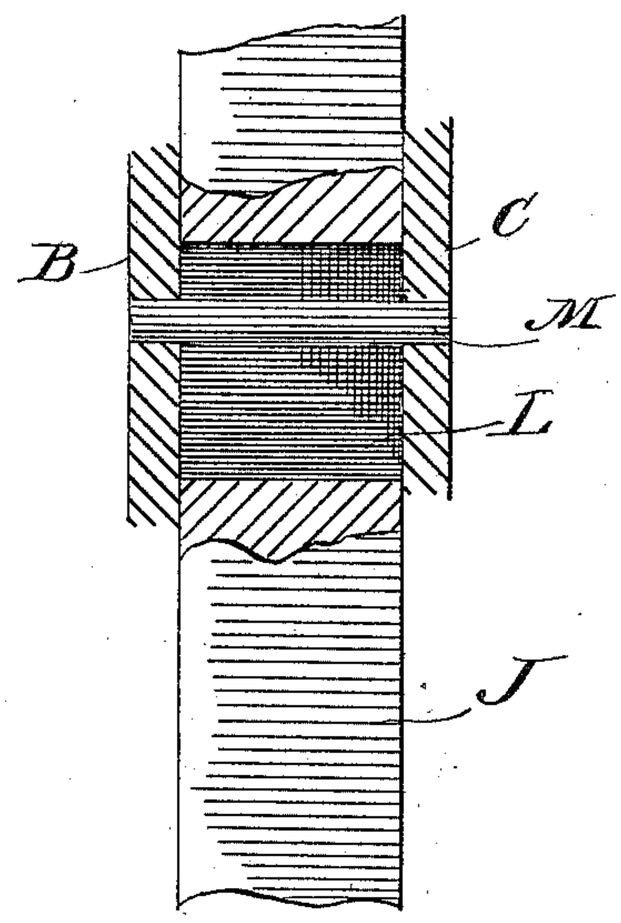


Fig. 5.

Fig. 6



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(No Model.) 4 Sheets—Sheet 4.

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MACHINE FOR FORMING SPRINGS.

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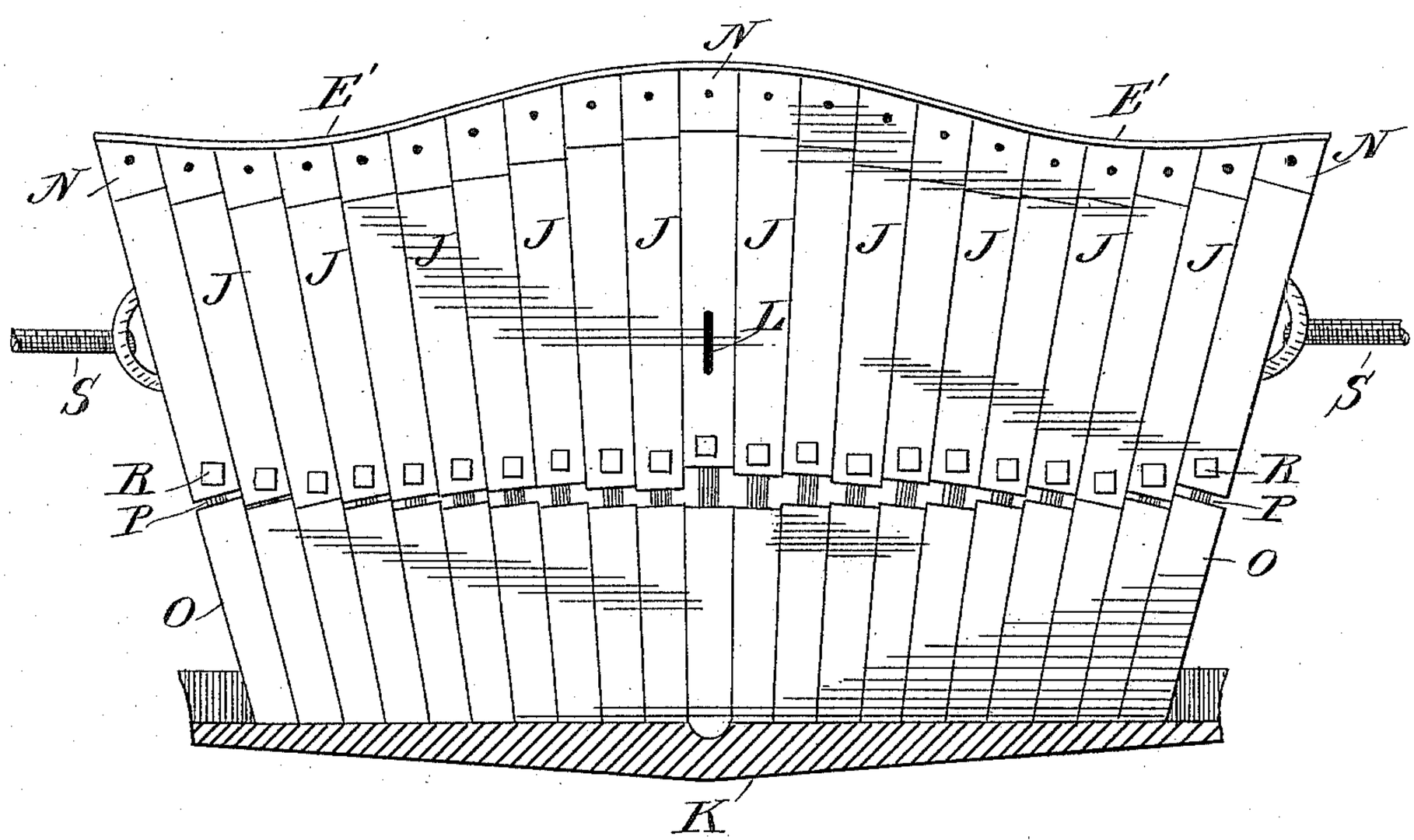
Fig. 7



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UNITED STATES PATENT OFFICE.

GEORGE NORWOOD, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR FORMING SPRINGS.

SPECIFICATION forming part of Letters Patent No. 301,261, dated July 1, 1884.

Application filed November 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE NORWOOD, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machines for Bending and Forming Springs; and I 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.

My invention relates to certain novel and useful improvements in machines for bending and forming springs; and has for its object to provide such a machine, in which the former-bars are readily adjusted to the desired contour or shape of the springs, while, at the same time, the spring itself is bent into the required shape gradually, and more after the manner of springs formed by hand, and not by a quick blow, as in the case of the ordinary plunger; also, to so arrange the former-bars at their upper extremities that they be forced together more closely at the bottom; and with these ends in view my invention consists in the details of construction and combination of elements hereinafter fully and in detail explained, and then specifically designated by the claims.

In order that those skilled in the art to which my invention appertains may more fully understand its construction and operation, I will proceed to describe the same in detail, referring by letter to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of a spring bending and forming machine embodying my improvement; Fig. 2, a detail plan view, partially in section, showing the construction of the table and the different devices for clamping and straightening the spring; Fig. 3, a vertical section on enlarged scale, taken at the line *x x* of Fig. 1, and also showing one of the former-bars in position between two sections of the table; Fig. 4, a detail side elevation of a device for clamping the spring to prevent warping during the chilling process; Fig. 5, a detail side elevation showing the adjustable clamp which prevents displacement of the spring; Fig. 6, a detail plan view illustrating the means for keeping the central former-bar free from all play except in a vertical plane; Fig. 7, a detail elevated view illustrating the method of adjusting the former-bars to the former.

Similar letters denote like parts in the several figures of the drawings.

A is the frame of the machine, and B C platforms secured to the frame or cast integral therewith. These platforms are provided with elongated slots D, for the adjustment of the clamping devices, as will be presently explained. The outer platform, C, has a downward projection, E, to which is attached any suitable device for straightening the spring laterally. I will not enter into any description whatever of this latter device, as it is of any ordinary construction, the operation of the cams F G acting merely to crowd the bar H against the spring after the latter has been placed on the supports I.

J are the former-bars, which are arranged between the platforms B C, with their lower extremities resting upon a cross-bar, K. These bars are so constructed that the center one only is in a plane at right angles to the cross-bar, while the others have a certain incline or pitch, which is the greater the farther off they are from the center bar, the sides of the bars being so constructed that adjacent bars are contiguous throughout their whole length. This practically makes the center bar the key, and therefore it is important that it should be held as against any movement except in a vercal plane. For this purpose I slot the central bar longitudinally, as shown at L, Fig. 6, and drive a pin, M, through the lower portion of the platforms B C in such manner that it will extend through said slot and keep the bar in a vertical position. I make the former-bars in three sections, namely: a central portion adapted to receive at the top thereof a detachable former-tip, N, and at the bottom a detachable piece, O. These tips are of different curvatures at their upper surfaces, so that when properly assembled they may be adapted to any desired shape of spring; also, different sets of tips are provided, so that instead of having a great number of heavy formers for different springs, another set of tips may be

substituted and very light formers used. The lower portions, O, have a pin projection, P, which fits into a recess in the central section and abuts against a coil-spring, Q, in said recess, so that it will be readily understood that the former-bars have a spring movement in the direction of their length, which greatly facilitates their adjustment.

R are set-screws passed through the central sections of the bars against the pins P, by means of which the upper portions of the bars may be held in any desired adjustment, as will be hereinafter fully explained.

S are clamping-screws, by means of which the bars are all held firmly together as against any lateral displacement. The inside upper portion of the frame A is adapted to receive a sliding carrier, T, which is racked at its inner sides, as seen at U, Fig. 3. Pinions V, arranged on the driving-shaft W, journaled at the sides of the frame, mesh with the rack U and impart motion to the carrier in a vertical plane. On one extremity of this shaft are arranged loose pulleys X and fast pulleys Y, and the arrangement of the belts is the same as in any machine—for instance, a planer—when a reciprocating movement is desired, the belts running in different directions, so as to cause the shaft to revolve in corresponding directions when the belts are properly shifted, which of course gives to the carrier a movement up and down, for the purpose presently to be explained.

Pivoted to the upper part of the carrier T, half-way between the ends thereof, are the presser-bars Z, constructed precisely after the manner of a pair of compasses. Within the lower extremities of said bars are journaled rolls A′. Attached to these bars, in such manner as to bring them together when no force is being exerted to separate them, are wires or any suitable cables, B′, passing over pulleys C′ and having weights D′ attached at their other extremities, as will be readily seen by reference to Fig. 1.

The operation of my improvement is as follows: The set-screws R are loosened to permit the former-bars to spring up as far as possible. The former E′ is then placed over and upon said bars and pressed down against the same until they adapt themselves to the contour of said former. The screws R are now tightened and the bars secured in this position. The set-screws S are now operated to bend the bars, so that they will not become displaced laterally. The spring is now placed upon the former E′ and the carrier T caused to descend. As the presser-bars Z, with rolls A′, come in contact with the spring, said rolls will press down upon the latter. As the carrier continues to descend the presser-bars will spread, and this spreading movement being a force directly opposite to that exerted by the weights D′, it follows that great pressure is maintained against the spring, which pressure is of course dependent upon the amount of weight. When the carrier has descended so that the rolls have traversed the entire length of the spring, the movement is reversed and the carrier ascends. The presser-bars are drawn together by the action of the weights D′, and the pressure exerted by said rolls on the spring is the same as when said bars are spread apart.

F′ is a lever provided at one extremity with a lug, G′, and recessed near its central portion to accommodate a block, H′, cut away, as shown at Fig. 4, in order to embrace the spring, as will be presently explained.

I′ are jaws adapted to be attached at the sides of the tips N, so as to slightly overlap the upper surface thereof, as seen at Fig. 5. J′ are spring-rods bearing against these jaws and attached to plates K′, which are adjustable in a horizontal plane by means of set-screws L′, passing through elongated slots M′ in said plates. In arranging a spring upon the former-tips, it is placed between the jaws I′, the latter being slightly beveled, as seen at N′, to facilitate this operation. Should the width of the spring be a trifle greater than the distance between the jaws, the springs J′ will permit said jaws to yield slightly; but if springs of considerable difference in width are to be accommodated, then the set-screws O′ are loosened, and also the plates K′ set farther back, which increases the distance between the jaws. The plates K′ are secured to the platforms B C, as seen at Fig. 2, by passing the set-screws L′ down through the inner openings in said platforms. As many sets of these jaws as are deemed necessary may be used; but I preferably use but one, as it holds the spring sufficiently.

P′ are brackets secured to the platform B by means of screws Q′, passed through the outer openings D in said platform. After the spring has been bent and formed, as hereinbefore set forth, the lugs G′ on the levers F′ are inserted within the sockets P′ and said levers brought down upon the spring in such manner that the block H′ will embrace the spring, as clearly shown at Fig. 4. Any suitable device, R′, may be used to fasten the levers down, and it will be readily understood that when the levers are depressed the blocks H′ will bite on the spring and hold it firmly. I preferably clamp the spring at the extremities, as shown at Fig. 2, although any number of clamps may be used. The blocks H′ are provided with holes or openings S′, for the purpose presently to be explained. After the spring has been thus clamped, a stream of water is introduced upon it longitudinally throughout its center. As the water reaches the portions of the spring held down by the clamps, it flows through the openings S′ and does not run down onto the sides. The spring is thus chilled from the center, which of course makes the operation of cooling much quicker and far more uniform, and any irregular contraction or warping of the spring is prevented by the clamps and by the action of the jaws I′.

I do not wish to be confined to any particu-

lar means for producing a reciprocating vertical movement of the carrier, as this forms no part of my invention; also, the number of clamping devices used and their particular location in respect to the spring is immaterial, as will be readily understood.

A great advantage in my improvement is that the spring is worked, as it were, into the required shape, which is very similar to the manner of making springs by hand; also, the pressure exerted upon the former-bars tends to wedge them closer together, and there is no danger of slipping or displacement.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a spring bending and forming machine, the former-bars constructed narrower at the bottom than at the top and clamped together, substantially as set forth.

2. In a spring bending and forming machine, the former-bars provided with detachable tips and with detachable spring bottom sections and means for securing the bars at the desired adjustment, substantially as described.

3. In a spring bending and forming machine, a reciprocating carrier having pivoted thereto presser-bars adapted to be distended by the downward movement of the carrier, and thereby forced against the spring, in combination with means independent of the carrier for causing said bars to automatically act on the spring during the upward movement of said carrier, substantially as set forth.

4. The bars J, with removable tips N, and detachable bottom pieces, O, adjustable by means of screws R, bearing against the pins P, in combination with the former, pivoted presser-bars Z, provided with rolls A′, reciprocating carrier T, and weights D′, attached to said presser-bars, substantially as described.

5. The levers F′, having therein the removable block H′, in combination with the sockets P′, and means for securing said levers in a depressed position, substantially as shown and described.

6. The jaws I′, adjustably secured to the sides of the former-bars, in combination with the spring-rods J′, attached to a horizontally-adjustable plate, K′, substantially as described.

7. The racked carrier, in combination with the pinion V on the driving-shaft W, presser-bars Z, weights D′, connected to said bars by wires or cables B′, the former, and former-bars, substantially as and for the purpose set forth.

8. In a spring forming and bending machine, the central former-bar secured against all movement except in a vertical plane, in combination with former-bars arranged on each side thereof and inclined toward the bottom, and means for clamping said bars in proper position, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE NORWOOD.

Witnesses:
F. W. SMITH, Jr.,
S. S. WILLIAMSON.