W. Van Anden,

Making Spiral Springs.

No. 6,634. Patented Aug. 7, 1849.

Fig. 3

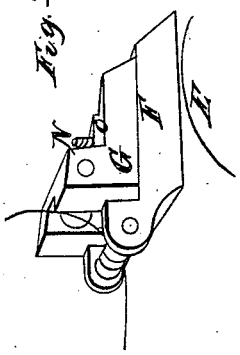


Fig. 2

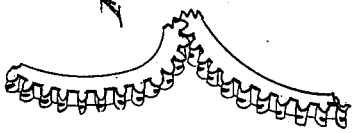


Fig. 4

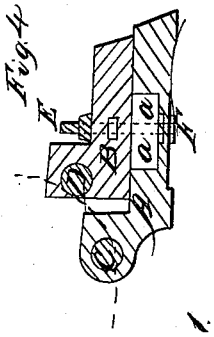
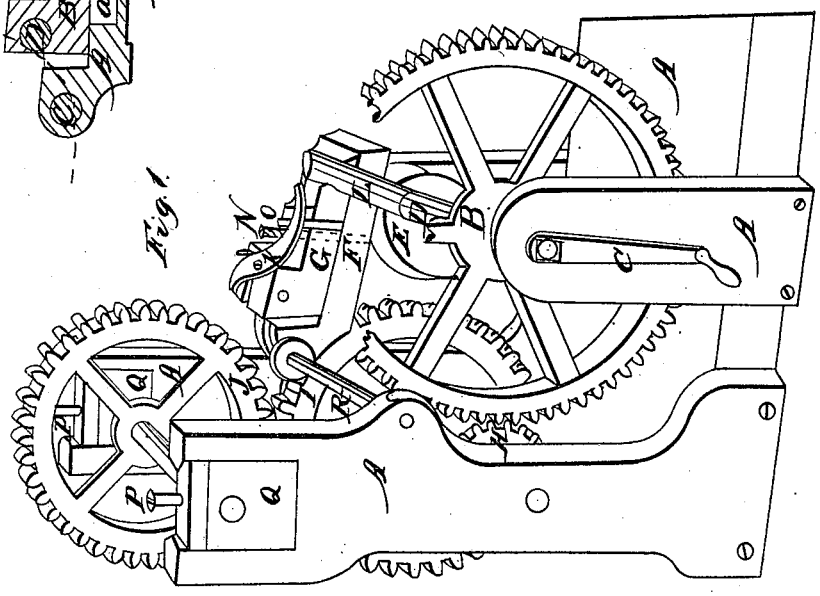


Fig. 1.



UNITED STATES PATENT OFFICE.

WILLIAM VAN ANDEN, OF TRENTON, NEW JERSEY.

MACHINE FOR MAKING SPIRAL SPRINGS OF WIRE.

Specification forming part of Letters Patent No. **6,634**, dated August 7, 1849.

To all whom it may concern:

Be it known that I, WILLIAM VAN ANDEN, of the city of Trenton, county of Mercer, and State of New Jersey, have invented a new Method of Constructing Spiral and Flat Springs for Seat-Cushions, &c.; and I do hereby declare that the following is a full and exact description of the construction and operation of the machine, reference being had to the annexed drawings, forming a part of this specification, in which—

Figure 1 is a perspective view of the machine; Fig. 2, a section of the notched wheels for the wire to pass through; Figs. 3 and 4, the tool by which the operation is performed.

In the construction of the machine I first make a strong frame-work of wood or metal, A A A A, Fig. 1.

A driving-wheel, B, is so constructed that it may be propelled by hand with a crank, C, or by steam or other power. The driving-wheel connects with a small toothed wheel or pinion, H, fixed upon a shaft having at the opposite end a large wheel, I. Another wheel, J, of similar size, connects with I in such a manner that it is driven by it. The teeth of these wheels are notched in such a manner that wire of the required size for making springs may pass through between the two wheels I and J, as seen in Fig. 2. The journals of the second wheel, J, is within movable boxes Q Q, which, by means of set-screws P P, regulates the depth with which the teeth of the two whee s I and J embrace.

Upon the shaft of the driving-wheel B is a cam, E, the eccentricity of which may vary according to the wish of the constructer. The function of this cam is to lift the frame F, which bears and forms a part of the operating-tool G. (More clearly represented in Fig. 3.) In the end of this frame next to the wheels I and J, and on a line with notches in the teeth, is a friction-roller, *a*, Fig. 3, under and behind which the wire passes after leaving the wheels I and J. In the same end of the tool G is also a friction-roller, in front of which the wire passes as it comes up from behind the roller *a*, Fig. 3. This tool, which rests upon the frame, Fig. 3, has a slot in it, through which a set-screw, with a large collar or a nut, passes up through the frame F, where a head of the screw also moves within a slot. This is better shown in Fig. 4.

A is the frame; B, the operating-tool; C D, the rollers in the two; F, the head of the set-screw moving in a space lengthwise the frame, so as to allow the tool to be moved in that direction; E, the screw with a nut at the top; C, a slot in the operating-tool B, which allows the tool to move in a lateral direction, and may be moved backward and forward, or laterally, to the option of the operator. The function of this tool is to curve the wire properly into circles as it passes through the wheels I and J, Figs. 1 and 3, and also to give the springs thus formed by circles a spiral form. The size of the circles of the spring is determined by the relative position of the two friction-rollers, giving direction to the wire. The greater the degree of the angle between the two from a plane the smaller will be the circles, and it is by the changing of this angle by means of the cam that the conical form of the spring is produced. Where the point of the cam most remote from the center operates upon the tool, the angle between the two rollers is greatest, and the curve of the spring consequently smallest. Therefore a spring which is completed during one revolution of the cam is smaller in cylindrical diameter in the center than at the ends—the common form of cushion-springs. When a straight spiral spring is required, there is no necessity for a cam, and it may be dispensed with. A flat scroll or clock-spring may be made by means of a scroll or inclined cam. Lifting the end of the frame F gradually until that part of the driving-wheel B where the teeth are removed comes round to the pinion H, the wire is cut off. At the same time the frame F drops on the cam nearest to the center, and is ready for another operation. Smooth bars may be used in the place of the friction-roller *a*, Fig. 3. Also, the friction-roller *c*, Fig. 3, may be dispensed with, forming a slot or tube in the tool *c* for the wire to pass through.

Upon the top of the tool is placed horizontally a piece of steel, moving, like a lever, upon a fulcrum at K, Fig. 1. The longer end of this lever is operated upon in such a manner by an upright piece, L, Fig. 1, attached to the shaft D of the driving-wheel, that it brings the shorter curved end around with its square edge against the wire and cuts it off. This operation is performed at every revolution of the driving-wheel when a spring is

completed. A brief halt is made in the forward motion of the wire at that moment. so that it may be cut off by the removal of a few teeth of the driving-wheel B.

Crimping of the wire in the formation of the spring renders it more elastic, and hence, for the spring of equal strength with one of plain wire, a smaller wire may be used for the crimped one. This machine may be used (and is so intended) for that purpose by simply setting the teeth of the wheels I and J deeper into each other, so deep that the wire will not pass through the notches in the teeth without being bent. The degree of crimping may be easily regulated by the set-screws P P, Fig. 1. With the tool G in the relative position to the wheels I and J, as represented in the drawings, the crimping would be in horizontal curves. To make them perpendicular, it is only necessary to change the position of the tool and the cam E, making the rollers in the former lie horizontally, to produce the desired effect.

The operation of the machine is as follows: The wire to be formed into a spring is placed so as to pass through between the notched teeth I and J, then immediately under the friction-roller *a*, Fig. 3, or C, Fig. 4, and up in front of the friction-roller *c*, Fig. 3, or D, Fig. 4. This gives it the required curve, the angle of which is determined by the relative position of the two friction-rollers, which position may be changed by the set-screw E, Fig. 4. By moving the tool B, Fig. 4, laterally, so that the two rollers are not in a line with each other, the wire, as it is bent into circles, receives a lateral bias, and the spring is made spiral. The degree of spirality is in proportion to the variation of the two rollers from a straight line with each other. I have already noticed the functions and operation of the cam in giving the spring a conical form having the appearance of two truncated conical cylinders—the usual form of cushion-springs. The upright piece L, Fig. 1, is so placed upon the shaft of the driving-wheel that it strikes the long end of the lever *k*, as already described, brings its short end with a square edge against the wire, and cuts it off at the moment a spring is completed.

The advantages which this method of making curved springs—such as spiral springs for cushions, beds, wire bells for clocks, and all other springs having a curved form—are chiefly in the perfect accuracy with which each is made, the great facility of construction, and consequently the cheapness with which they may be furnished to the public. The crimping of the wire is also a great advantage, for it adds so much to its elasticity that there may be a great saving in material.

What I claim as my invention, and desire to secure by Letters Patent, is—

The entire method herein described of making springs of curved character in a flat or spiral form, in the manner herein set forth—namely, by forcing the wire, by notched toothed wheels or otherwise, between friction-rollers, tubes, or smooth bars, so as to form a wire spring into a curved and spiral form at the same time by means of varying the tool, as described; also, the method herein set forth for varying the size of the curve by moving the operating-tool by a cam, inclined plane, or any similar mechanical contrivance.

Trenton, June 14, 1849.

WILLIAM VAN ANDEN.

Witnesses:

SAML. LLOYD,

ELI MORRIS.