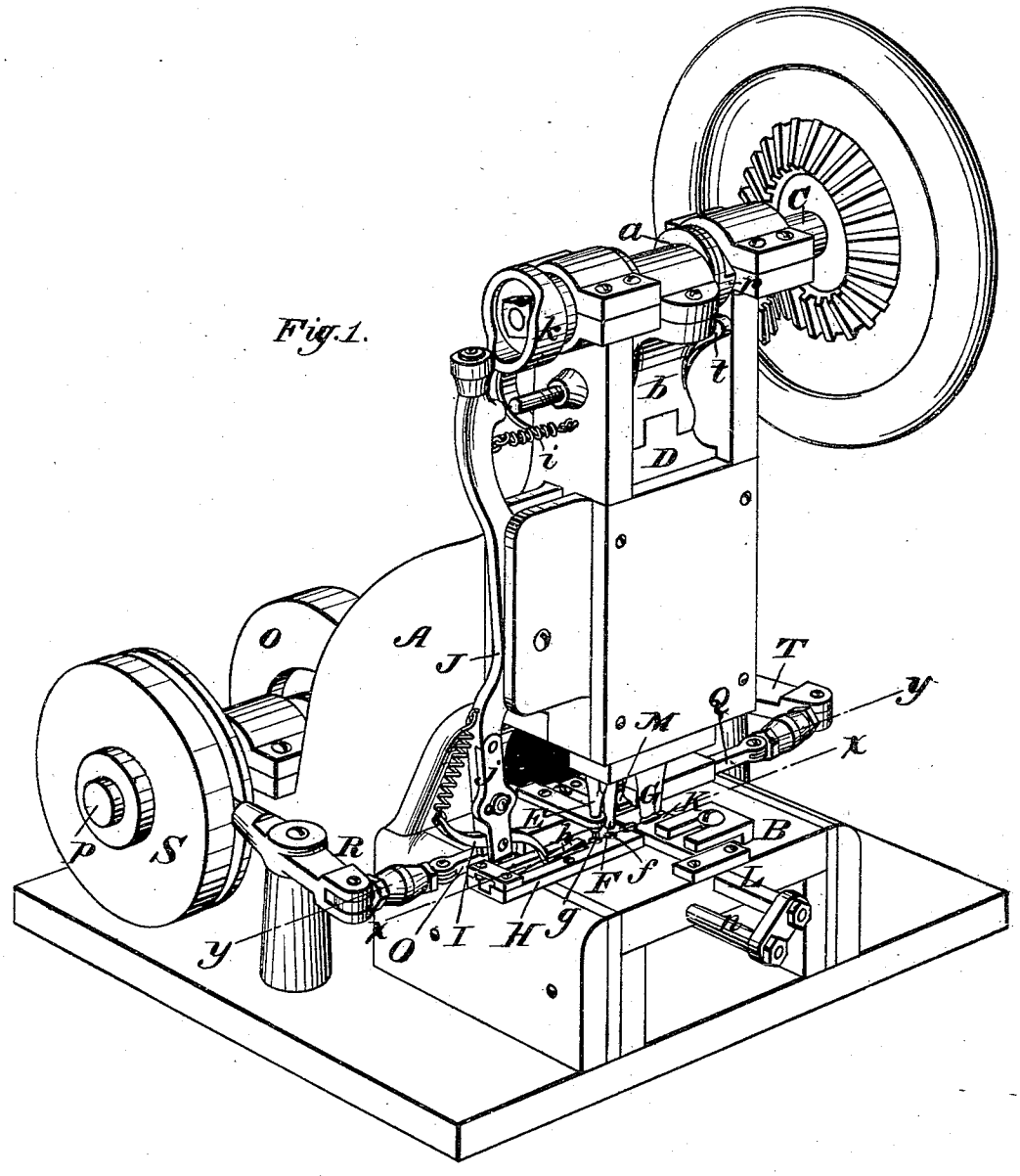
5 Sheets—Sheet 1.

S. N. SMITH.

MACHINE FOR MAKING LACING HOOKS FOR SHOES.

No. 259,597. Patented June 13, 1882.

Fig. 1.



Witnesses:

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Alex. Scott

Inventor:

S. N. Smith

By Dodger Sons

Attys

N. PETERS. Photo-Lithographer. Washington, D. C.

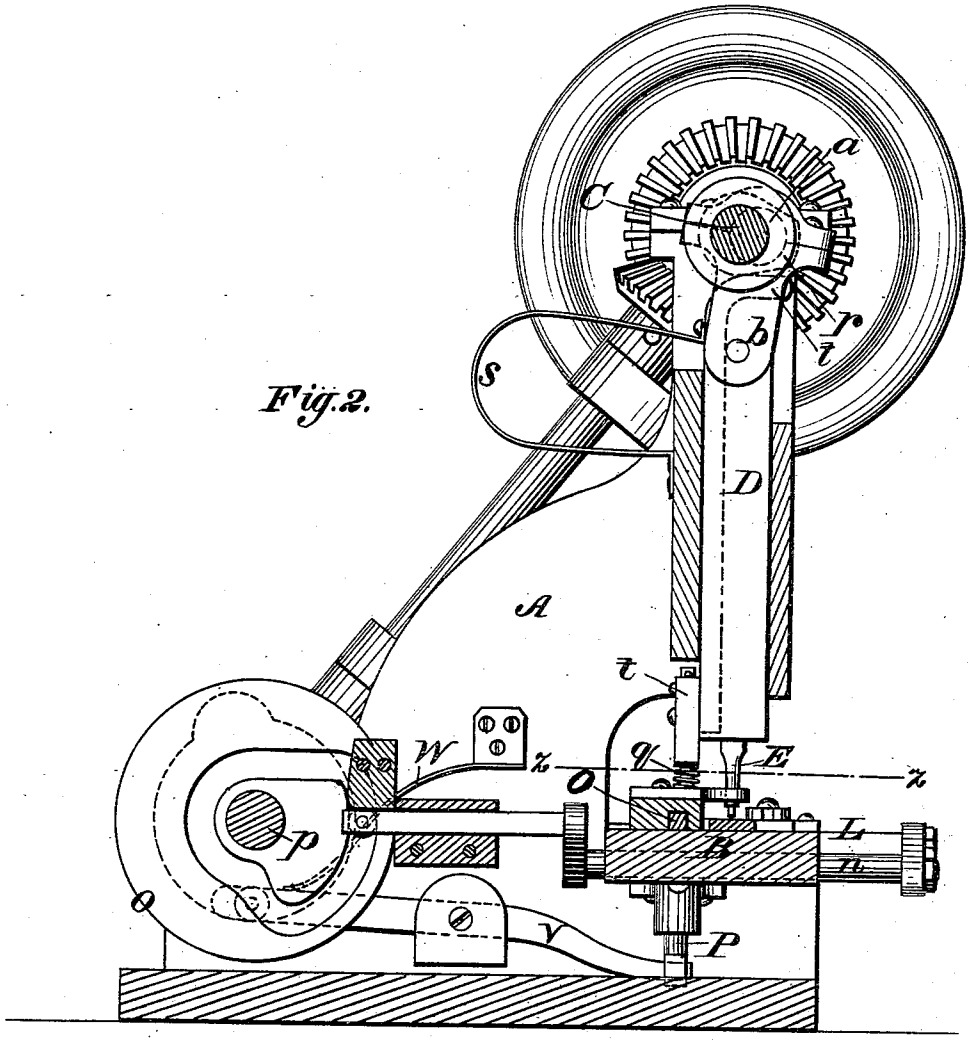
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S. N. SMITH.

MACHINE FOR MAKING LACING HOOKS FOR SHOES.

No. 259,597. Patented June 13, 1882.

Fig. 2.



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Fig. 3.

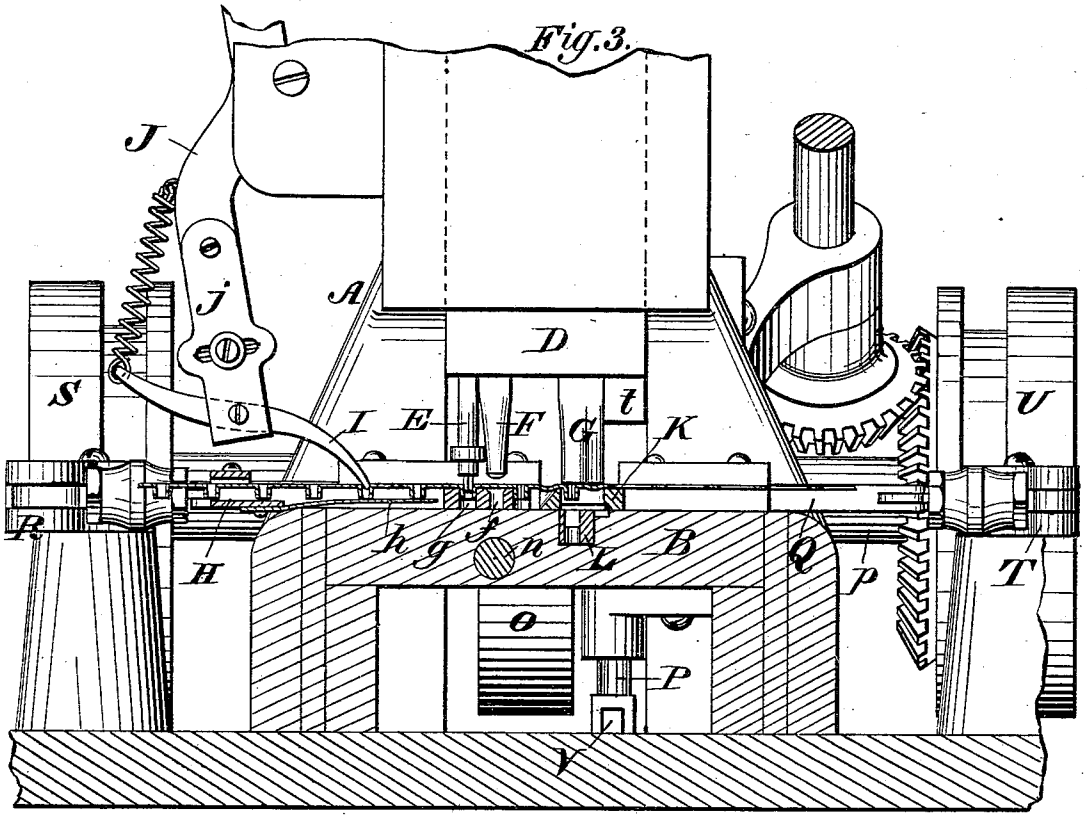


Fig. 4.

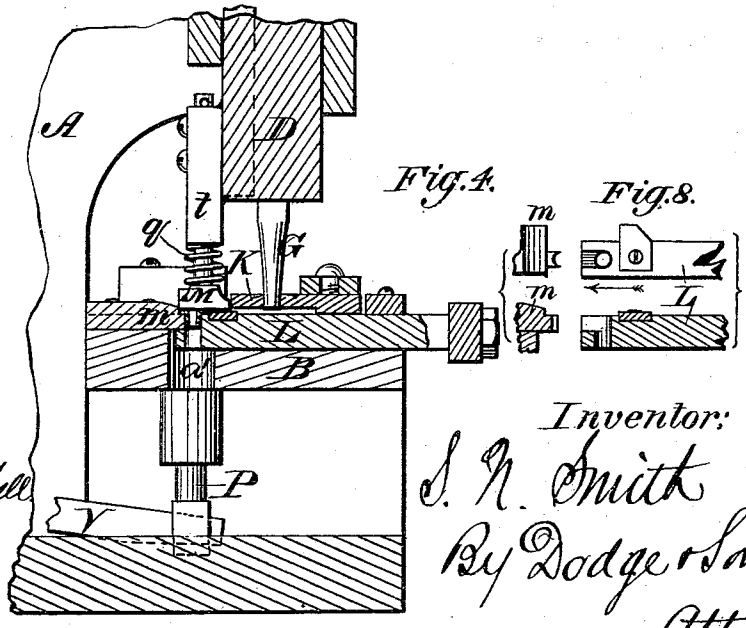


Fig. 8.

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S. N. SMITH.

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Fig. 5.

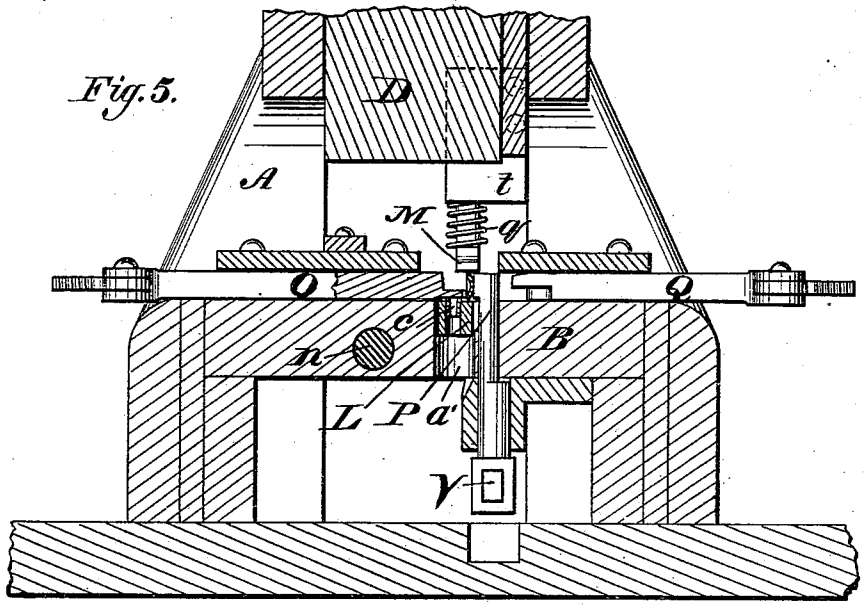
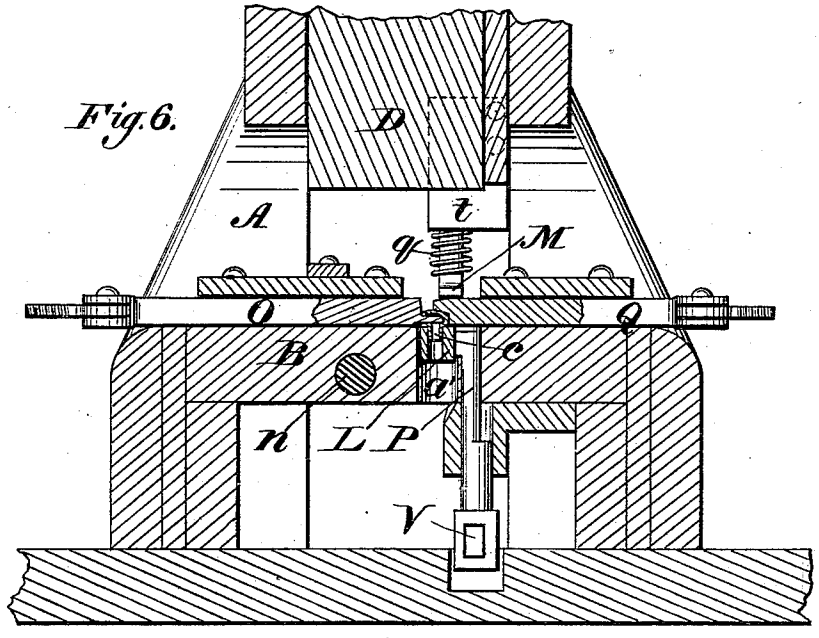


Fig. 6.



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S. N. SMITH.

MACHINE FOR MAKING LACING HOOKS FOR SHOES.

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Fig. 7.

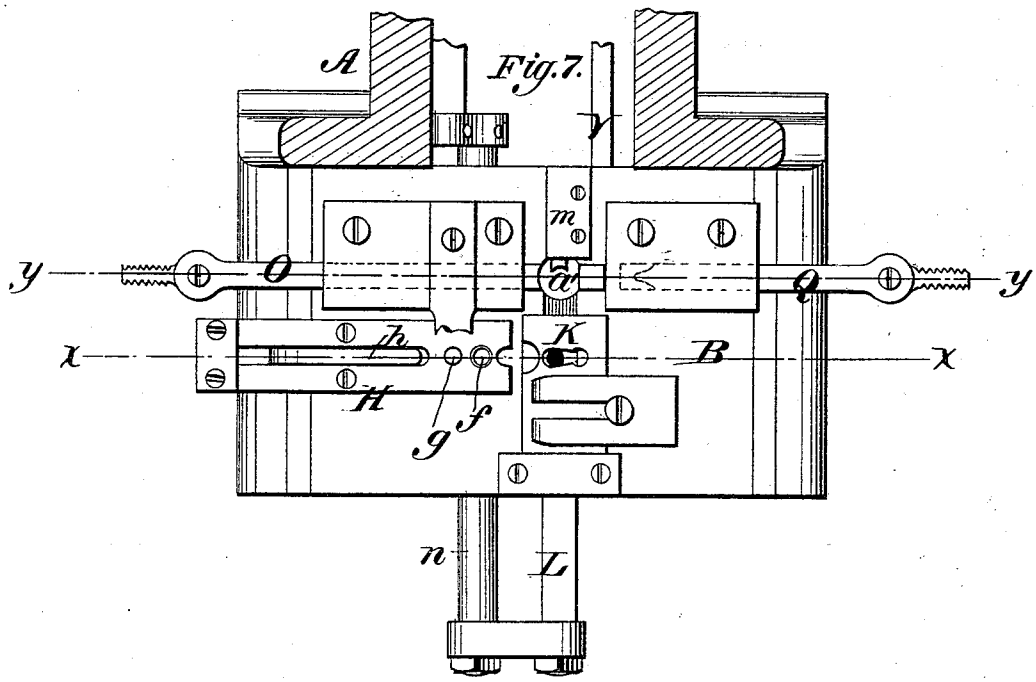


Fig. 9.

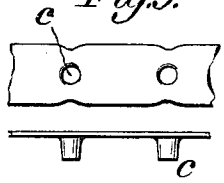


Fig. 10.

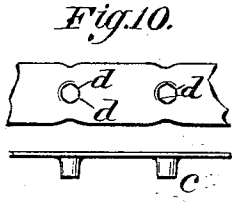


Fig. 11.

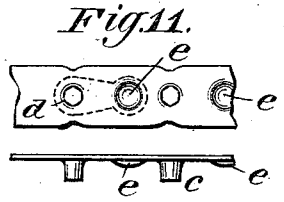


Fig. 12.

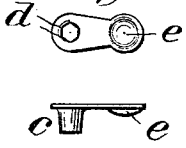
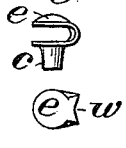


Fig. 13.



Fig. 14.



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UNITED STATES PATENT OFFICE.

STEPHEN N. SMITH, OF PROVIDENCE, RHODE ISLAND.

MACHINE FOR MAKING LACING-HOOKS FOR SHOES.

SPECIFICATION forming part of Letters Patent No. 259,597, dated June 13, 1882.

Application filed July 28, 1879.

To all whom it may concern:

Be it known that I, STEPHEN N. SMITH, of Providence, in the county of Providence and State of Rhode Island, have invented certain Improvements in Machines for Making Lacing-Hooks for Shoes, of which the following is a specification.

My invention relates to an improved machine for making lacing-hooks for shoes.

Lacing-hooks as known in the art for many years past consist of a small sheet-metal hook having a rounded upper end and a tubular lower end or neck, the latter designed to be inserted through the leather and spread or upset beneath the same in the same manner as an eyelet, in order to secure the hook in place on the shoe. The methods of manufacturing these hooks generally practiced are slow, laborious, and expensive. They render many hooks defective, and they necessitate the waste of an excessive amount of metal.

The object of my invention is to increase the production and cheapen the cost of these hooks, and at the same time give them increased stiffness.

In order that the construction and operation of my machine may be the more readily understood, I will briefly state the method and process of manufacturing the hooks, the principal steps of which it is the purpose of my machine to perform. The method itself, irrespective of the machine by which it is carried out, will be made the subject of a separate application.

The method of manufacture consists in taking a strip of specially-prepared stock of a width slightly greater than that of the hooks, having tubular necks formed therein at regular distances apart, indenting the stock at suitable points to form the cup-shaped or rounded ends of the hooks, punching from the necked and indented strip lengthwise thereof, end to end, flat blanks, each embracing one of the necks and one of the cupped or indented portions, and, lastly, bending the blanks by two operations into form.

In practice it is found that by pursuing the above-described steps the hooks can be made cheaper and better than in any other manner.

Figure 1 represents a perspective view of my machine; Fig. 2, a vertical section through the same from front to rear; Fig. 3, a transverse vertical section on the line *x x* of Fig. 1; Fig. 4, a section from front to rear, showing the parts in different positions from those shown in Fig. 2; Figs. 5 and 6, transverse vertical sections on the line *y y* of Fig. 1, the former showing the parts as they appear during the first bending and the latter showing them as they appear during the final bending of the hook; Fig. 7, a horizontal section on the line *z z* of Fig. 2, looking downward; Fig. 8, a plan view and a vertical section through the blank carrying and sustaining devices; Figs. 9 to 14, views showing the metal in its different stages.

In order that the construction and operation of the machine may be the more readily understood, it is proper to state that it operates upon previously-prepared stock or material, such as shown in Fig. 3, and that its action is first to score or groove the inside of the tubular necks, as in Fig. 10, then indent the metal, as in Fig. 11, and punch therefrom, as in dotted lines, the blank shown in Fig. 12, and afterward bend the same first into the form shown in Fig. 13, and finally into the form represented in Fig. 14.

A represents an upright rigid frame, the upper end of which overhangs a bed or table, B, on which are mounted nearly all the devices that act directly upon the metal. In the top of the frame there is mounted a horizontal driving-shaft, C, having, in addition to the driving-pulley and other devices, a central crank, *a*, connected by a pitman, *b*, to a vertically-sliding head, D, the lower end of which carries the three punches or spindles E F G. The first punch, E, is made polygonal in form, and is designed to pass down through the round tubular necks *c* of the stock and groove or score the same on the inside, as shown at *d* in Fig. 10, so that in upsetting the necks to fasten the hooks upon the shoe they will split at the ends and turn down evenly on all sides. The second punch, F, is designed to indent the blank or stock at the points *e* and give the rounded form to the heads of the hooks when they are punched therefrom. The third punch, G, is adapted to cut from the metal strip or stock the hook-blanks in flat form, each blank embracing at opposite ends, as shown in Fig.

12, one of the tubular necks and one of the cupped or indented portions, *e*. The stock is introduced at the left and carried to the right past the scoring, indenting, and punching dies in succession, with its tubular necks extending downward on the under side. To secure the proper feeding of the stock, the bed B is provided on one side with a fixed guide-plate, H, grooved at the outer end to receive the stock and direct the same forward in line with the punches. At its inner end the guide is provided, as shown in Figs. 1, 3, and 7, with a depression, *f*, into which the metal is forced by the indenting-punch, and also with a hole, *g*, to receive one of the tubular necks of the stock during the action of the punches, for the double purpose of supporting the metal and of holding the stock firmly in the exact position required with reference to the punches. The outer end of the guide is adapted to cover the stock-strip and prevent its escape, and in the grooved portion of the guide there is mounted a spring, *h*, the function of which is to act beneath the stock-strip and raise the same, so as to lift its neck from the hole in the plate when the strip is to be advanced. The advance of the strip is caused, as shown in Fig. 3, by means of a spring pawl or finger, I, (shown also in Fig. 1,) pivoted to the lower end of a vibrating lever, J, and arranged to engage in the necks of the stock. The lever J is pivoted to the side of the main frame, and actuated at its upper end by means of a spring, *i*, and a cam, *k*, on the end of the main shaft C. During the descent of the punches the finger I moves backward from one neck to the next, and, engaging in the latter, moves the stock forward beneath the punches as the latter rise, the adjustment being such that one of the necks is carried each time directly beneath the scoring-punch.

In order to permit the adjustment of the machine to compensate for wear and to feed stock for hooks of different lengths, the finger I, instead of being pivoted directly to lever J, is pivoted to a pivoted adjustable plate, *j*, upon the lever, as shown. At each descent of the sliding head the three punches act simultaneously, the neck for one hook being scored and the end indented, while at the same time a hook is cut out by punch G and carried down through the fixed die K. Beneath the die K there is arranged a horizontal carrier-slide, L, upon which the flat blanks are received from punch G and carried backward. This carrier is constructed, as shown in Fig. 4, with a shoulder on its face to act against the blank and with a notch in its end to receive the tubular neck of the same.

In order to give the neck and body of the blank the required support when carried backward, and at the same time admit of its ready release at the proper time, a fixed tongue, *m*, is mounted on the bed, as shown in Figs. 4 and 7, in position to enter and close the notched end of the slide as the latter moves back. The movement of the carrier-slide is secured, as shown in Figs. 1, 2, and 3, by connecting its front end with a sliding bar, *n*, which passes backward through the bed to the rear side of the machine, where it is mounted in a guide, and provided with a stud or roller working in a cam-groove in the side of a driving-wheel, *o*, which is mounted on a horizontal shaft, *p*.

In order to hold the blank down in place as it is carried from beneath the die by the slide-carrier, a yielding presser-foot, M, is employed, as shown in Figs. 2, 4, 5, and 6. This foot has a sliding stem mounted in the lower end of a bar, *t*, and is urged downward independently of said bar by a spiral spring, *q*. The bar *t* passes upward through the main frame, and is forced down at the proper times by the pressure of a cam, *r*, mounted on the main driving-shaft, as shown in Figs. 1 and 2, and when the cam rises the bar is lifted by a spring, *s*, arranged as in Fig. 2. The bar descends and carries the presser-foot down in advance of the carrier-slide, which then moves the blank back beneath the foot and subject to its yielding or spring pressure, whereby the blank is retained in form and position.

In order to hold and support the blank while being bent into form, I mount upon the bed a horizontally-sliding bar or anvil, O, as shown in Figs. 1, 5, 6, and 7. As soon as the carrier ceases its backward movement the presser-foot rises and the anvil O slides forward over and upon the tubular end of the blank to the position shown in Fig. 5.

In order to give a partial bend to the blank, a vertically-moving rod, P, is mounted in the bed, as shown in Figs. 5 and 6, in such position that the carrier leaves the solid end of the blank resting thereon. After the anvil O has advanced the rod P rises and turns the end of the blank upward at a right angle past the end of the anvil, as shown in Fig. 5, and instantly descends. To complete the bending or doubling of the hook, a horizontally-sliding presser-bar, Q, is mounted on the bed opposite anvil O, as shown in Figs. 1, 5, 6, and 7, and arranged to advance as soon as rod P descends, and fold the end of the blank down over and upon the anvil, as shown in Fig. 6, thereby completing the hook.

In order to give the hook a rounded surface on the inside to receive the cord, and also to give it increased stiffness, so that it will not straighten out under the strain of the cord, the anvil O is notched or made concave in its end and the end of bar Q rounded outward or pointed on the under side, as shown in Fig. 7, so that as the bending of the hook is completed it will also be indented or creased in the outer side of the bend, as shown at *w*, Fig. 14. As soon as the hook is completed the anvil, the presser-bar, and the carrier-slide move back from each other to their original positions, and the hook falls through a discharge-opening, *a'*, formed in the bed, as shown in Figs. 4, 5, 6, and 7. The anvil O is connected to an oper-

ating-lever, R, the rear end of which enters and is driven by a grooved cam-wheel, S, on the rear shaft before mentioned. The presser or bar Q is actuated in like manner by a lever, T, moved by a cam-wheel, U, on the rear shaft. The vertically-moving rod P bears upon and is moved by a lever, V, the rear end of which is depressed by a spring, W, and elevated by an eccentric rim on the wheel *o*. It will be noticed that this wheel has different cams on opposite sides, and that it serves to actuate both the rod and the carrier-slide.

While it is deemed best to operate the various slides by the means above detailed, any other suitable operating mechanism may be substituted.

The continuous operation of the machine is as follows: The prepared stock is introduced to the guide H and carried forward intermittingly by the action of the finger I over the spring and beneath the punches. The punches descend, and while the scoring and indenting for one hook are being performed by punches E F a blank for another is cut out and carried downward by punch G to the carrier-slide. The presser-foot M descends and the slide carries the blank thereunder; the presser rises and the anvil advances over the end of the blank; the rod rises and bends the end of the blank upward; the slide advances, and, bending the end of the hook down, at the same time indents its back; and, lastly, the slides retreat and the hook falls from the machine.

The present invention is restricted to those matters and things which are specifically claimed herein; and as to all other features which may be described and shown, and particularly as to the method of manufacture herein described, irrespective of the machine, the right is reserved to make the same the subject of a separate application, to be considered as a division of the present case and a continuation of the present application.

Having thus described my invention, what I claim is—

1. In a machine for making lacing-hooks, the series of punches for scoring, indenting, and cutting, constructed as described, jointly with the feed mechanism, arranged to move the prepared stock from the first two punches to the last.

2. The combination of the cutting-punch, the carrier, the sliding anvil, and the vertically and horizontally moving slides arranged to act successively and bend the blank over the anvil.

3. The combination of the anvil O and the two slides, arranged to act successively and double the blank thereon, as described.

4. In combination with the cutting-punch, the carrier-slide, the anvil, and a bending mechanism, substantially as described, the yielding presser-foot arranged to act upon and hold the blank.

5. In combination with the blank-forming devices, as described, the presser-foot, the bar having a spring-connection with the foot, and means, substantially such as described, for imparting a reciprocating movement to the bar.

6. The blank-carrier having the notched end to receive the tubular necks of the blanks, in combination with the tongue adapted to close said notch and sustain the blank.

7. In combination with the scoring and cutting punches and the feeding-finger, the grooved guide H, provided with the hole *g* and spring *h*.

8. In a lacing-hook machine for operating upon stock having tubular necks, the combination of the indenting devices, the cutting devices operating subsequently to the indentation, the carrier, and the bending devices, whereby the blank is folded across its middle into a U form, substantially as described and shown.

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