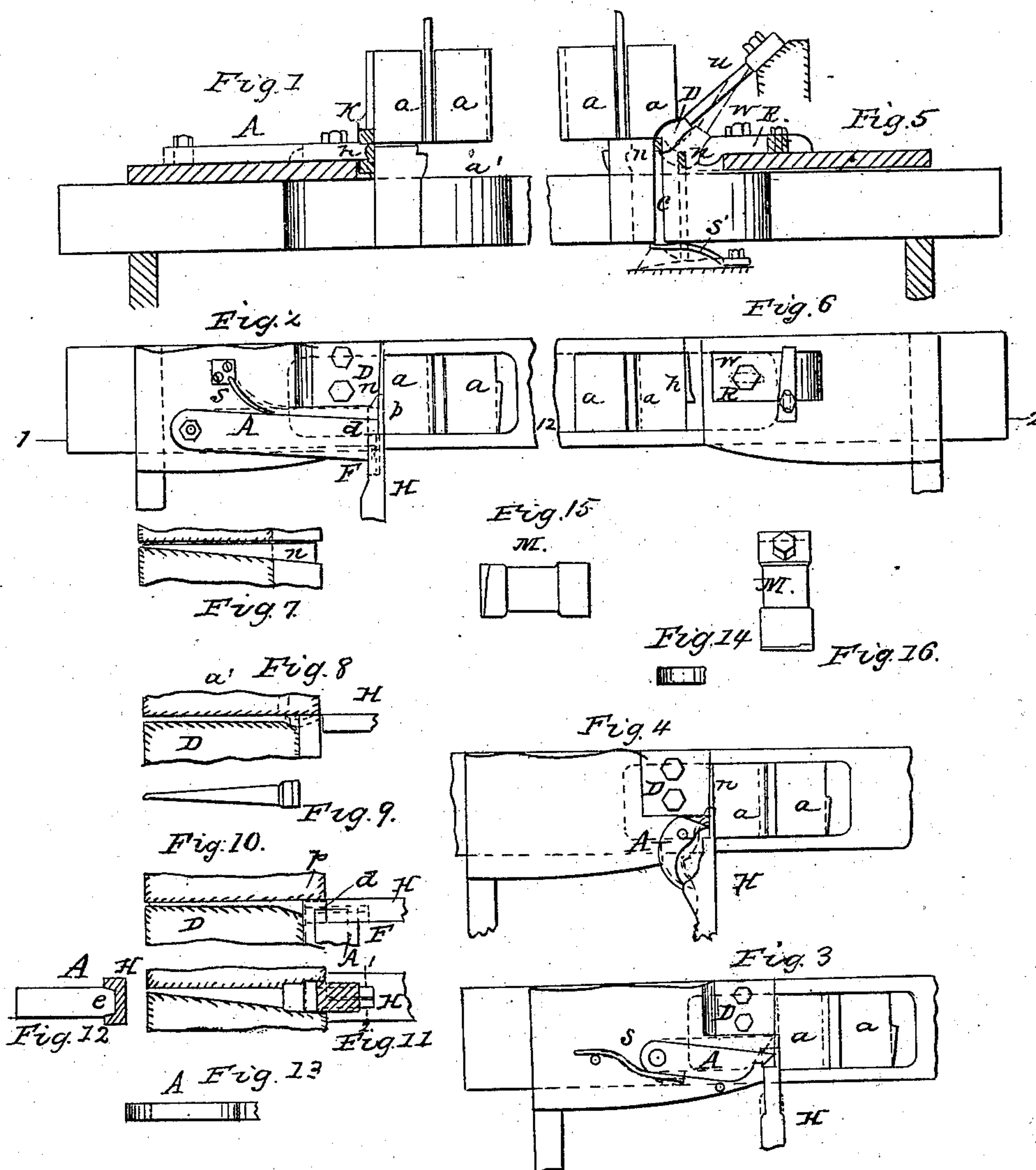


S. G. REYNOLDS.

Nail Machine.

No. 58,137.

Patented Sept. 18, 1866.



WITNESSES  
John D. Thurston  
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# UNITED STATES PATENT OFFICE.

SAMUEL G. REYNOLDS, OF BRISTOL, RHODE ISLAND.

## IMPROVEMENT IN MACHINERY FOR MAKING NAILS.

Specification forming part of Letters Patent No. 58,137, dated September 18, 1866.

*To all whom it may concern:*

Be it known that I, SAMUEL G. REYNOLDS, of Bristol, in the county of Bristol and State of Rhode Island, have invented certain new and useful Improvements in Machinery for Making Nails and similar articles; and I do hereby declare that the following specification, taken in connection with the drawings making a part of the same, is a full, clear, and exact description thereof.

Figure 1 is an elevation showing the stationary and movable shears, the radial lateral supporter A, hereinafter particularly referred to, and also showing in section the peculiar shape of the header employed in this modification of the invention. Fig. 2 is a plan showing the combined action of the radial supporter A and the header H in forming the head of a nail. Fig. 3 is a modification of the invention exhibiting the operation of the same principle under a different form and arrangement. Fig. 4 exhibits another modification of the application of the same principle. Fig. 5 is an elevation of the same machine as arranged in Fig. 1, but in addition it exhibits the arrangement to compress the nail to the desired gage without injuring the edge of the movable cutting-shear, which arrangement is designed to be attached to the machine shown in Fig. 1, but to avoid confusion is in the drawings exhibited separately. Fig. 6 is a plan of the same. Figs. 7 to 16, inclusive, are explanatory details.

The invention which is the subject of this patent has particular reference to an improvement upon the machinery for making nails for which Letters Patent were granted to me bearing date January 20, 1852. It may, however, be applied to any nail-making machine which forms the head upon the principle of upsetting the metal of the blank by the application of pressure in the direction of its length, the shank, or that portion which is distinct from the head, being at the same time gripped by means of dies acting against its surface in a lateral direction.

It is well understood that the natural tendency of a strip of heated metal as thin as that which constitutes a nail-blank, unless supported laterally, will be to crimp or double itself upon the application of pressure in the direction of its length, for the reason that the

particles of matter in a strip so slender will more readily break away from each other at the weakest point than undergo the molecular rearrangement which otherwise will be the effect of such pressure.

It has been heretofore essayed to counteract this tendency of the nail-blank to crimp itself under the operation of heading, and with this object William Tallman, of Providence, in the schedule accompanying his patent dated March 27, 1860, has described a means of arranging and operating the devices which co-act to form the head so as to constitute a surrounding case or mold of a definite size, within which the heading-punch works to press the metal of the rod which is to compose the head against the walls of such case. Practical use, however, has demonstrated that this means is without any influence in preventing the crimping of the metal, but is simply capable of giving a better external appearance to the head by imparting to it regularity of outline and partially concealing its defects by pressing together closely the folds in which it is crimped; and that such must be the case is obvious from the fact that the rod or strip is as free to double itself into folds until the full size of the head is obtained (before which time it does not receive support from the sides of the mold) as if it were headed in open space.

Another invention having the above-mentioned object in view, and for which I have heretofore applied for Letters Patent, consists in making the heads of nails and similar articles by consecutively upsetting small portions of the metal of which the head is composed by uncovering the metal from the inclosure of the die as the header advances.

The present invention is distinguished from those which I have described both in the manner in which the necessary lateral support is applied and in the mode of operation of the parts to effect the result of making a solid head upon a slender nail-blank without crimping the same.

In the accompanying drawings the plate of heated metal is to be understood as fed to the machine through a space between two stationary cutters or shears, *a a*, below which vibrates a double-edged cutter or shear, *a'*, by which a piece to form a nail, *n*, Fig. 7, is cut off at each motion, the rod or plate being vibrated



at each cut so as to give the taper alternately on opposite sides. This blank is carried forward in the way described in the patent granted to me January 20, 1852, and pressed against the griping-die D, and by this pressure held securely in place during the process of heading.

It will be observed in the plan, Fig. 2, that the width of the griping-die D is as much less than the length of the nail-blank  $n$  as the length of the portion required to form the head, while on the other side of the blank a full support throughout its length is furnished by the side of the movable shear  $a'$ . Such being the case, it is clear that, unless some means be provided for giving support to the blank upon that portion of its side toward the griping-die which projects beyond such die, the effect of the header H will be to crimp the metal, as shown in red outline in Fig. 8. Now, in arranging such support two opposite conditions are to be fulfilled, one of which is capacity to furnish a constant support during all that time while the blank, from its want of substance, has a tendency to crimp, and the other is a capacity to accommodate itself to the increasing size of the head, due to the upsetting action of the header.

I have illustrated in the drawings three several modifications of the principle of my invention, which, while differing from each other in arrangement, embody substantially the same mode of operation.

The first modification is shown in Figs. 1 and 2, and it must be understood that in this as in the other figures illustrating the other modifications no attempt is made to represent a full nail-machine, but only such parts as relate to the improvement claimed, all other features sufficient to enable those skilled in the art to construct a machine being shown in the patent of 1852, before referred to.

Referring to Figs 1 and 2, and for details to Figs. 10, 11, and 12, it will be seen that I employ in this instance, to accomplish the above-named purpose, what I call a "radial supporting-bar," A, which is arranged so as to vibrate upon the pivot  $c$  in a direction toward the griping-die D, and is operated in one direction by the shoulder  $f$  of the header H, and in the other direction by the spring  $s$ .

H is the header, which is arranged to travel in a line tangential to the arc described by the end of the supporting-bar A. This header is recessed, as shown in section, Figs. 1 and 12, and in such recess the end of the supporter A is entered, Fig. 12; but when the parts are in the position shown in Figs. 2 and 10, and ready to receive the nail-blank, a portion,  $d$ , of the width of the supporter projects beyond the face of the header.

The end of the supporting-bar A is made concave or V form, as shown at  $e$ , Fig. 12, toward the nail-blank, which latter, by pressure from the movable shear  $a'$ , is made to conform to this concavity, and is thereby prevented from bending vertically.

We will suppose, now, that the blank has been brought forward by the cutting-shear, as shown in Fig. 2, and that the supporter A and the header H are relatively placed as in that figure appear. The portion  $d$  of the supporting-bar will bear against the nail-blank, and will remain so, supporting it until the header has reached the point  $p$ , Fig. 2, when, the face of the header and the front edge of the supporter A being coincident, or in the same straight line, the two will move together to complete the upsetting of the metal to form the head.

That this will accomplish the result of producing a solid head is obvious when it is considered that during the movement of the header from its point of starting to  $p$  the metal is firmly supported for a distance equal to the full one-half of the length of the portion of which the head is to be formed, and that the distance between the edge of the supporting-bar and the side of the griping-die is too short to allow the blank to crimp during this operation, although it will be thickened in proportion to its reduction in length, and when the bar A and the header move together as one mass both such increased thickness of the blank and the short distance to be traveled insure the proper upsetting of the metal.

The second modification is shown in Fig 3. Here the section of the header H is rectangular, corresponding to that of the nail-head.

A is the vibrating radial supporter, having its extremity chamfered like a chisel and its edge made concave, as shown in Fig. 13, for the purpose of preventing the blank from bending vertically, as in the former modification described.

The point of contact of the supporter A with the nail-blank at the commencement of the heading operation is near the middle of that portion which projects beyond the griping-die to form the head. As by the movement of the header the length of this portion decreases, the lateral pressure of the thickening blank will cause the supporter to partake of the forward movement due to the header, and it will be carried to the position indicated in red, where the head is completely formed.

The third modification is shown in Fig. 4. In this instance the supporter A is in the shape of a bent lever pivoted at  $c$ , the shorter arm of which supports the blank at the same point as in the previously-described modifications, and the longer arm is in contact with the face of an inclined surface upon the side of the header, whereby, as the header advances, the extremity of the shorter arm is made to travel over the surface of the blank as fast as the metal to compose the head increases in thickness behind it, so that, while it shall at all times support the blank to prevent the latter from crimping, it shall not interfere with the formation of the head, which is finally completed when the lever has been moved to the position indicated in red outline.

Another feature of my invention which is applicable to the several methods of arrange-



ment above described is shown in Figs. 5 and 6, and is represented separately in order to avoid confusion which would otherwise exist in the drawings, and also because it may be used independently of the other improvements described. Its special purpose is to provide a means for changing the position of the blank with reference to the cutting-edge of the vibrating shear at the time when the blank is to be swaged, so that such cutting-edge shall not become dulled so soon as in machines as heretofore constructed is the case.

Inasmuch as the swaging of the nail-shank is effected by pressing the same between the movable shear and the die D, it follows that, if the edge of such shear remain in close contact with the heated blank during the time that it is required to finish the nail, it will soon lose its sharpness. I propose, therefore, to lower the blank below the edge of the shear before the operation of swaging and heading is performed upon it. This I effect by giving to the gripping-die a capacity to make a movement in a downward direction for a sufficient distance to clear the edge of the shear. In Fig. 5, D represents a die so arranged. It is attached in this instance to the end of a spring-bar, M.

The blank, when cut from the plate, is supported by the movable piece *r*, whose foot rests upon the spring *s'*, and it is brought forward in that position until a recess cut in the front corner of the die D embraces the blank upon two of its sides, as shown in black outline. The continued forward movement of the shear causes the end of the spring-bar M to describe an arc, whereby the blank *n* and the support *r* upon which it rests are depressed below the edge of the shear and brought to

the position shown in red outline, at which point further downward movement is arrested by the block R. The movement of the shear, however, continues for a short distance farther and completes the swaging of the blank, the gage of which can be adjusted by altering the position of the block R, which is held by a clamp-screw. While the shank of the nail is thus held the header advances to perform its work, as already above described.

I do not mean to limit myself to the precise construction and arrangement of the parts constituting my improvements herein described, but mean to include all mere variations of form, structure, and arrangement accomplishing the same substantial mode of operation by equivalent means.

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

1. Giving lateral support to that portion of the nail-blank which is to be upset to form the head, during the operation of heading the nail, by means of the radial supporting-bar A, arranged to co-operate with the header H, substantially as herein described, for the purposes specified.

2. Combining and arranging the gripping-die in a nail-making machine with the movable cutting-shear, as described, so that the former shall change its position relatively to the latter for the purpose of lowering the blank during the swaging and heading operation below the cutting-edge of the shear, in the manner and by the means substantially as herein set forth.

SAMUEL G. REYNOLDS.

Witnesses:

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