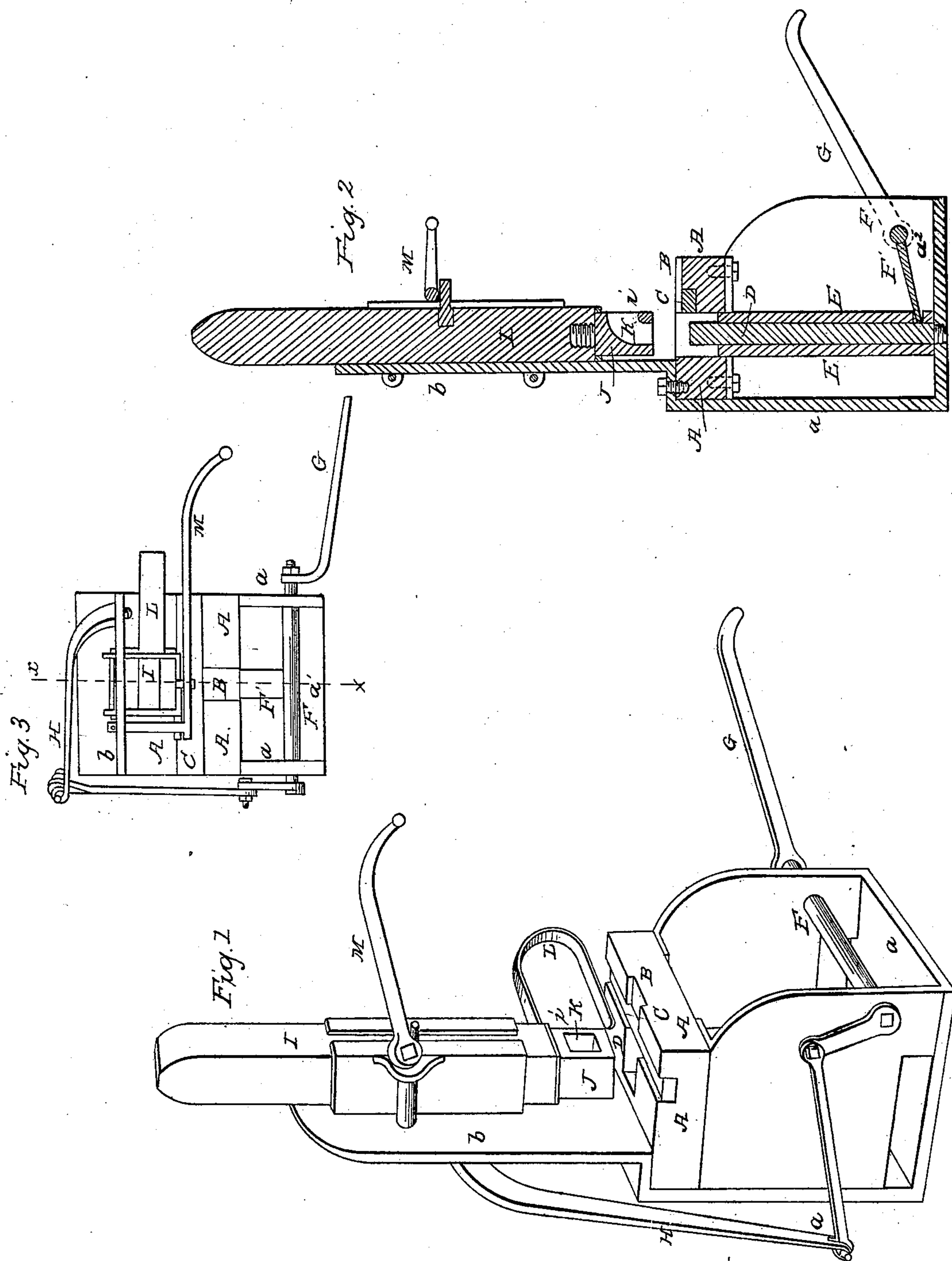


I. H. STEER.
Nut and Washer Machine.

No. 13,118.

Patented June 19, 1855.



UNITED STATES PATENT OFFICE.

ISAAC H. STEER, OF WINCHESTER, VIRGINIA, ASSIGNOR TO HY CARTER, OF PITTSBURGH, PENNSYLVANIA.

MAKING NUTS.

Specification of Letters Patent No. 13,118, dated June 19, 1855.

To all whom it may concern:

Be it known that I, ISAAC H. STEER, of Winchester, in the county of Frederick and State of Virginia, have invented a new and useful Improvements in the Manufacture of Nuts for Screw-Bolts by Means of Swaging and Punching Machinery, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which makes part of this specification, and in which—

Figure 1, is a view in perspective of said machine; Fig. 2, is a vertical section of the same at the line $x x$ of Fig. 3, and Fig. 3, is a plan thereof.

My invention consists first, in the manufacture of nuts from metal in bars or other suitable shapes at a single operation, by cutting off from the bar or plate a piece which constitutes the blank, punching a hole or eye through the blank, and swaging the same into shape while highly heated in whatever relative order these operations may be performed; whereby a well finished and sound article is expeditiously and cheaply produced.

It is well known that in consequence of the large size of the eye or hole made through nuts, compared with the narrow margin of material left around the eye, the larger portion of them are either burst asunder or badly strained by the act of punching, which greatly impairs their strength and value; it has, prior to the date of my invention, always been considered a desideratum to contrive some way of making the eye without straining or bursting the metal; this I have attained by means of the second part of my invention which consists in punching the nut, while heated in a die or press-box, by which it is firmly supported and prevented from bursting or straining during the operation.

The third part of my invention consists in compressing nuts to make them solid and to shape them with smoothness, regularity, and precision, so that they will be fit to use in the construction of most kinds of machinery without further finishing, by subjecting them to powerful and sudden pressure while highly heated, between a pair of swages while on the punch and in the punching die, which is properly shaped for that purpose.

The accompanying drawing represents a

hand machine which embraces my improvements. This machine consists mainly of a cutter to sever from the bar, a piece of the proper size to form the blank for the nut, a die to receive the blank, a punch to perforate an eye in the blank, and swages to compress the punched blank into the form it is desired it should have when finished. These several parts are fitted with suitable mechanism for operating them, and the whole is mounted upon a strong frame. The frame is divided into two parts, a strong and solid base (a) and a standard (b), the latter is intended to support the sliding swage which carries the moving member of the cutter, and gives shape to the upper side of the nuts. The base (a) is for the purpose of supporting the other parts of the apparatus, and more particularly the die and the parts more immediately connected therewith.

The die is formed in a rectangular block or slab (A) of steel by perforating the same through the middle with an aperture corresponding in diameter and shape with the outer edge or periphery of the nut it is designed to make. The upper face of the die block has a cutter (C) let into it in front of the die; this cutter should be held in place by set screws so that it can be adjusted to act in connection with the movable cutter, and that it may be removed to sharpen, or to be replaced by another whenever it gets injured. A notch or groove (B) also, is formed in the upper face of the die block, in front of the die and at right angles to the cutter (C), this notch or groove is to guide the bar across the cutter and over the die, and this fixed cutter is to act in connection with a moving one to sever a piece from the bar to form the blank.

The die block is firmly secured to the upper part of the lower portion (a) of the frame. In the center of the die a stationary punch (D) is fixed which corresponds in shape and diameter with the eye it is required to punch out of the nut, the lower end of this punch screws into, or is otherwise secured to the bottom piece (a^1) of the frame (a), if screwed in, it can readily be removed for repairs or to be replaced by another of a different size or shape. This punch is encircled by a sleeve or sliding swage (E) which slides freely up and down upon it, within the die. The diameter and

outline of this swage are such that it fits accurately into the die and forms a bottom for the same. The upper end of this swage it made the counterpart in shape of the nut, to be made by it, and when in its lowermost position is far enough below the top of the die, to give sufficient space for the reception of the blank, and when in this position the sliding swage must rest upon the bottom of the frame, or be otherwise firmly supported, so as to sustain without yielding, the great pressure required to swage the nut into shape. The lower extremity of the sliding swage (E) is connected with the arm (F¹) of a rock shaft (F) in such manner that when the shaft is turned by the depression of a foot lever (G) the arm (F¹) will rise and carry up the swage (E) to push the finished nut before it, out of the die, and thus discharge it, to make way for the reception of another blank, after which the swage is returned to its lowermost position by the action of a spring (H). Above the die, and in a line therewith, a sliding swage (I) is mounted in guides on the upper part of the frame or standard (b) in such manner that it will be free to move into and out of the die; this swage is depressed into the die by means of a lever (M) or it may be struck down by the blow of a ram or hammer. Instead of the lever (M), or a cam, crank, or eccentric may be employed to depress the swage; or instead of the blow of the hammer, the blow of a wiper or tappet may be used. This swage may be raised by a spring (L) or by a positive motion derived from the return motions of the depressing mechanism, or by separate mechanism specially provided for the purpose. The lower end of this swage fits accurately into the die with which it corresponds in diameter and shape, and it has a hole sunk into it which fits over and receives the fixed punch (D) so that whenever the swage (I) descends into the die, the punch will enter it and allow this swage to approach the lower swage (E) until sufficient space only is left between them for a finished nut. The front side (i) of the swage (I) constitutes the movable limb or member of the shears or cutter of which the steel cutter (C) let into the upper face of the die block (A) is the fixed limb. The cavity in the lower end of the swage (I) is enlarged a short distance above its lower extremity, and opens out at the side of the swage at (K). The enlargement of the upper extremity of the aperture and the opening from this aperture out at the side of the swage, are to facilitate the discharge of the core punched out of the nut, or other article, to form the eye thereof.

The lower end of the swage (I) should be made separate from the upper portion of the mandrel or sliding stock, and so at-

tached to it, that it can be readily removed for repairs or to be replaced by another of different size or shape; this lower extremity or movable face of the swage should be made of steel well fitted and tempered, and in form the counterpart of that side of the nut to which it is intended to give shape.

The several parts of this machine may be varied, in form, proportions, and material, to suit the views of different constructors, and to adapt it to different circumstances and uses, without in any degree departing from the principle of my invention. The iron or other material from which the nut is to be made could be used most conveniently in the form of a bar of about the width and thickness of the article to be made; one end of this bar should be made red hot, or better, raised to a high welding heat, and then placed on its side in the groove (B) on the upper face of the die, and pushed forward until its extremity is in contact with the back side of the die, which forms a stop to gage the length of the blank; the upper swage (I) is now caused to descend, by depressing the lever (M) or by a blow, and a piece is cut from the end of the bar by the action of the front edge (i) of the swage (I) and the fixed cutter (C), the piece thus cut off the bar, is the blank, which by the continued downward movement of the swage is forced into the die, the middle, or the portion removed to form the eye resting upon, and being detained by the fixed punch (D) while the margins are forced down into the annular space between the sides of the die and the fixed punch, until a core is punched out of the center and an eye formed, this core being forced into the cavity in the end of the descending swage, whence it is discharged out of the aperture (K) at the side, the continued descent of the swage (I) forces down the blank upon the lower die, so that it is pressed between them with sufficient force to make it take the shape of the included space—its lower side the shape of the face of the lower swage, and its upper side the shape of the face of the upper swage, its outer edge or periphery the shape of the sides of the die, and its inner periphery or eye the shape of the eye punch, which at this stage of the process acts as a forming mandrel on which to shape and smooth the eye. The shaping of the nut being now complete the upper and lower swages are simultaneously raised until the nut is lifted out of the die, when the lower swage stops and the upper continues to rise a short distance farther so as to leave the nut between them free to be pushed aside in any convenient way and fall down into some suitable receptacle.

When the machine is constructed to work by power it will simply be necessary to

apply cams, treadles, and springs to give the same motions to the acting parts that are given by hand, by means of the levers &c. before described. Since however, any
 5 good and skilful machinist, conversant with bolt and nut making could readily construct and apply the cams, etc., to give those motions, I deem it unnecessary to describe them, especially as it is the mode of operation
 10 of the swaging or forging mechanism, that I claim, and not the peculiar means employed for communicating motion to particular parts. The metal is hot and plastic when introduced into the machine, and since
 15 the operation of cutting off the blank, punching an eye in it, and compressing it between swages into shape, are but the work of a moment, the metal has not time to chill and lose its plasticity and the property of
 20 welding; hence any seams or rents that may happen to be made in the act of cutting and punching the blank, are welded up, and the article made strong and solid, by the compression, which causes it to fill fully and
 25 accurately the cavity left for it in the die, so that any number of articles may be produced of uniform size, shape and finish, as well as uniformly sound and strong.

Having thus described my improved
 30 manufacture of nuts, and described or indicated some of the modifications of machin-

ery by which it may be carried into effect by hand or power, what I claim therein as new, and desire to secure by Letters Patent is—

1. Making a nut, at a single operation 35 from a heated bar or plate of metal, by cutting off the blank from the bar, punching a hole or eye through it, and swaging it into shape, substantially as herein set forth.

2. Punching the eye of the nut, in a die 40 or press box, by which it is surrounded and firmly supported and thus prevented from straining or bursting during the operation, substantially as set forth.

3. Shaping nuts by subjecting them while 45 hot to powerful and sudden compression on the punch, and in the punching die, substantially as herein set forth, whereby they are finished with such a degree of smoothness, regularity and precision that in the condi- 50 tion in which they come from the machine they are fit to use in the construction of most kinds of machinery, and are at the same time sounder and stronger than impressed nuts made by machinery. 55

In testimony whereof I have hereunto subscribed my name.

ISAAC H. STEER.

Witnesses:

P. H. WATSON,
 SAML. GRUBB.