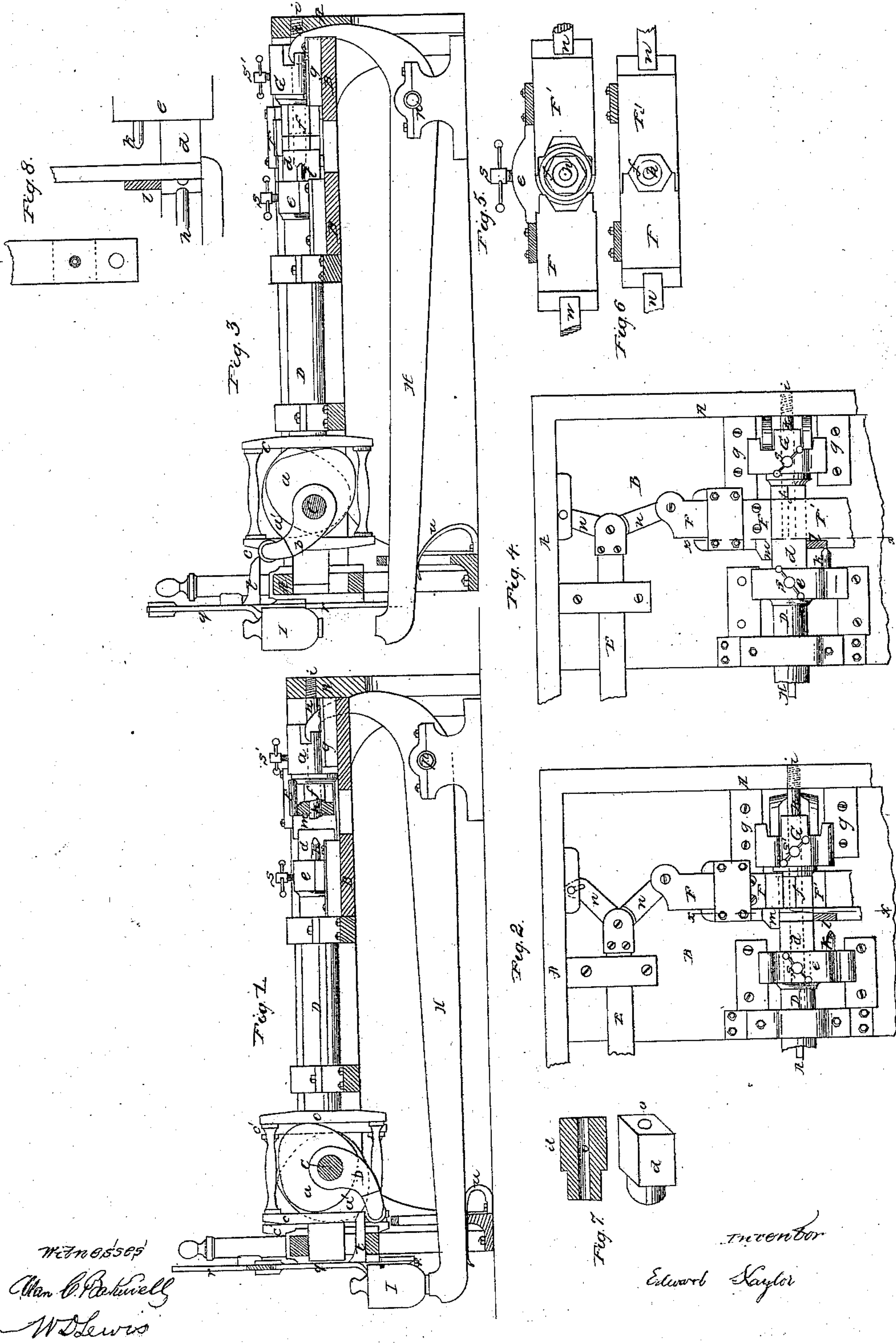


*E. Kaylor,*

*Making Metal Nuts.*

*N<sup>o</sup> 56,062.*

*Patented July 3, 1866.*



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# UNITED STATES PATENT OFFICE.

EDWARD KAYLOR, OF PITTSBURG, PENNSYLVANIA.

## IMPROVED MACHINE FOR MAKING NUTS.

Specification forming part of Letters Patent No. 56,062, dated July 3, 1866.

*To all whom it may concern:*

Be it known that I, EDWARD KAYLOR, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Making Nuts; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 3 are longitudinal sections of my machine, Fig. 1 showing the position of the parts at the commencement of the operation, and Fig. 3 their position before the drop-hammer falls. Figs. 2 and 4 are top views of the front end of the machine, corresponding as to the position of the parts with Figs. 1 and 3, respectively. Fig. 5 is a front view of the side dies and swage through *xx*, Fig. 2, the dies being open. Fig. 6 is a front view of the side dies and swage through *xx*, Fig. 4, the dies being closed. Fig. 7 is a perspective view and section of the square die. Fig. 8 represents the operation of cutting and punching the nut and puncturing the blank.

In the several figures like letters denote similar parts of the machine.

My improved machine is designed to make nuts from a bar of iron of any desired thickness, which has been previously heated so as to be in a plastic condition, by the following operations, viz: The bar of iron is first perforated at the point where the eye of the nut is to be formed by a tapering punch, which punctures the metal without punching a piece out of it, this preliminary operation being performed at the same time that a square of iron is being cut off from the end of the bar to make a nut, which square had been previously punctured. The bar is then pushed forward in front of a square punch, which cuts off the square or blank already punctured and forces it over a round punch of the diameter of the eye of the nut, having a rounded or tapered end, which enlarges the hole. The blank thus held in place upon and by the round punch is then squeezed between two side dies, which advance so as to inclose it on all sides, and shape the sides hexagon or square, or other shape, as may be desired. The nut then, while still in contact with the square punch, receives a blow from a swage or die, which is

struck, either mediately or immediately, by a drop-hammer, for the purpose of causing it to fill the cavity of the side dies and form a washer on the top of the nut. The square punch then recedes, the side dies open, and the nut is pushed off the stationary round punch by the swage, which is caused to advance by the farther descent of the drop-hammer, and the machine is in position for a repetition of the operation.

In order to enable others skilled in the art to make use of my improvement, I will proceed to describe the construction and operation of my machine.

The operative parts of the machine are supported by a rectangular frame, A, which surrounds the table or bed-plate B. At the rear end of the machine, placed horizontally across it, is a revolving shaft, C, which carries the cams *a a'* and wiper *b*, to which shaft power is applied to operate the machine. The cams *a, a',* and *a''* are each surrounded by a cam-yoke, *c*, in which they respectively work, one cam-yoke, *c*, being attached to the horizontal shaft D, which is placed lengthwise of the machine at right angles to the cam-shaft C, and carries the square punch *d*, and the other cam-yokes, *c' c''*, being attached to the arms E E', which are also placed at right angles to the cam-shaft C, and operate the knuckle-joints of the side dies, F F'. The cams *a, a',* and *a''* and the wiper *b* are set on their shaft C in such relative position as to operate the machine in the manner hereinafter described.

In the drawings, Figs. 2 and 4, only one of the arms, E, is shown, the other, E', being placed on the other side of the shaft D, and operating the side die, F', in the same manner as the side die, F, is worked. The square punch *d* is set in the head-stock *e* of the shaft D, and fastened by a screw, *s*, so as to be removed or changed when desired. In front of the square punch *d*, and on the same horizontal axial line, is placed the swage *f*, set in a sliding head, G, which slides back and forth on ways *g g*, the swage *f* being fastened in the head G by a screw, *s'*. The swage *f* is square, hexagon, or other shape desired to be given to the nut, and is of the same size in cross-section. The swage *f* and its head G are perforated by a round hole, through which passes the cylindrical punch *h*, which is of the same diameter



as the eye of the nut. The end of the punch *h* is rounded or pointed, but, excepting at the extreme end, is of uniform diameter. It is stationary, being screwed at *i* into the side piece of the frame of the machine.

Between the swage-head *G* and the square punch *d*, on either side of their axial line, are placed the side dies, *F F'*, which move horizontally toward and from each other at right angles to the line of motion of the square punch *d* and swage *f*.

On the opposite face of each of the side dies, *F F'*, is a cavity the counterpart of the exterior shape of one-half of the nut to be formed therein, these dies being made so as to overlap when their faces are brought together, as shown in Fig. 6, and when thus closed these dies surround the swage *f*, which fits in them exactly, but not so closely as to prevent its moving back and forth in the cavity thus formed.

In the head-stock *e* of the shaft *D*, to one side of the square punch *d*, is placed the perforating-punch *k*, which is of smaller diameter than the eye-punch *h*, and has a pointed end, or is tapered, if preferred. The distance between the center of the perforating-punch *k* and the eye-punch *h*, or center of the square punch *d*, is equal to the diameter of the nut, or is such that when a nut-blank is severed from the bar of iron by the square punch *d* a hole shall be made in the bar of iron by piercing it with the pointed punch *k* at that point in the bar where the eye of the nut will be formed when another nut-blank is cut off.

On the side of the die *F'* nearest to the head-stock *e* is placed a block of steel, *l*, attached to the bed-plate of the machine, the end of which fits close against one side of the square punch *d* when it makes its forward stroke. Against this plate *l* the bar of iron is placed when fed into the machine, and it is cut off between the edge of the plate *l* and of the square punch *d*. A similar plate, *m*, is attached to the bed of the machine on the other side of the square punch *d*. The plate *m*, being wider than the plate *l*, serves as a gage against which the end of the bar of iron is pressed when fed into the machine.

The dies *F F'* are operated by the arms *E* by means of the knuckle-joints *n*, Figs. 3 and 4. The square punch *d* has a cylindrical cavity, *o*, in its axial line, (see Fig. 7,) which receives the end of the eye-punch *h* when the square punch is advanced to cut off the nut-blank and force it on the eye-punch.

Under the shaft *D* and parallel to it is a lever, *H*, which has its fulcrum near to the front end of the machine in a bearing at *p*. The short arm of the lever *H* curves upward from its fulcrum, its extremity being forked, so as to have a central bearing in the head *G* of the swage *f* without interfering with the eye-punch *h*, as shown in Figs. 2 and 4. By this arrangement the depression of the long arm of the lever *H* presses the swage-head *G*

toward the square punch *d*; but as the extremity of the short arm of the lever *H* is not pivoted or attached to the swage-head *G*, the reverse motion of the lever *H* does not draw back the swage, this being effected by the nut-blank when pushed forward over the eye-punch *h* by the square punch *d*.

The long arm of the lever *H* extends beyond the rear end of the frame of the machine, so as to be in a vertical line under the drop-hammer *I*. The drop-hammer *I* is attached to a frame, *q*, which slides vertically in ways *r* at the rear end of the machine. The hammer is raised by means of two wipers, *b*, attached to the revolving cam-shaft *C*, (one only of the wipers being shown in the drawings,) each wiper *b* acting upon the underside of a bracket, *t*, projecting from the hammer-frame *q*, so that as the shaft *C* revolves it raises the hammer up to the position shown in Fig. 3, and as soon as the wiper passes away from the end of its bracket *t* the hammer drops upon the end of the long arm of the lever *H*, which imparts its stroke to the swage-head *G*, causing the swage *f* to strike a blow on the forward end of the nut while on the eye-punch *h* and inclosed in the side dies, *F F'*. When the hammer *I* is raised, a spring, *u*, under the lever *H* causes its long arm to rise to the position shown in Fig. 3, thus leaving the swage-head *G* free to recede from the square punch *d*.

The operation of my machine is as follows: Just as the wipers *b* begin to raise the hammer *I* the bar of iron, first properly heated, is inserted sidewise into the machine, resting against the steel plate *l*, and with its end touching the gage *m*. The square punch *d* then advances against the side of the bar of iron, as shown in Fig. 8, and cuts off a square piece or blank, forcing it over the round eye-punch *h*. As the hole for the eye of the nut has been previously made by the puncturing-punch *k*, the eye-punch *h* enters the hole, pressing the iron outward, but does not cut out any wad or punching, so that there is no loss of metal in that respect. When the nut-blank is forced onto the eye-punch *h* the punch *K* punctures the nut-bar at the point where the eye of the next nut will be made. The side dies, *F F'*, then close upon the square nut-blank, the shape of which has been somewhat distorted by the eye-punch *h*; and if a hexagon nut is to be made they cause the iron to assume that shape; or if dies with a square or other shaped cavity are employed they mold it into the required form. As the iron is not confined or compressed by the swage *f* during the time it is being molded by the side dies, the thickness of the nut-blank may be somewhat increased by the compression of the side dies. At this point of the operation the drop-hammer *I* falls and strikes the end of the lever *H*, which causes a violent blow to be struck by the swage *f* on the nut while it is in the punch and surrounded by the side dies, *F F'*. The square punch is then withdrawn, and as it recedes



the swage *f* advances, (being pressed forward by the weight of the drop-hammer *I*, which rests on the end of the long arm of the lever *H*.) and the finished nut is pushed off the eye-punch *h*, and thus delivered from the machine.

It will be observed that as the swage *f* is not restrained or confined in any way so as to prevent its moving away from the square punch *d* as the latter advances to force the nut-blank onto the eye-punch *h*, nor while the side dies, *F F'*, close to mold the exterior of the nut into shape, the depth of the nut will be greater or less according to the thickness of the iron bar from which it is cut and the size of the blank which was cut off from the bar of iron.

The chief peculiarities of my machine are that the nut-blank which I cut from the iron bar is a rectangular four-sided piece in all cases, whether the nut to be made is four-square, hexagon, or other exterior shape, so that there is no loss of iron in that respect; that the eye is not made by punching a piece out of it, nor by the meeting of two opposite converging punches within the blank, but by the perforation of the iron; that the nut is not inclosed or restrained while being punched; that the nut is not compressed between swages

within a mold or matrix, but is molded into any desired shape by dies, while it is left free at one end to expand; and, finally, that it is finished by the blow of a hammer upon a swage which enters the cavity of the dies.

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

1. The combination of the side dies, *F F'*, so constructed as to inclose the nut on all sides but not at the ends, the square punch *d*, stationary eye-punch *h*, and swage *f*, fitting the cavity formed by the side dies, constructed and operating substantially as described, for the purpose of making nuts by cutting off a square blank, forcing it over a perforating-punch, molding it into shape, and finishing it with the blow of a hammer.

2. Finishing the nut, after it has been perforated and molded laterally into shape, and while still confined in the side dies, by means of the swage and hammer, substantially as hereinbefore described.

In testimony whereof I, the said EDWARD KAYLOR, have hereunto set my hand.

EDWARD KAYLOR.

Witnesses:

ALLAN C. BAKEWELL,  
W. D. LEWIS.