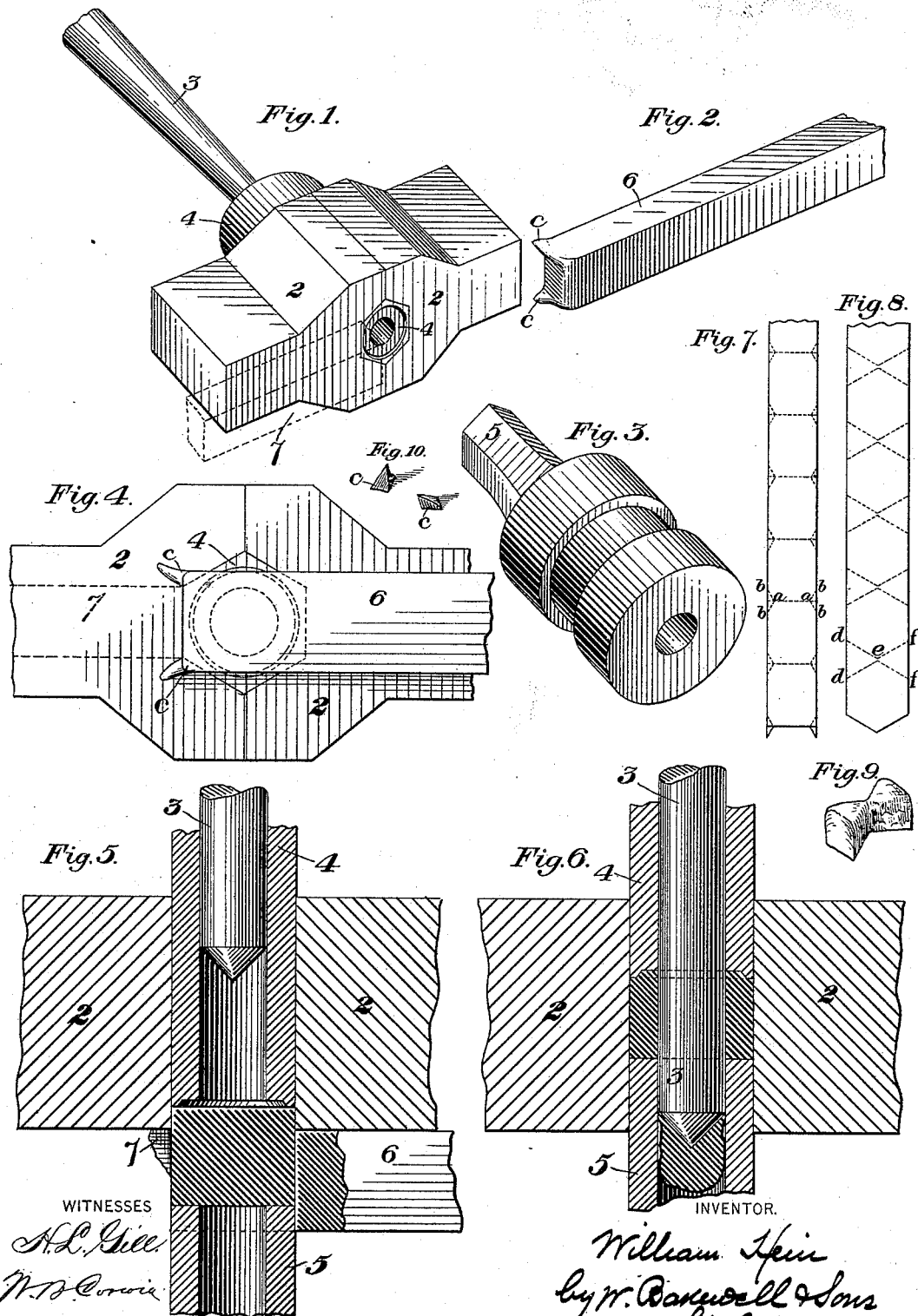


(No Model.)

W. HEIN.
MANUFACTURE OF NUTS.

No. 417,784.

Patented Dec. 24, 1889.



UNITED STATES PATENT OFFICE.

WILLIAM HEIN, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE IRON CITY MANUFACTURING COMPANY, OF SAME PLACE.

MANUFACTURE OF NUTS.

SPECIFICATION forming part of Letters Patent No. 417,784, dated December 24, 1889.

Application filed December 6, 1888. Serial No. 292,813. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HEIN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Nuts, of which the following is a full, clear, and exact description.

My invention relates to an improvement in the manufacture of hexagonal or octagonal nuts, and its object is to cheapen the cost of manufacture and to better the quality of the nuts. It is applicable either to the manufacture of octagonal or hexagonal nuts; but I shall describe it with reference to the manufacture of hexagonal nuts, because in their manufacture the advantages derived from the invention are more marked.

I shall describe my invention with reference to the accompanying drawings, which illustrate tools which I may use in the practice of my improved method.

In the drawings, Figure 1 shows in perspective view the die-box in which the nuts are shaped and the punch by which the hole is formed in the nut. Fig. 2 is a perspective view of the metal bar from which the nut is cut. Fig. 3 is a perspective view of the male die. Fig. 4 is a front elevation, on an enlarged scale, of the die-box and the metal rod in position to be cut by the male die. Fig. 5 is a horizontal section through the die-box, the punch, the male die, and the blank, which is shown in the position which it occupies when cut off by the male die from the bar and in the first stages of its entrance into the die-box. Fig. 6 is a similar section showing these parts in the positions which they occupy at the conclusion of the operation of forming the nut in the die-box. Fig. 7 is a plan view of a bar from which the blanks are cut by the dies, the dotted lines showing the lines on which the blanks are cut. Fig. 8 is a similar view showing the manner of cutting the nut-blanks commonly practiced before the date of my invention. Fig. 9 is a perspective view of the scrap formed in the former method of cutting the blanks. Fig. 10 shows in perspective the scrap formed in cutting the blanks according to my improved method.

Like symbols of reference indicate like parts in each.

In the drawings, 2 represents the die-box. 3 is the punch, and 4 is the reciprocating tubular die situate within the box 2, within which die the punch moves.

5 is the male die, which is made hollow in the usual manner, and which is constructed to enter the cavity of the die-box and to receive the metal forced out from the blank by the punch. The construction of these dies and their mode of operation are well understood in the art. The die-box is, however, placed differently from the position which it has occupied in the machines heretofore used, since instead of having opposite angles of its hexagonal cavity set in the line of feed of the bar from which the blank is cut the flat sides of the cavity are set in this line, as shown in Figs. 1 and 4.

The bar from which the nut-blanks are cut is a bar of iron, preferably rectangular in cross-section and of less width than the diagonal width of the cavity of the die-box. It is narrower than the bars heretofore commonly employed; but to compensate therefor it is preferably made of somewhat greater thickness than the thickness of the finished nut.

The bar 6 is fed to the dies transversely toward a flat side of the die-cavity, and there is a stop 7, (indicated by dotted lines in Figs. 1 and 4,) at the side of this cavity, against which the end of the bar is fed, in order to secure its proper position relatively to the dies.

Fig. 4 shows the position of the bar when it has been placed in position to be cut by the male die, its width being such that the vertical corners of the die-box project to a considerable extent above and below the bar. When in this position, the male die, which is hexagonal in external cross-section, is caused to advance and to sever the blank from the bar, and to force the severed blank into the cavity of the die-box against the end of the die 4, as shown in Fig. 5. The male die then continues to force the blank into the die-box cavity, the die 4 meanwhile receding and the punch 3 advancing, until the punch engages

the blank and the follower comes to rest. The punch then forces its way through the blank, thereby forming the eye of the nut, while the compression imparted to the blank between the end of the male die 5 and the die 4 compresses the blank and shapes the nut. (See Fig. 6.) The finished nut is then ejected from the die by a reverse motion of the parts in the usual manner. The punch 3 is made with an end considerably more tapering and less obtuse than the punches heretofore commonly employed in nut-machines, so that in forcing its way through the nut it displaces the metal thereof laterally against the sides of the die-box cavity, so as to fill up the spaces caused by the disproportion in size between the diagonal width of the cavity and the width of the bar. For this reason the amount of metal punched out from the blank is comparatively small, its shape and relative dimensions being illustrated in Fig. 6. This lateral displacement of the substance of the blank is also aided and in part accomplished by its compression between the dies 4 and 5, which reduce the blank in thickness, the reduced or surplus metal being caused by the punch to flow out laterally into the angles of the die-box. I do not, however, intend to limit my invention to the employment of both of these modes of effecting the displacement.

The manner in which the bar is cut by the male die is illustrated in Fig. 7, in which the lines *a a* represent the transverse right-angled cuts made by the punch, and the lines *b a b* represent the small triangular pieces of scrap which are formed in the cutting of the blank. These pieces are caused by the slight overlapping of the die-cavity by the corners of the bar, as shown in Fig. 4; but the scraps are very small, since the drawing-in action of the male die on the hot metal of the bar causes the projecting scrap-pieces *c*, Figs. 2 and 4, to be formed only at the corners of the bar on the inner side, and not on the outer side thereof. The size of the scrap-pieces relatively to the size of the bar is shown in Fig. 10. This saving in waste of material is the principal advantage which results from my improved method, and is of considerable importance as a matter of economy in nut-making, since the waste of metal in cutting hexagonal nuts in the manner heretofore practiced has detracted largely from the profits of the business. The former manner of cutting nuts of this class was to feed the bar in toward the angle of the die-cavity and to employ a bar of about the same width as the distance from one flat side of the die-cavity to the opposite side, so that the cut ends of the blank should form the angles of the nut and that the blank should be a complete hexagon. (See Fig. 8.) In this figure, *d e f* represent the lines of cut, and the portions of the bar bounded by the lines *d e d* and *f e f* represent the scrap which

is formed in cutting. The size and shape of this scrap are shown in Fig. 9. Besides these large pieces which are wasted in cutting the blank, there is a considerable waste caused by the large size of the core which is removed from the nuts by the punch, whereas in my improved method a very considerable portion of the metal of the blank is displaced laterally, and the amount actually removed by the punch is small.

The disadvantages and waste of the former method are obviated by my method of cutting the blank in incomplete hexagonal form by transverse cuts.

In a prior patent, Reissue No. 10,788, there is described a method of making hexagonal nuts "which consists in first providing a rectangular bar of metal having the width of its face equal to the side of the hexagon, and having a depth or thickness sufficient to fill up a hexagonal die when compressed and spread, then presenting the end and side of the bar against gages over the die, severing a rectangular piece from the bar, and finally forcing the said piece into the die and punching the complete eye and spreading the metal to fill the die." Said method, however, differs essentially from that herein claimed, since, while in that the blank is of equal width with the side of the nut, my blank is made of somewhat greater width, as clearly shown in Figs. 4 and 7 of my drawings, so that a slight portion of the bar shall be removed as scrap. This difference is essential and important, because, while I have found it difficult and often impossible to form uniformly merchantable nuts by the mode of manufacture described in said reissue patent, (unless the eye of the nut be made of abnormally small diameter,) the method which I describe and claim has been reduced to practical and successful use in the manufacture of nuts of the usual size and proportions.

The nuts produced by my method are of very excellent quality, the compression of the hot blank and its reduction in thickness serving to weld and close any defects or flaws in the metal.

I do not intend to limit myself to the use of any special form of dies for practicing my invention, since I have shown those illustrated in the drawings merely for the sake of more clearly explaining the invention. Nor do I intend to limit myself strictly to the precise mode of operation which I have described, since it is susceptible of modification by those skilled in the art; but

What I claim is—

1. The method of making hexagonal or octagonal nuts, which consists in cutting blanks from a bar by transverse right-angled cuts, the width of the bar being less than the diagonal width of the desired nut, but somewhat greater than the side thereof, and displacing the substance of the blank laterally while under confinement in a die-box into such por-

tions of the said die-box not filled by the blank, substantially as and for the purposes described.

2. The method of making hexagonal or octagonal nuts, which consists in cutting from a bar by transverse cuts oblong blanks, the distance between whose cut sides is substantially equal to the desired width of the nut, while the width at right angles thereto is considerably less than the diagonal width of the nut, but somewhat greater than the side thereof, and punching the blank and displac-

ing the uncut sides thereof into the angles of a die-box in which the nut is confined, substantially as and for the purposes described. 15

In testimony whereof I have hereunto set my hand this 3d day of December, A. D. 1888.

WILLIAM ^{his} X HEIN.
mark

Witnesses:

THOMAS W. BAKEWELL,
W. B. CORWIN.