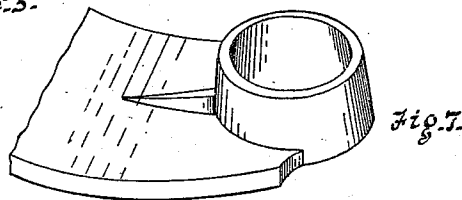
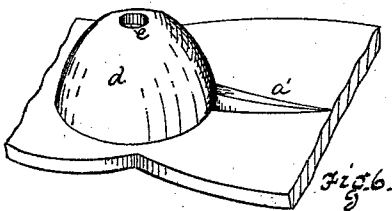
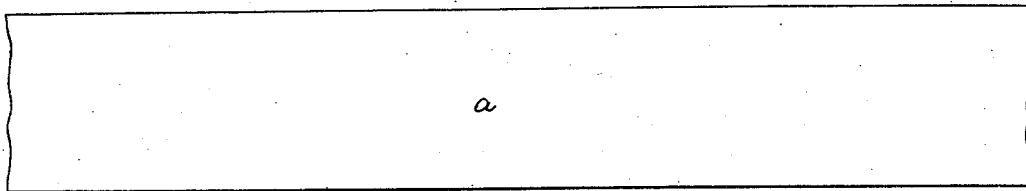
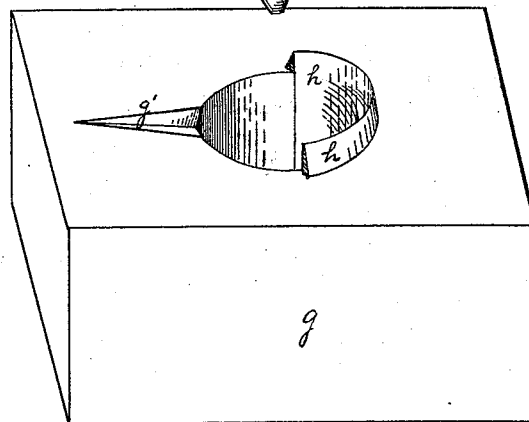
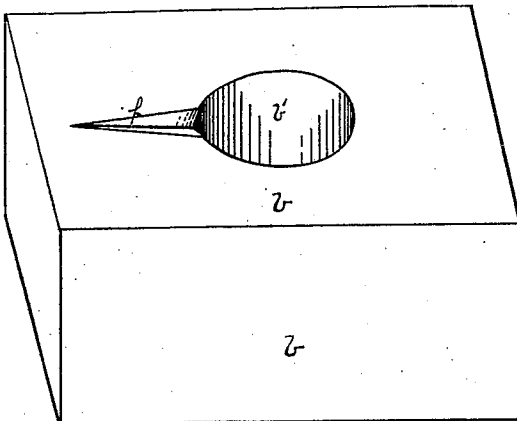
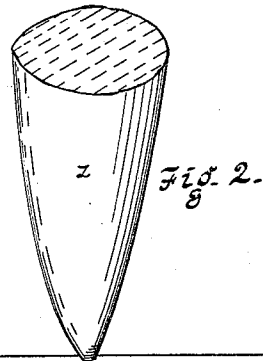
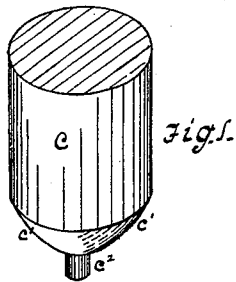


J. GRAFF.

DIES FOR MAKING HOES.

No. 184,468.

Patented Nov. 21, 1876.



WITNESSES.

R. L. Wainshaw
James K. Bakewell

INVENTOR

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UNITED STATES PATENT OFFICE.

JOSEPH GRAFF, OF BEAVER FALLS, PENNSYLVANIA.

IMPROVEMENT IN DIES FOR MAKING HOES.

Specification forming part of Letters Patent No. 184,468, dated November 21, 1876; application filed August 14, 1876.

To all whom it may concern :

Be it known that I, JOSEPH GRAFF, of Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in the Manufacture of Hoes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a view of the dies for performing the first step of my improved method of making hoes. Fig. 2 is a view of the dies for performing the second step of my said method. Figs. 3 and 4 are plan-views of the lower dies. Fig. 5 is a view of the blank. Figs. 6 and 7 are views of the same after undergoing the first and second manipulations.

Like letters of reference indicate like parts in each.

My invention relates to the manufacture of that class of hoes which are formed by the action of dies from a solid plate of metal by first subjecting it to the action of a blunt bell or dome shaped die, having a center punch, which forms a bowl-cavity with an initial opening to provide for the subsequent opening out of the eye, and, second, opening, shaping, and trimming the eye by the action of a tapered die and cutter, said dies operating in combination with die-blocks, having suitable cavities. By this means the metal is stretched sufficiently to form the eye without fracture, and the subsequent opening of the eye is performed by laying back the apex of the set-up and perforated portion by means of a tapering punch, thereby avoiding the rupture or cracking which is caused by too violent manipulation or stretching. It also consists in the construction of the dies.

The blank *a* is a flat plate of metal of the proper size. It is heated and placed upon the lower die *b*. The drop hammer or die *c*, which has abruptly rounded or tapered shoulders *c'*, and center punch *c''* of small diameter, then descends, and, forcing the metal into the cavity *b'*, imparts a bowl shape to it, as at *d*, and punches a small hole, *e*, through the center of the bowl. This is an initial opening, from which the bowl is opened out into a full eye in the second operation, by the simple stretch-

ing or turning back of the edges of the opening.

The punch is secured to a suitable collar or head, which, with the groove *f* in the face of the die *b*, imparts a rib, *a'*, to the inner face of the blank. This rib is enlarged by the subsequent manipulation in the die *g*, which has a similar groove, *g'*. The blank is then removed to the die *g*, which is provided with a cutter, *h*, around its rear side to trim off the surplus stock. The drop-die *z*, which is of tapering form, then descends and opens out the eye, stretching the metal from the opening *e*, the existence of which, and the form of the bowl, guards most effectually against any hurtful cracking or fracture, as it involves the simple throwing out of the edges, and not the stretching of the body or sides of the eye. The cutter *h* operates with the die collar or head, to trim the rear end of the blank. The blade is then drawn out under a hammer or in rolls, after which the hoe is put through the usual manipulations to fit it for market.

The staving up of the eye without opening or changing the body of the metal enables me to form the eye without fracture or undue strain on the metal, it being supported during the first step by the displaced metal, which remains unbroken at the points under strain.

The punching of the center point during the first step is not objectionable, as the strain is at that time at the sides of the bowl, while the presence of this opening is the surest guard against splitting in the second step, as it gives passage to the taper eye-opener. For this reason I use a dome-punch, having a point, *c''*, for making the opening.

The dies are to be made of proper shape to produce an eye of the shape desired, whether round or oval.

This article, when finished, is very superior, not being defective by reason of undue severity of manipulation.

The groove for forming the rib on the blade of the hoe may be on either or both of the dies *b* or *g*, and the cutter *h* may, if desired, be placed on die *b*, but I prefer to have it on die *g*.

I am aware that the eyes of hoes have been formed by subjecting a blank to the action of a series of rounded and tapering dies, and that the blank has been perforated before sub-

jecting it to such dies, and do not herein claim such subject matter.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Conjointly with the opening and trimming die *z* *h*, the dome-shaped die and center-punch for setting up and perforating the blank, substantially as and for the purpose specified.

2. The combination of the die *g*, provided with a cutter, *h*, with a drop-die, for the purpose described.

In testimony whereof I, the said JOSEPH GRAFF, have hereunto set my hand.

JOSEPH GRAFF.

Witnesses:

JAMES I. KAY,
R. C. WRENSHALL.