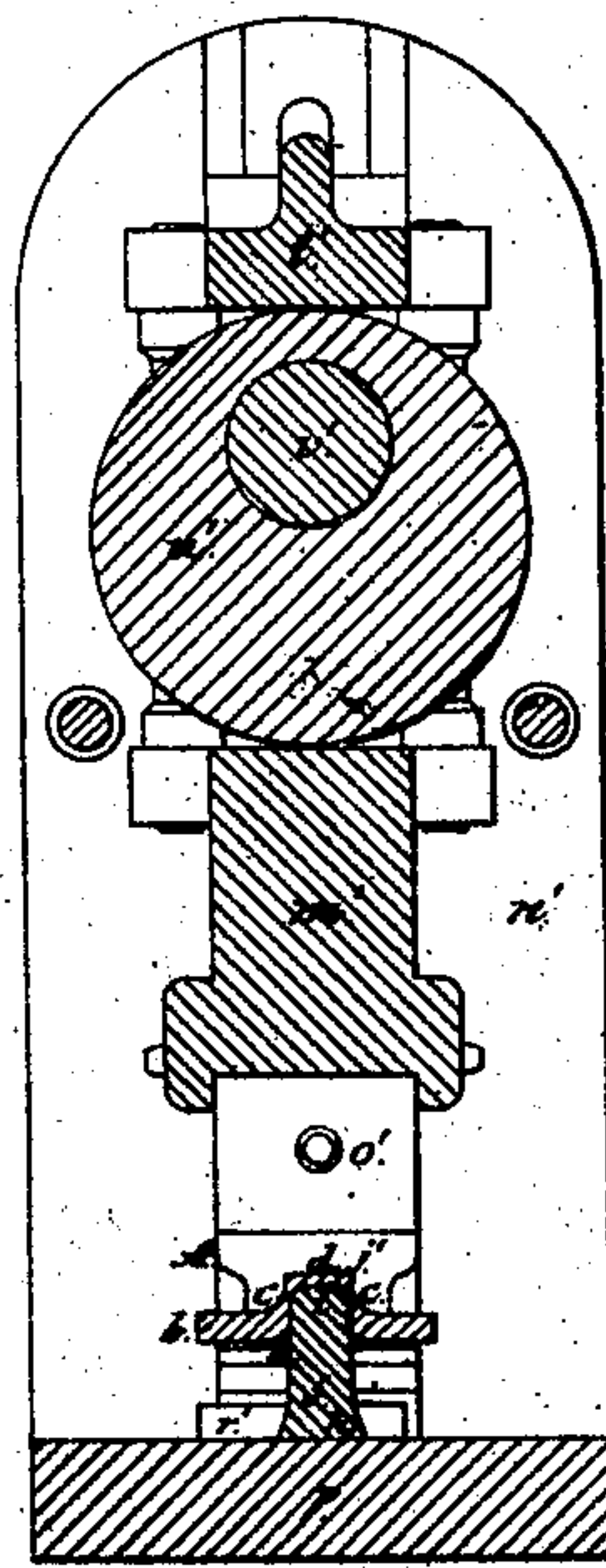
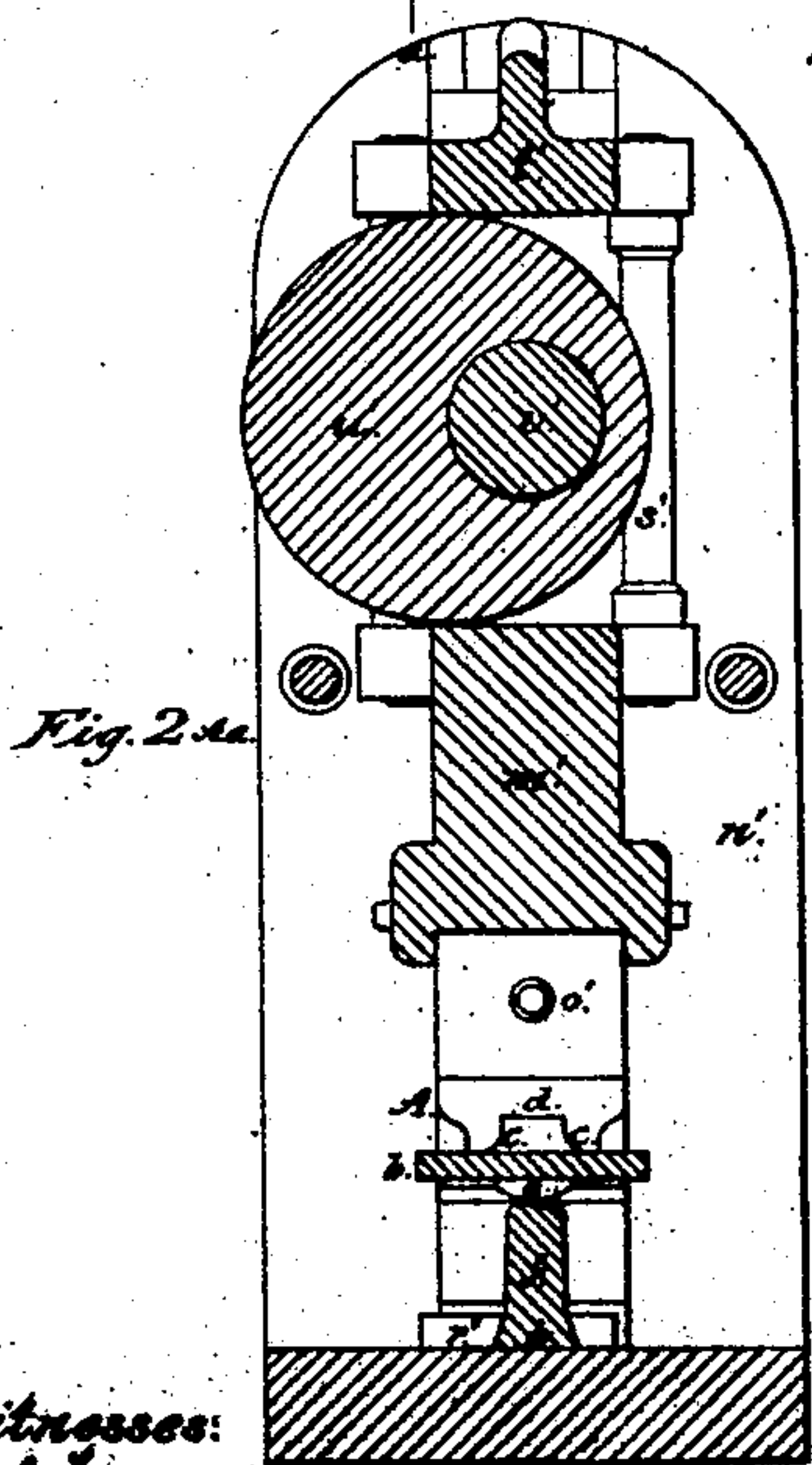
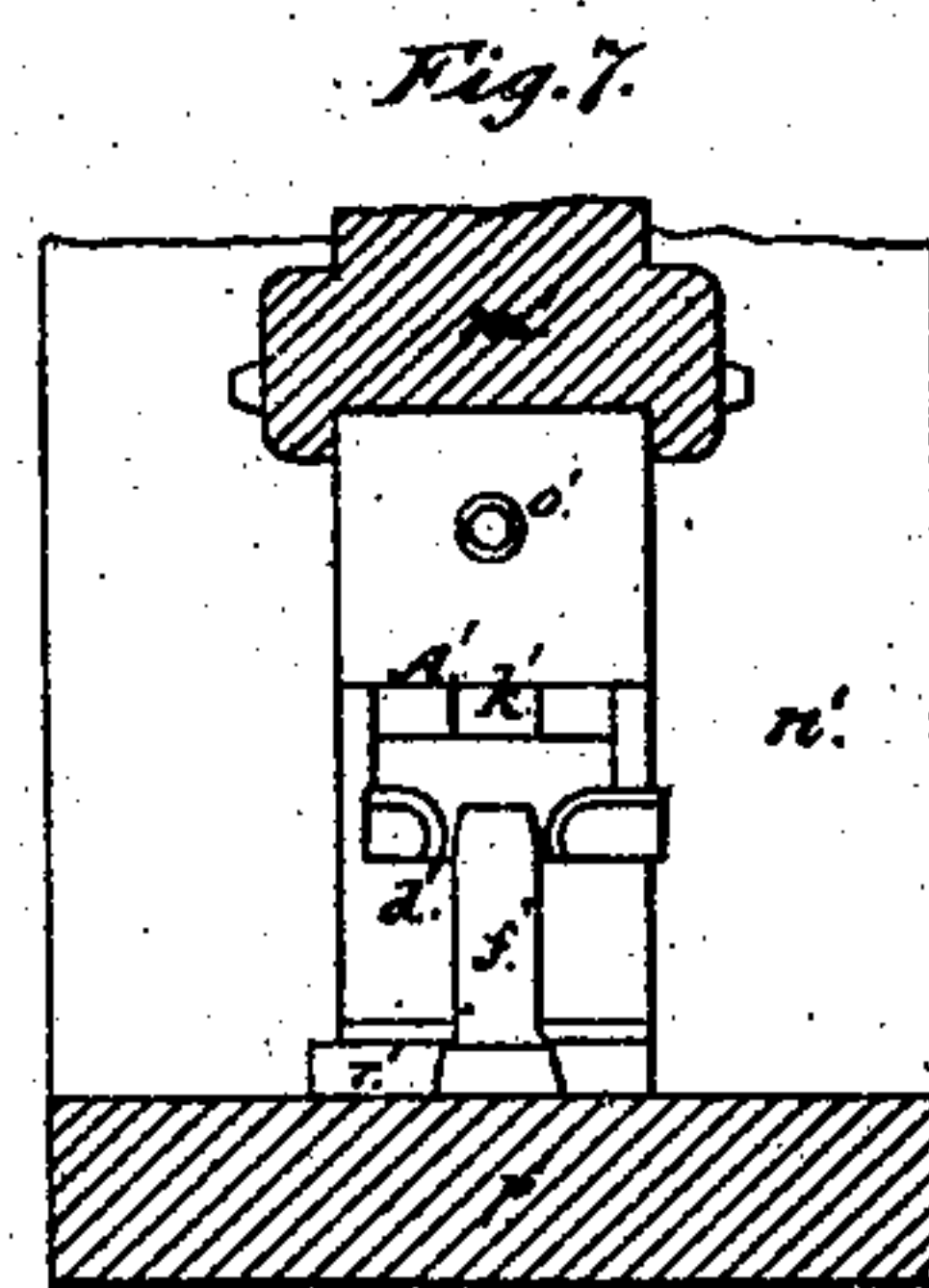
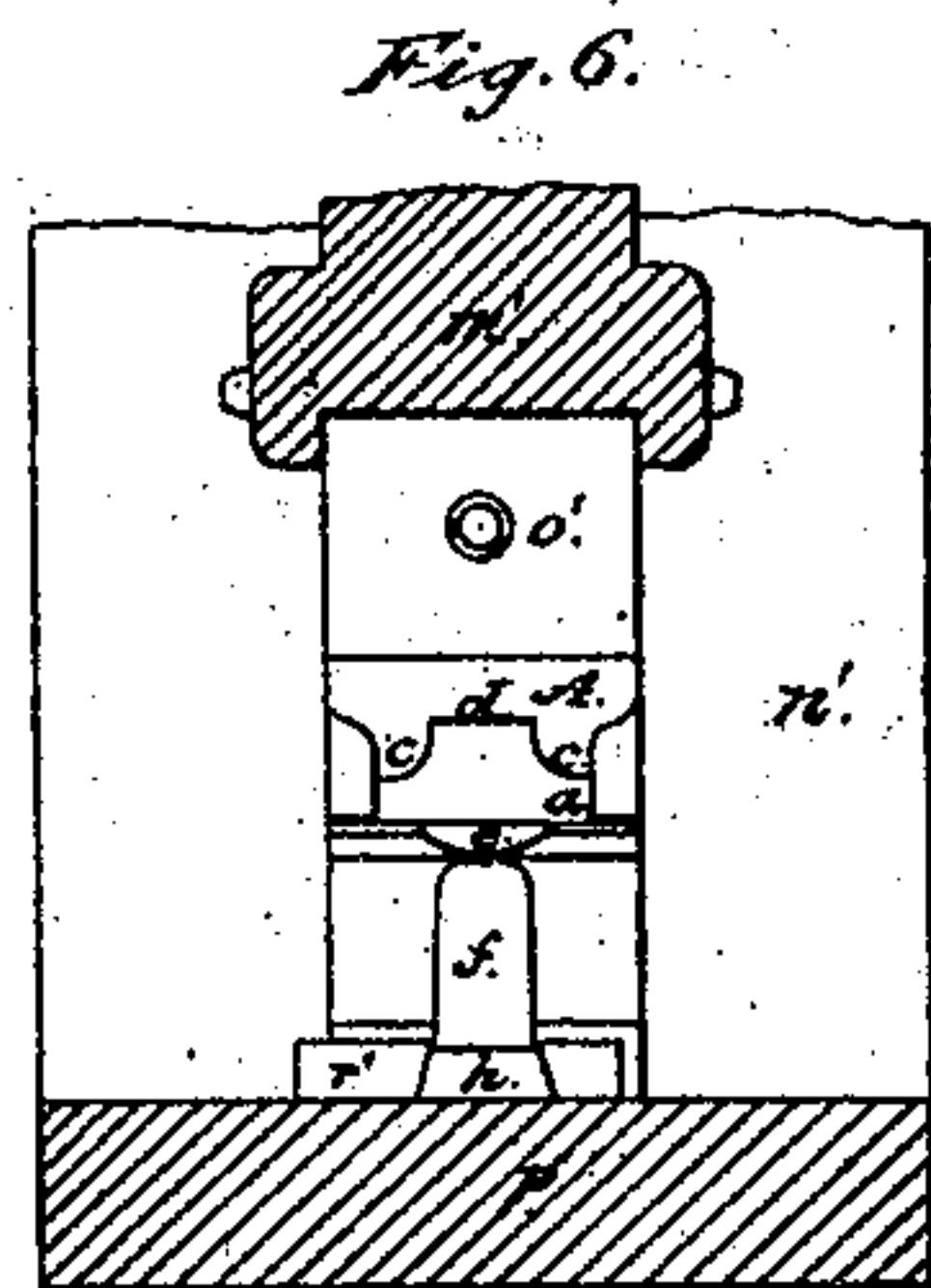
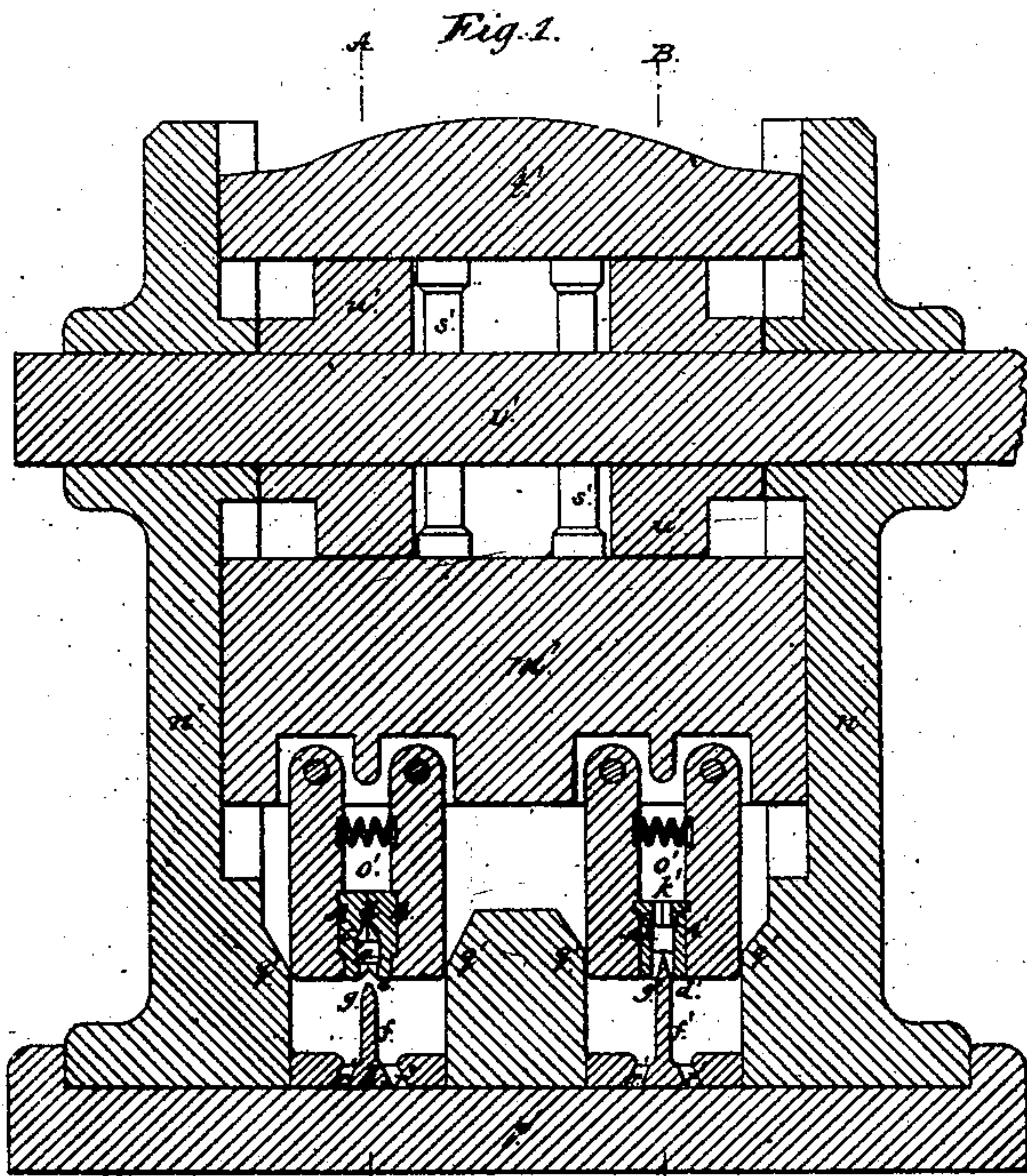


H. L. Lowman,

Making Pick-Axes,

N^o 79364.

Patented June 30, 1868.



Witnesses:
A. de Bay,
W. H. Nichols.

Inventor
H. L. Lowman.

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Fig. 4 B. b.

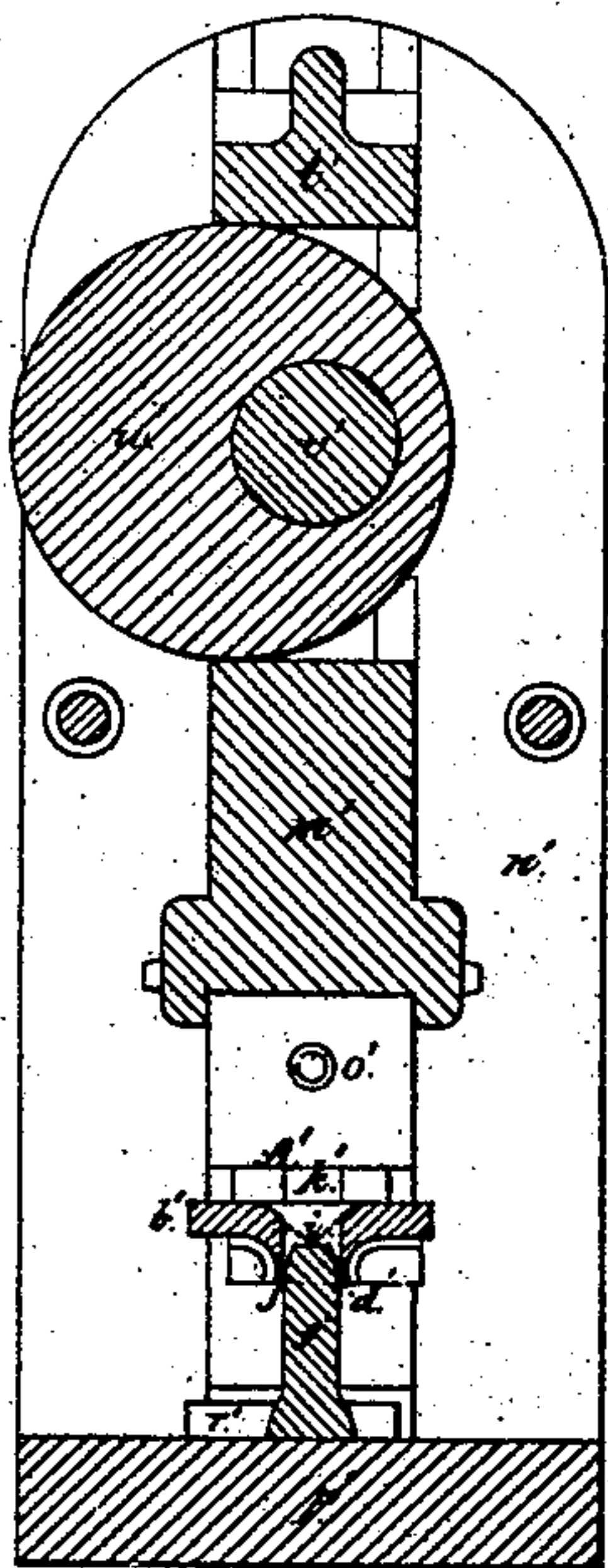


Fig. 5 B. b.

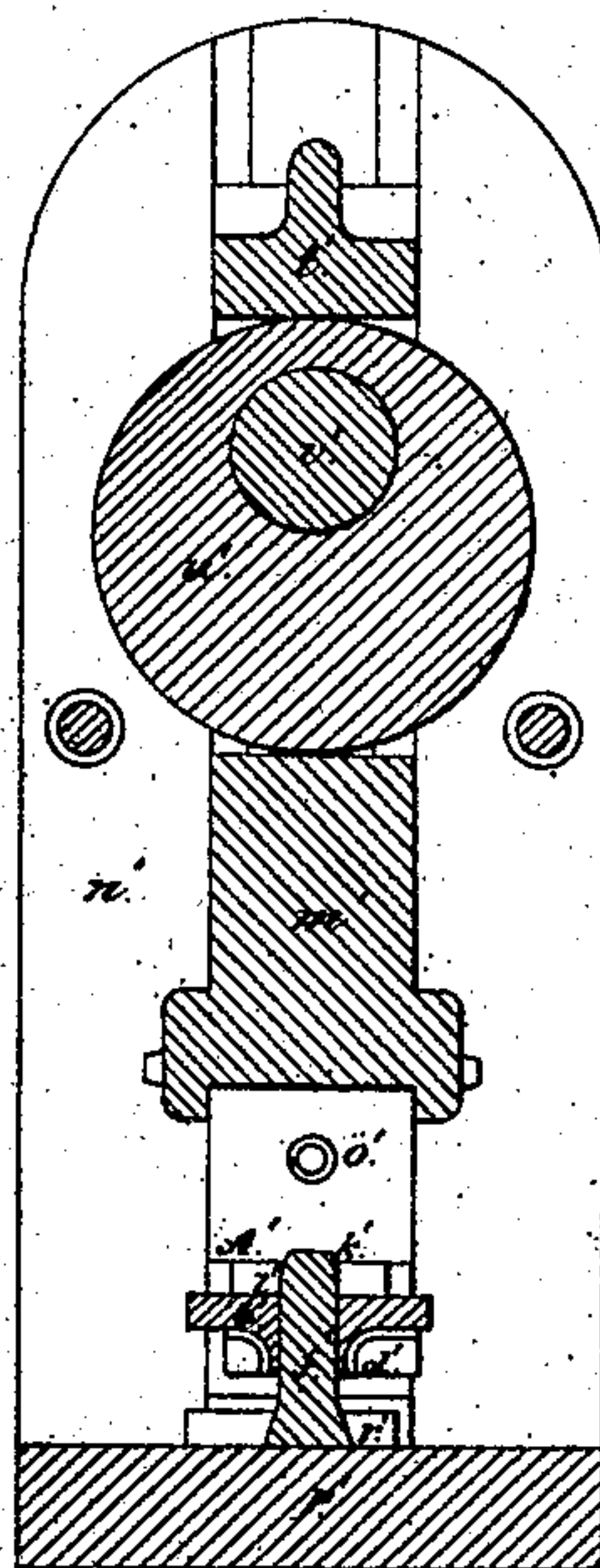
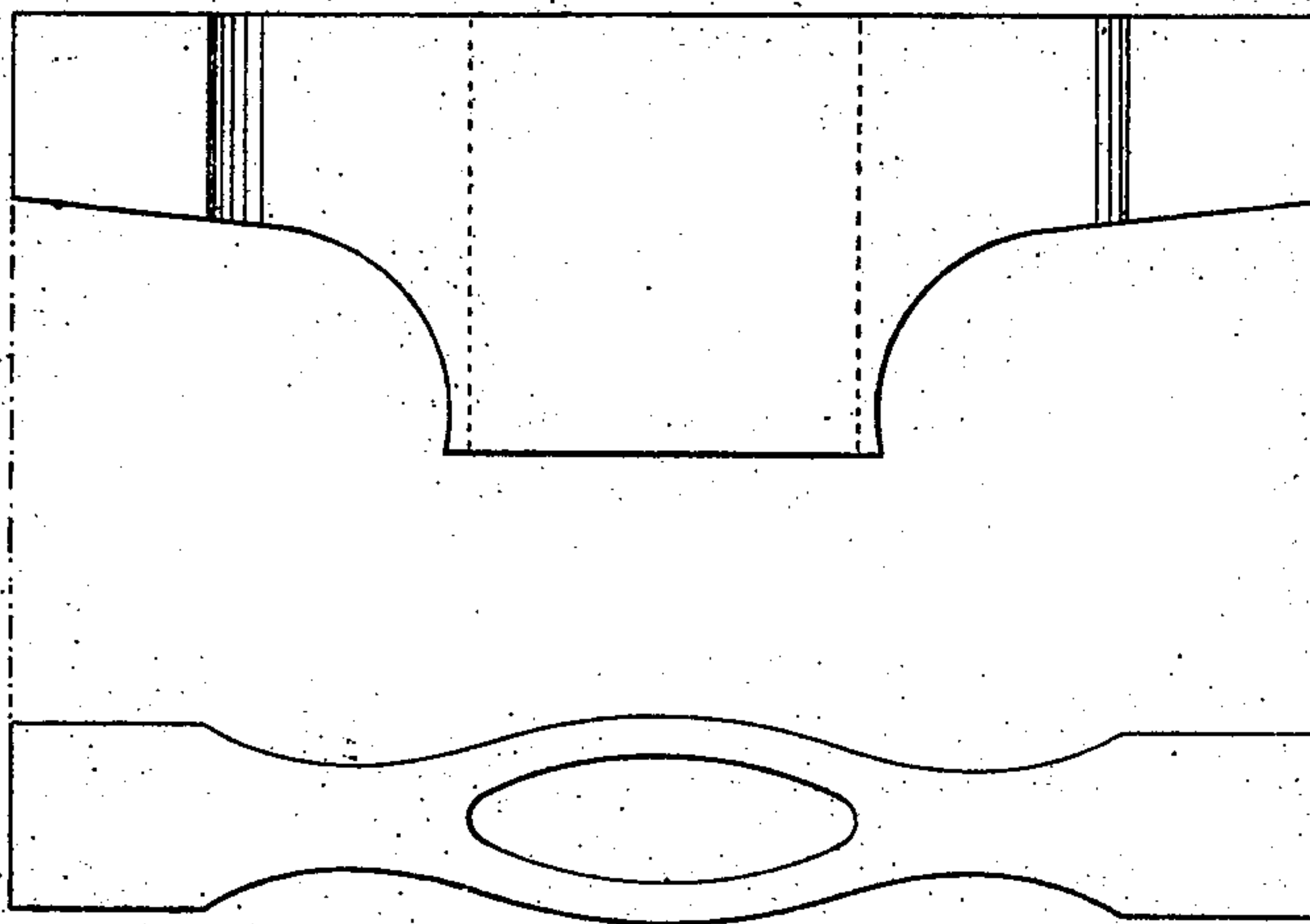


Fig. 8.



Witnesses:
Peter de Long
W. H. Fisher

Inventor:
H. L. Lowman

UNITED STATES PATENT OFFICE.

H. L. LOWMAN, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR FORMING EYES OF PICKAXES, &c.

Specification forming part of Letters Patent No. 79,364, dated June 30, 1868.

To all whom it may concern:

Be it known that I, H. L. LOWMAN, of the city, county, and State of New York, have invented certain new and useful Improvements in Machinery for Forming the Eyes of Pickaxes and other tools; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical longitudinal section of the machine and the two sets of dies and inside swages. Fig. 2 is a vertical cross-section at A *a* of Fig. 1, with the bar or block of iron inclosed in the first set of dies and ready to be acted upon by the inside swage. Fig. 3 is a similar section, in the same plane A *a*, after the metal has been acted upon by the inside swage. Figs. 4 and 5 are vertical sections at B *b* of Fig. 1, corresponding to Figs. 2 and 3; Fig. 6, an elevation of the inner face of one of the first set of dies and inside swage; Fig. 7, an elevation of the inner face of one of the second set of dies and inside swage; and Fig. 8 is an elevation and edge view of the eye of a pickax completed.

The same letters indicate like parts in all the figures.

My present invention relates to improvements on dies described in Letters Patent of the United States granted to me, and bearing date the 27th day of November, 1866.

I shall describe and represent my said invention of the required form to produce the eyes of pickaxes, and from this it will be seen that my said invention is equally applicable to form the eyes of other tools which require the eye for the reception of the handle to be of greater length than the thickness of the body of the tool.

In the accompanying drawings, A A represent the first dies, both alike, and which, when put and held together firmly, form what may be termed a "close die" with a cavity, *a*, (see Fig. 1,) extending through the whole length to receive the blank or bar of iron *b* to be formed. This part of the cavity must be of a form suited to the shape of the bar or piece of iron from which the pickax or other tool is to be made, and the shape of the blank or bar is

not material so long as it presents the required bulk of metal, although I prefer to use square bars cut of the required length.

The part *c* of the cavity of the die should be of the form, or nearly so, of the eye of a pickax or other tool intended to be formed; but an exact resemblance in form is not essential, as the final form is not intended to be given in this pair of dies; but the upper part of the cavity, as at *d*, (see Figs. 2 and 6,) should extend at least as high as the intended projection of the eye beyond the body of the tool to be made. In the lower part of the die there is an aperture, *e*, of the required form for the free entrance of the inside swage *f*, which swage, along the body, is made with parallel, or nearly parallel, sides longitudinally, of an oval shape in its cross-section, and wedge-formed at the end *g*, (see Fig. 1,) but not brought to a cutting-edge, and at the butt-end *h* it is to be suitably formed so that it can be securely held in line.

Suitable machinery for operating the dies will be described presently.

The blank or bar of iron *b*, at a high heat, is introduced between the dies when opened, and so held that when the dies are closed it will be gripped and held in the cavity *a*. The dies are then moved toward the inside swage, or vice versa, by which operation and the wedge form of the inside swage the metal is spread out laterally in the part *c* and upward into the part *d* of the dies. The movement is then to be reversed and the blank liberated.

When delivered from this first pair of dies the blank will be only partially formed, the principal object of this part of the operation being to force the metal into the part *d* of the dies to give the required projection to the eye of the intended tool. In performing this operation the instrument which has been termed an "inside swage" forces the metal bodily upward, leaving it so that the lower side is bent up, as at *i*. (See Figs. 3 and 4.)

The form given by the first set of dies will greatly facilitate the operation of making such tools by hand-forging, as the preparatory form given by such means would be very difficult to be given by hand-forging.

The object of the second pair of dies, in com-

bination with an internal swage having a cutting-edge, is to complete the form of the eye inside and outside by a second operation. The blank b' , at the proper heat, is introduced in the second pair of dies, $A' A'$. The cavity in these dies forms a mold of the external shape of the eye of the tool intended to be produced—say, the eye of a pickax.

The body of the inside swage f' , used in connection with the second set of dies, is made with parallel sides; but the tapered portion g' (see Fig. 1) is longer and brought to a cutting-edge, as represented.

The position of the dies $A' A'$ relatively to the inside swage f' is the reverse of the position of the first pair of dies to the inside swage f , as will be seen by reference to the drawings.

The object of the second operation is to complete the hole or eye for the reception of the handle to force back a sufficient quantity of metal to fill up the cavity i —that is to say, to force back, in part, the metal which was bent upward by the inside swage in forcing the metal in the first pair of dies to form the projection of the eye, and finally to complete the external form of the eye.

As the dies $A' A'$, with the heated blank b' , approach the inside swage f' , or vice versa, the cutting-edge of the latter cuts through the part j' (see Figs. 3 and 4) of the blank, and in continuing through the hole for the handle is completed in the eye of the blank.

During the operation last above described the tendency of the wedge-like form of the inside swage is to carry the metal of the blank back to the form it had before it was operated upon in the first pair of dies, except as to the hole made through it, and thus to destroy the projection of the eye from the body of the tool to be made.

What is required is to force back only enough metal to straighten what may be termed the "back" of the pick or other tool, and at the same time to preserve the projection of the eye from the body of the tool obtained by the first operation.

The means by which I have been enabled to accomplish this desired result constitutes a material part of my invention.

That part of the cavity d' of the dies where the inside swage first enters is slightly rounded or beveled outward, so that the cavity shall be wider where the inside swage enters than it is a short distance inward, as will be seen by reference to Fig. 1. It results from this form of the cavity in the dies, in connection with the wedge form of the forward part of the inside swage, that, as the metal of the blank is divided by the cutting-edge, it is spread outward and into contact with the beveled surfaces of the cavity of the dies by the wedge form of the inside swage; and these beveled surfaces of the dies present such resistance to the iron that the wedge-like form of the inside swage can only carry with it such portion of the metal as is not required to form the projecting part of the

eye, and the metal so carried forward fills up the cavity which was formed in the blank at i by the inside swage in the first operation, at the same time completing the eye.

The dies $A' A'$ have an opening at k' , through which the inside swage can pass freely toward the end of the operation, that the wedge portion of that instrument may pass entirely through the eye of the blank, the flange-like projection l' of the dies around that hole forming a resisting-surface to give the required form to the back of the blank around the eye.

I am thus enabled by two operations only to form from a plain bar or block of metal that part of a pickax or other tool requiring the eye for the handle to be of greater length than the thickness of the body of the tool; and I am enabled to accomplish these results without waste of metal, as the hole for the handle is formed by spreading the metal instead of punching through and discharging scraps.

The dies $A A$ and $A' A'$ are hinged in pairs to the under side of a cross-head, m' , which slides vertically in ways in the standards $n' n'$ of a suitable frame. Each pair of dies is provided with an interposed spring, $o' o'$, by which they are opened like a pair of jaws, that the blank may be inserted and taken out.

To the bed-plate p' of the frame are secured cam-pieces $q' q' q' q'$, so located and formed that when the cross-head m' begins to move down, the outer lower surface of the dies strike these cam-faces, and are thereby forced toward each other to close the dies, and so hold them until they are relieved by the return-motion and opened by the springs for the discharge of the blanks.

The butt-end of the inside swages, f and f' , are firmly secured to the bed-plate by side wedges, r' , so that they can be readily taken out and replaced and adjusted.

The cross-head m' is connected by rods $s' s'$ with another and parallel cross-head, t' , at a distance apart equal to the diameter of each of two eccentrics, $u' u'$, on the driving-shaft v' , by which the dies are moved up and down.

At each upward motion of the dies a partially-formed blank is taken out of the first pair of dies, and a highly-heated bar is introduced, and at the same time a finished eye is taken out of the second set of dies, and a highly-heated and partially-formed blank inserted.

It will be obvious that, instead of moving the dies toward and from the inside swages, the machine may be organized so as to move the swages instead of the dies; and it will also be obvious to the skilled machinist that other machinery for giving the required motions may be substituted for that herein described.

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

1. The second set of dies and inside swage,

in combination with the first set of dies and inside swage, substantially as and for the purpose specified.

2. Forming the second pair of dies with that part of the cavity toward the inside swage with an outward bevel or curve, substantially as herein described, in combination with the inside swage, the forward end of

which is wedge-shaped and with a cutting-edge, substantially as and for the purpose specified.

H. L. LOWMAN.

Witnesses:

WM. H. BISHOP,
PETER DE LACY.