

No. 750,824.

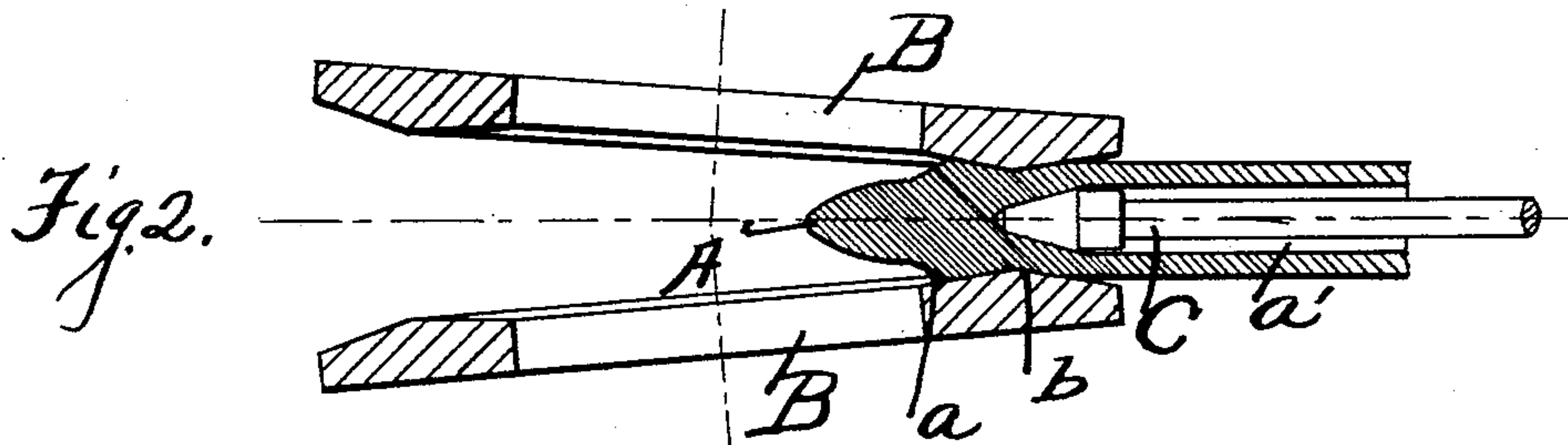
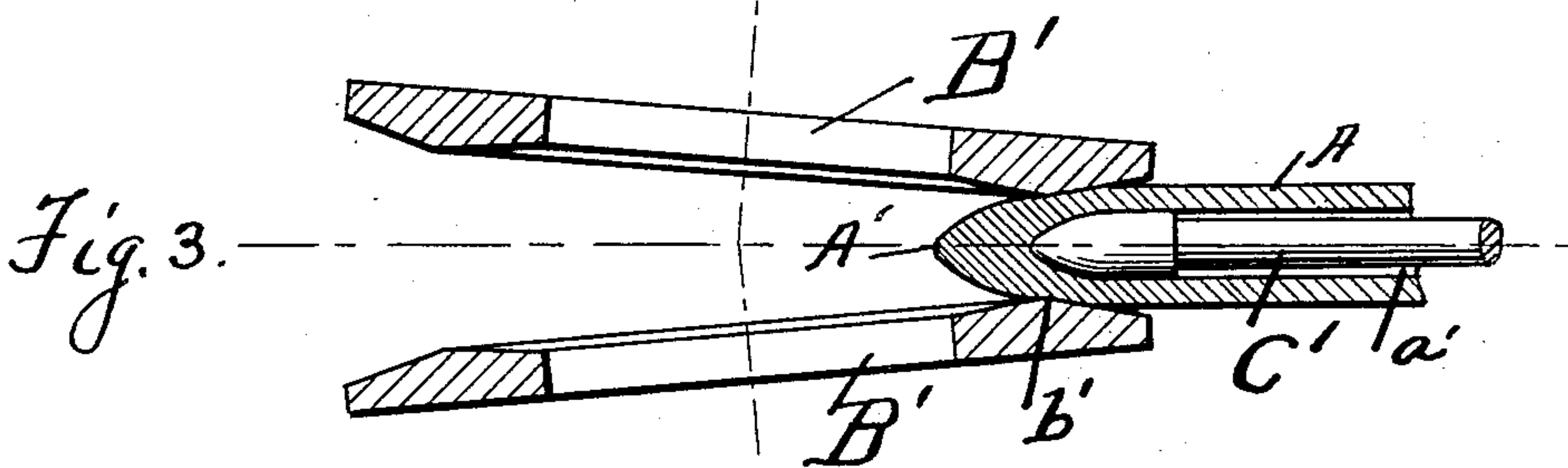
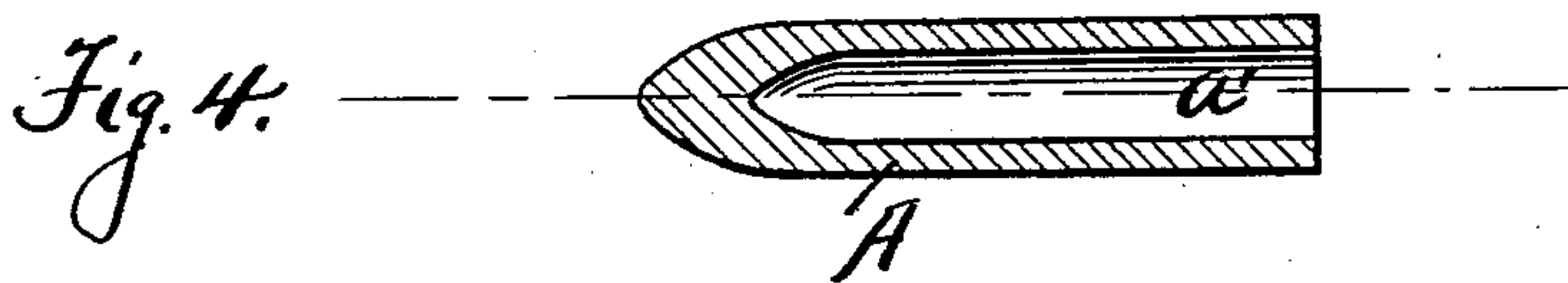
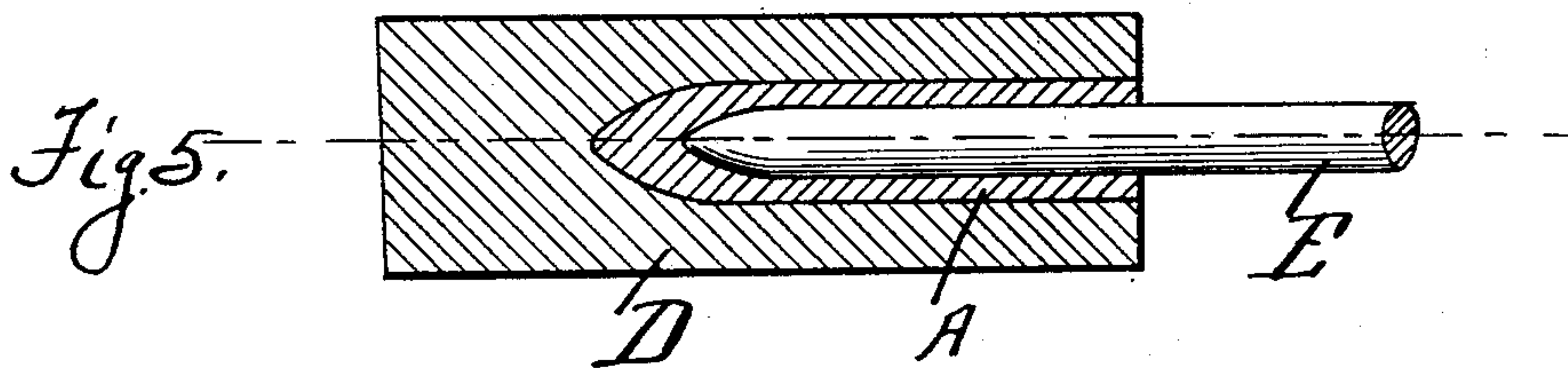
PATENTED FEB. 2, 1904.

L. D. DAVIS.

PROCESS OF PRODUCING PIERCED INGOTS WITH SOLID ENDS.

APPLICATION FILED SEPT. 3, 1901.

NO MODEL.



Witnesses:
Grace J. Breerton.
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Atty

UNITED STATES PATENT OFFICE.

LEONARD D. DAVIS, OF ERIE, PENNSYLVANIA.

PROCESS OF PRODUCING PIERCED INGOTS WITH SOLID ENDS.

SPECIFICATION forming part of Letters Patent No. 750,824, dated February 2, 1904.

Application filed September 3, 1901. Serial No. 74,158. (No specimens.)

To all whom it may concern:

Be it known that I, LEONARD D. DAVIS, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Methods or Processes of Producing Pierced Ingots with Solid Ends; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the method or process of producing pierced ingots with solid ends; and it consists in certain improvements therein, as will be hereinafter fully described, and pointed out in the claims.

The object of the invention is to partially pierce an ingot, leaving a solid end, and shaping the ingot with a forming process preferably following this.

The process is particularly adapted for forming projectiles, and I show a means for carrying out the process in making a projectile.

In the drawings, Figure 1 shows the ingot after the first step in the process has been formed upon it. Fig. 2 shows a section of a piercing-mill with a billet therein; Fig. 3, a section of a forming-mill similar in construction to the piercing-mill, the mandrel being of a shape to form the opening in the ingot; Fig. 4, a section of the article as it comes from the forming-mill; Fig. 5, a section of a form and ram giving the final shape to the projectile.

With the first step of the process the ingot is formed with the body A and an end A' of smaller diameter than the body A, preferably with quite an abrupt shoulder *a* between the body portion A and the end A'. The reduction in size from the body portion of the ingot, or, in other words, the shoulder *a*, is so located that when the ingot is run through the mill, as shown in Fig. 2, the disks or rolls forming a part of the piercing-mill will run off the shoulder *a*, with the end of the mandrel C at the depth in the ingot desired.

In Fig. 2, B marks the disks and C the mandrel. The ingot, as shown in said figure, is still being subjected to the action of the disk, and consequently the piercing action is pro-

ceeding. As soon as the shoulder *a* passes the point *b*, the narrowest point in the pass, the disks B B cease to grip the billet, and consequently the forward action of the billet ceases. By this method the depth of the opening *a'* may be nicely calculated, especially with reference to the closed end.

I prefer that the difference in diameter of the end A' to the body portion A be such as to permit of two operations of disks, such as the disks B B, in order that a second operation may be had for shaping or forming the opening *a'*.

In Fig. 3 I show the disks B' B', which are similar in construction to the disks B B, and a forming-mandrel C'. After passing through the piercing-mill (shown in Fig. 2) there is still left on the article a shoulder similar but slightly smaller than the shoulder *a*. The shoulder is preferably so proportioned as to be nearly eliminated after the passage of the article through the mill. (Shown in Fig. 3.) The desirability of this course depends upon the final shape of the article operated upon. As soon as the shoulder reaches the point *b'* in Fig. 3, the forming-mill, the disks cease to grip the billet, and consequently the piercing or forming action stops, producing an article similar to that shown in Fig. 4. The article is then placed in the form D and a ram E forced into the opening *a'*. This gives to the article its final shape. Of course the form D may be the movable element and the ram E stationary; but in either event the ram is forced into the opening.

What I claim as new is—

1. The method of producing a pierced metallic ingot with a solid end, which consists in previously shaping the ingot with the portion to be closed of smaller diameter than the body of the ingot, passing the ingot through a piercing-mill arranged to apply pressure rotatively on the ingot and to feed the ingot upon the piercing-mandrel, the size of the reduced portion being such relatively to the pass of the mill as to prevent an actuating engagement of the reduced portion by the mill.

2. The method or process of forming a pierced metallic ingot with a solid end which consists in providing the ingot with a body

portion to be pierced and a reduced portion
to remain solid; feeding the ingot so formed
into a piercing-mill, the body portion being
sufficiently greater in size than the reduced
5 portion to pass through the piercing-mill with-
out a reduction in the size of the body portion
to that of the reduced or solid portion; then
passing the ingot so formed into a forming-
mill similar in construction to the piercing-
10 mill with a former-mandrel, the reduced por-

tion of the ingot being sufficiently small rela-
tively to the pass of each mill to prevent an
actuating engagement of the reduced portion
by either mill.

In testimony whereof I affix my signature in 15
presence of two witnesses.

LEONARD D. DAVIS.

Witnesses:

H. C. LORD,
GRACE E. YARD.