(No Model.) 2 Sheets—Sheet 1.

T. O'LEARY.

DIE FOR MANUFACTURING SHOES FOR STAMP MILLS.

No. 550,026. Patented Nov. 19, 1895.

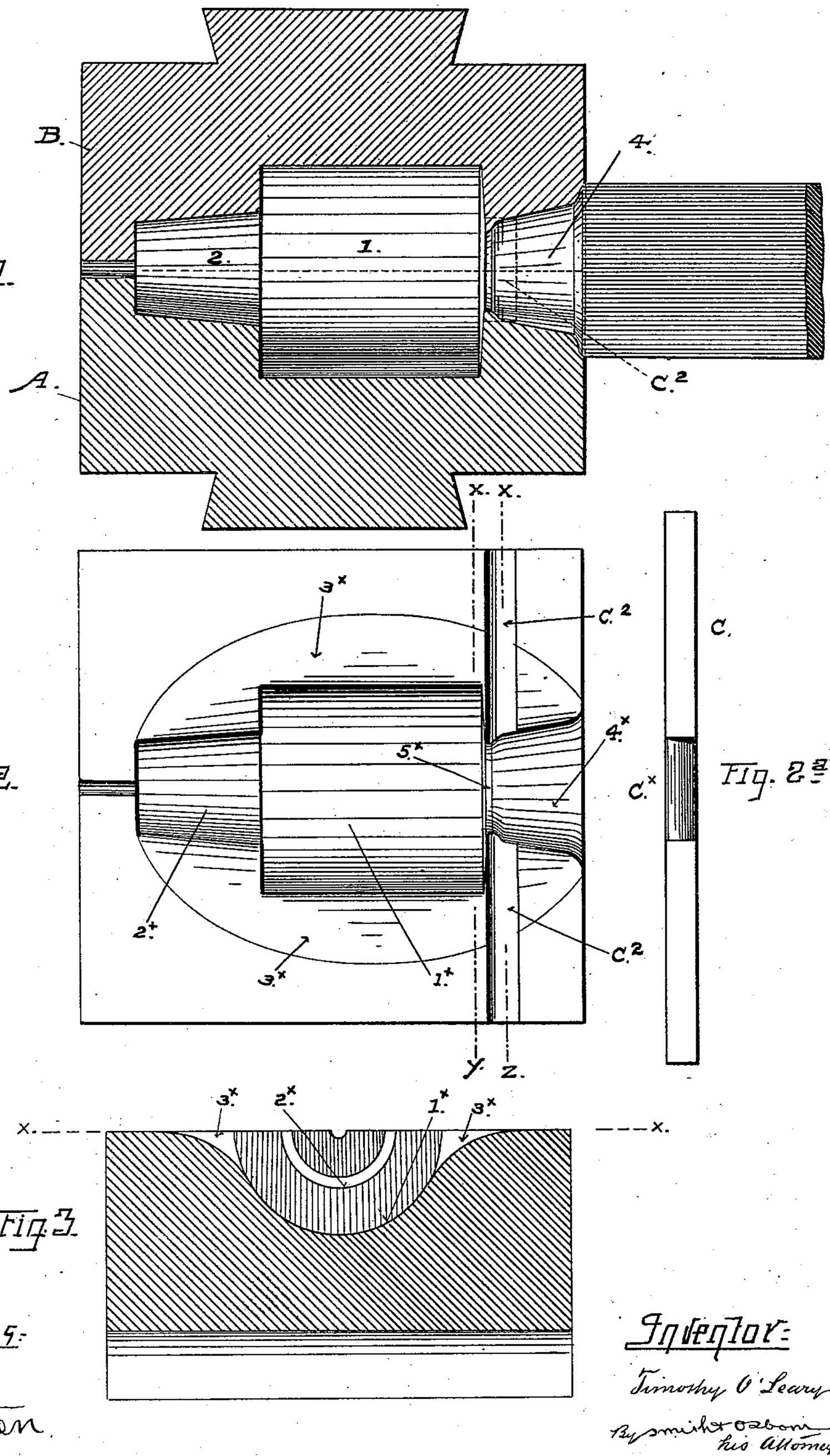

Fig. 1.

Fig. 2.

Fig. 2a.

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

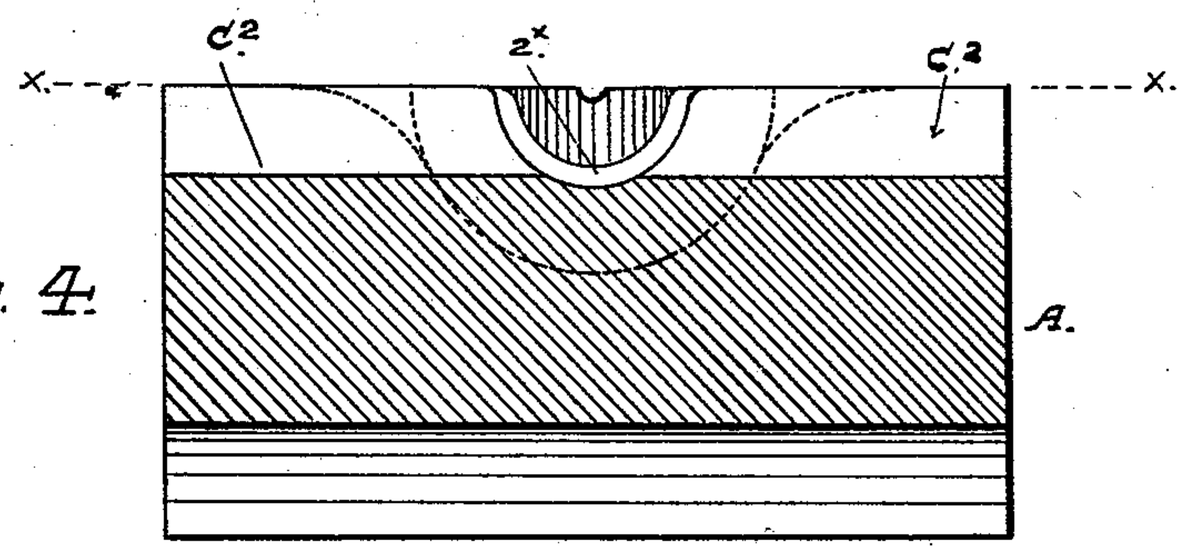


Fig. 5.

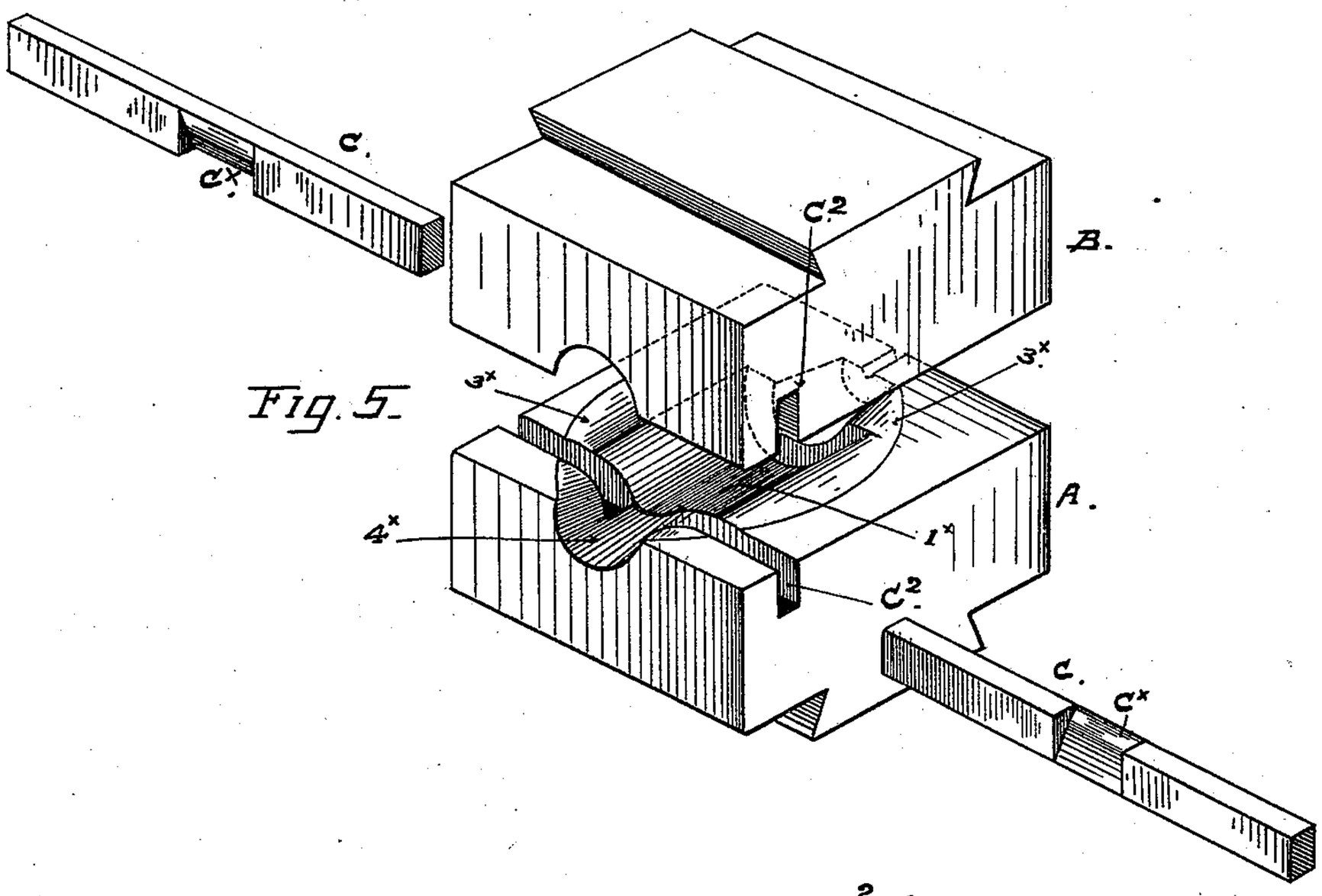
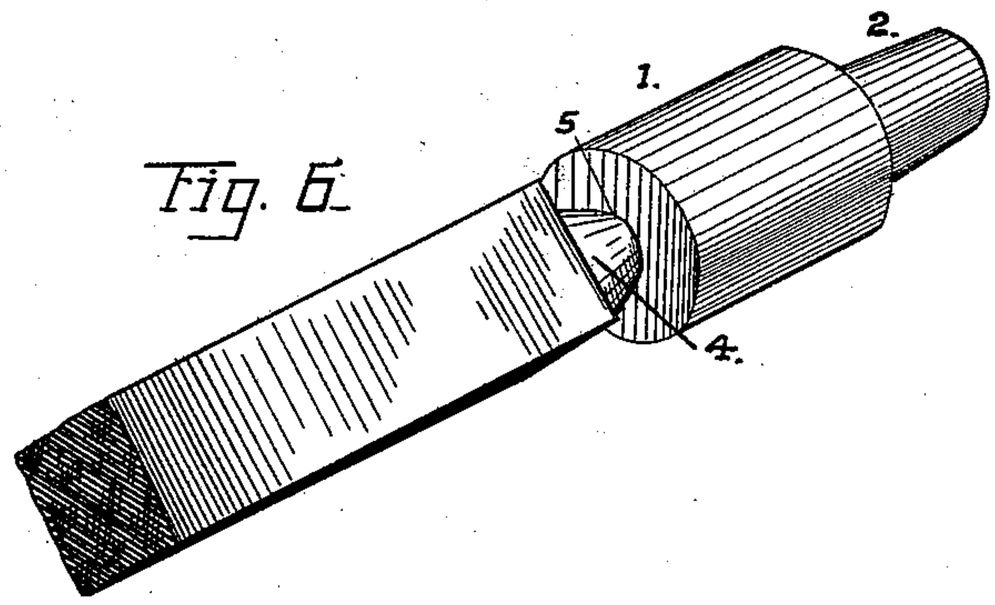


Fig. 6.



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UNITED STATES PATENT OFFICE.

TIMOTHY O'LEARY, OF SAN FRANCISCO, CALIFORNIA.

DIE FOR MANUFACTURING SHOES FOR STAMP-MILLS.

SPECIFICATION forming part of Letters Patent No. 550,026, dated November 19, 1895.

Application filed March 19, 1894. Serial No. 504,312. (No model.)

To all whom it may concern:

Be it known that I, TIMOTHY O'LEARY, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in the Manufacture of Wrought-Metal Shoes for Ore Stamp-Mills and in Dies for Producing the Same, of which the following is a specification.

My invention relates to the production of a shoe for an ore stamp-mill out of wrought-metal as a new article of manufacture.

The invention has for its object the production of an article that is much superior in many respects to the present cast-metal shoe and the manufacture of the same at relatively small cost.

To such ends and object my invention consists, first, in a wrought-metal shoe for ore stamp-mills forged and finished at a simple operation from bar metal, and, secondly, in certain improvements in the construction of forging-dies specially adapted to manufacture the said shoe out of bar metal, as hereinafter more fully explained and set forth.

The following description explains the nature of my said invention and the manner in which I proceed to carry out, practice, and apply the same, reference being had to the drawings that accompany and form a part of this specification.

Figure 1 of the said drawings represents a pair of forging-dies constructed in accordance with my invention for the manufacture of my wrought-metal shoe. The figure represents the dies in vertical longitudinal section with a finished shoe resting in the dies, but still attached by a stub to the bar from which it is forged. Fig. 2 is a plan of the bottom die. Fig. 2^a is a top view of a cutter which is inserted in the die to separate the finished piece from the stub at the end of the forging operation. Fig. 3 is a vertical cross-section of the lower die taken at the line $x\ y$, Fig. 2. Fig. 4 is a cross-section taken at the line $x\ z$, Fig. 2. Fig. 5 is a perspective view of the two dies partly separated before the bar of metal is inserted. This figure shows the insertible cutters that are set into the dies to separate the finished piece from the stub at the end of the forging operation, and the recesses in the dies to receive them. Fig. 6 is a view of the finished shoe before it is separated from the bar.

A indicates the bottom one and B the top one of a pair of dies, each having a flat face and a cavity of such form that when the two dies are closed upon each other with the flat faces in contact the contained space or cavity corresponds in shape with the complete shoe—that is to say, with the cylindrical body 1 and the tapered neck 2 of the shoe, excepting that the edges of the two cavities are chamfered and rounded off, so that the meeting-edges of the two faces around the cavity are set back toward the outer edges of the dies along each side. The cavity is cylindrical along the top and the bottom, but from a point or line about two-thirds the distance upward toward the horizontal diameter $x\ x$, Figs. 3 and 4, the cavity in each die increases in width toward the sides, so that along both sides the cylindrical body-cavity $1^\times$ and the neck-cavity $2^\times$ are spread outward in shallow channels or spaces $3^\times$. In addition to these cavities and flaring channels there is formed in each die a stub-cavity $4^\times$, extending from the head of the body-cavity $1^\times$ outward to the front end of the block and connected with the principal cavity by a neck or contracted part $5^\times$, and from that part gradually increasing in diameter outward to the end of the block. The last-mentioned or stub cavity corresponds in shape with the neck-cavity $2^\times$ at the back or opposite end of the die, but is somewhat shorter, and at the base or widest end it is somewhat larger in diameter than the widest end of the aforesaid neck-cavity $2^\times$ where it joins the body-cavity $1^\times$. The chamfered or cut-away sides of the cavities are finished on smooth curved lines, as clearly shown in the sections, Figs. 3 and 4, and the corresponding surfaces in the top die are likewise rounded and finished to the same extent, so that when the two dies are in working contact the spaces or channels $3^\times$ along the sides are equally disposed above and below the dividing-line between the two dies for the length of the body-shaping cavity $1^\times$ and the length of the neck-shaping cavity $2^\times$. The two dies thus formed are placed under a drop-hammer, or they are fixed in place to the bed and the head, respectively,

of a power-hammer by dovetails formed on the back of the two dies in the usual way of fixing dies of this character.

In the operation of making the wrought-metal shoe a square bar of metal of somewhat smaller dimensions in thickness than the diameter of the body of the finished shoe is heated at the end and then introduced the required distance between the dies. The hammer is then operated in the usual manner, and between the blows the bar is turned in the dies until the proper cylindrical shape is obtained. In and during the operation the square bar is gradually brought to the shape of the body and the neck of the shoe by the partial rotation of the bar, which is first set on edge or with the square in diagonal position between the two dies, and then the surplus metal forced outward into the side channels along the body and neck cavities is taken in and incorporated with the main portions of metal to fill up and form the cylindrical body and the taper-neck. The surplus metal is that portion in the rectangular bar which is in excess of the quantity required for the neck-cavity $2^{\times}$ and also that portion which unites the finished piece to the bar, and which consists of the stub portion 4 when the forging operation is completed and the piece is ready to be separated from the die, and this additional metal being first distributed into or taken up by the lateral channels or recesses before described is afterward worked into the body and neck of the shoe. In this operation, also, the stud portion of the bar in front of the bottom or acting face of the shoe being forged is brought into shape for the neck of the next shoe, and at the end of one forging, when the finished piece is cut from the bar, this stub or partially-shaped end of the bar is ready for inserting into the cavity $2^{\times}$ of the dies for the next shoe.

In each block provision is made for inserting a cutting-tool C across the line of juncture between the end of the body-cavity $2^{\times}$ and the cavity $4^{\times}$. The cutter which I provide for this purpose is a bar C with a cutting blade or edge $C^{\times}$ and a flat back properly shaped to fit a groove or recess C^2 in the block at or in line with the narrow or contracted portion $5^{\times}$ of the cavity $4^{\times}$. These recesses C^2 open to the outside at one or both sides of the block, so that the cutter can readily be slipped into place from the side of the die when the dies are separated and as readily removed before the forging operation.

A wrought-metal shoe for ore-stamp batteries produced in the manner above described is superior in many respects to the cast-metal shoes heretofore used. It is not only much stronger, but will stand wear and be serviceable for a much longer time. The metal of the body being close and solid is always free from air-holes, so that a smooth solid face on the bottom is obtained at all times during work as the shoe wears down instead of being pitted or broken with holes and crevices, as in the cast-metal shoe.

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

1. An upper and a lower die each having a body-shaping cavity and a neck-shaping cavity at one end of the first-mentioned cavity, both substantially cylindrical along the bottom and flaring along the sides forming when placed together a cavity to shape the body and a cavity to shape the neck of an ore stamp shoe, and channels or recesses along the sides thereof to take up and distribute surplus metal of the bar, and a stub-shaping cavity at the opposite end of the body cavity substantially corresponding with but larger than said neck cavity, as and for the purpose hereinbefore set forth.

2. The combination with an upper and a lower forging die, each having a shaping cavity to produce the article to be forged, a supplemental stub cavity at the end of the principal or shaping cavity adapted to partially shape the bar or piece of metal for the next article, and a narrow neck connecting these two cavities; of a removable cutter inserted across said narrow neck, as and for the purpose set forth.

3. An upper and a lower die, each having near its center a body-shaping cavity, at one end thereof a neck-shaping cavity, the two adapted to form the body and neck respectively of an ore-stamp-shoe, and at the other end of the central cavity a stub-shaping cavity extending out the front end of the die for forming a stub on the metal being forged, the stub-cavity being somewhat shorter than the neck-cavity but slightly larger at its outer end, whereby the metal of the stub is partially shaped to form the neck of the next succeeding shoe, substantially as described.

4. The combination with a pair of forging dies, of an insertible cutting device adapted to separate the finished piece from the block or bar from which it is forged and removable from the said dies during the forging operation, substantially as hereinbefore set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

TIMOTHY O'LEARY. [L. S.]

Witnesses:

EDWARD E. OSBORN,

R. M. EDWARDS.