(No Model.) 2 Sheets—Sheet 1.

H. JAMES.

METHOD OF BORING UNDERCUT HOLES IN METAL.

No. 412,508. Patented Oct. 8, 1889.

Fig. 1

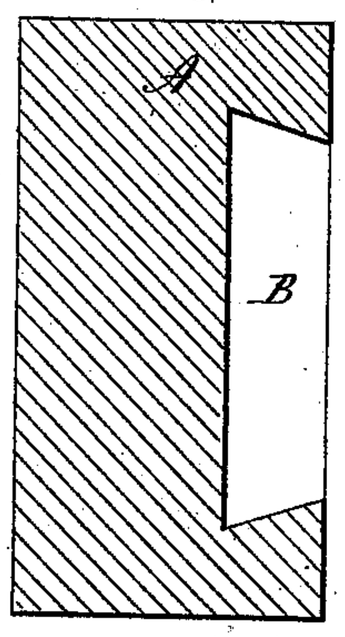


Fig. 2

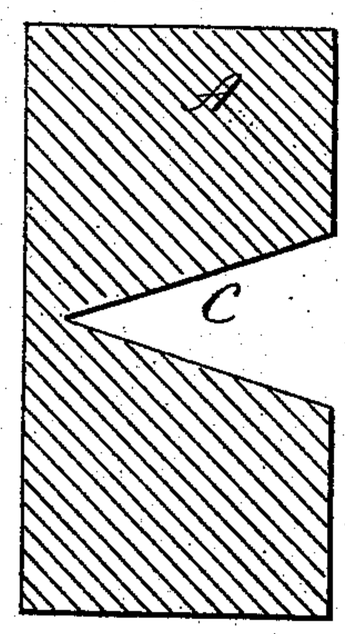


Fig. 3

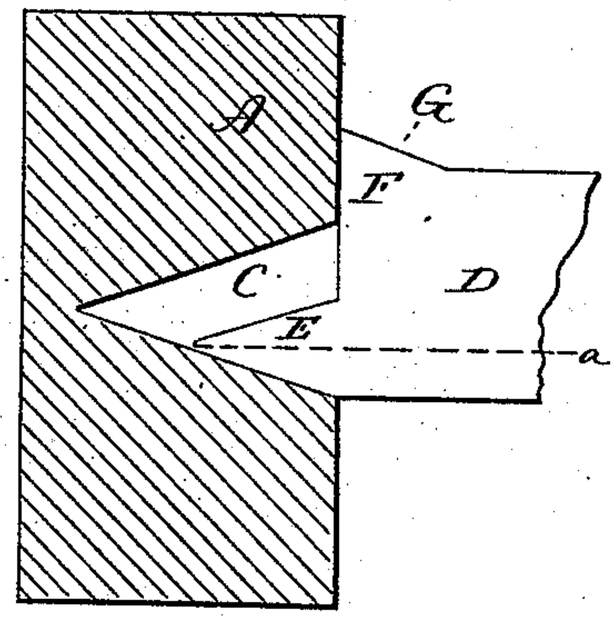


Fig. 4

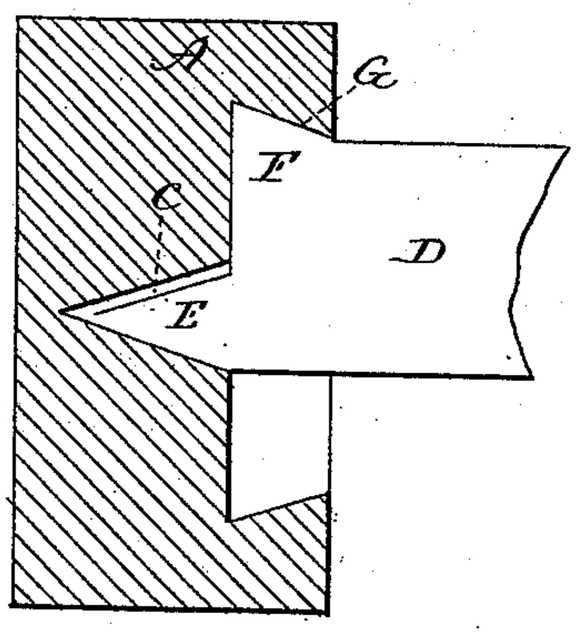
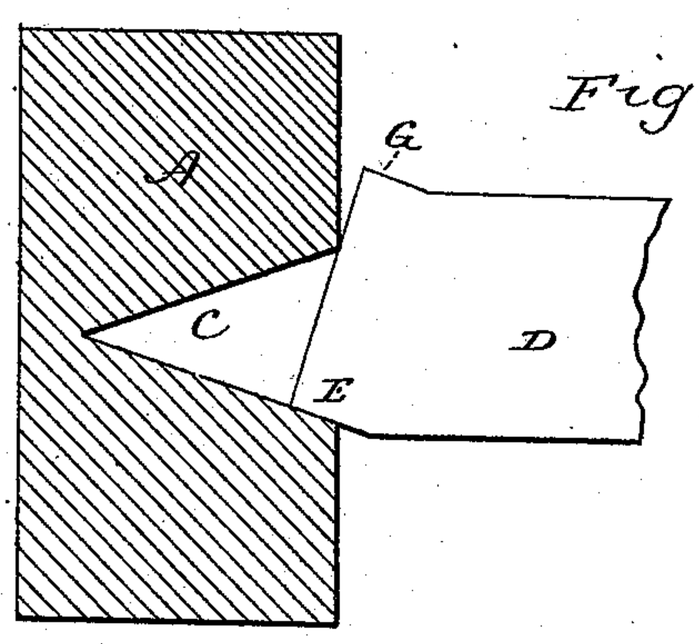


Fig. 5



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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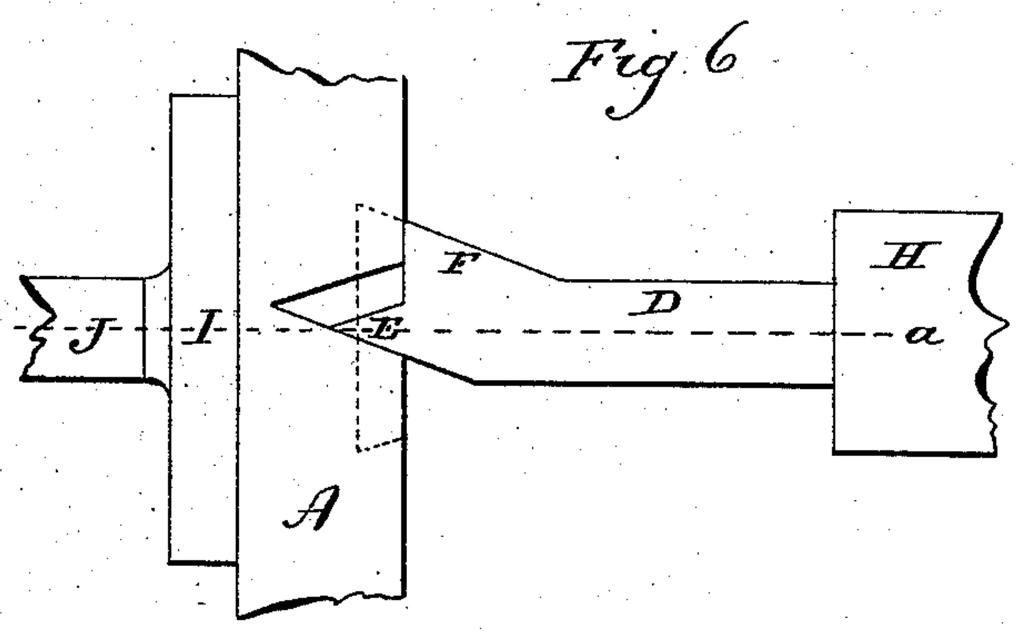
METHOD OF BORING UNDERCUT HOLES IN METAL.

No. 412,508. Patented Oct. 8, 1889.

Fig. 6



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UNITED STATES PATENT OFFICE.

HENRY JAMES, OF NEW HAVEN, CONNECTICUT.

METHOD OF BORING UNDERCUT HOLES IN METAL.

SPECIFICATION forming part of Letters Patent No. 412,508, dated October 8, 1889.

Application filed July 15, 1889. Serial No. 317,538. (No model.)

To all whom it may concern:

Be it known that I, HENRY JAMES, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in the Method of Boring Undercut Holes in Metal; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a section through a piece of metal representing the shape of the hole desired to be bored; Fig. 2, a piece of metal having the central cavity formed therein preparatory to boring the hole; Fig. 3, the same as Fig. 2, with the boring-tool as introduced to commence its work; Fig. 4, the same, representing the tool as having completed its work; Fig. 5, a modification. Fig. 6 illustrates the boring-tool as in the mandrel of the head-stock with the block resting against a face-plate in the mandrel of the tail-stock.

This invention relates to an improvement in the method for boring undercut holes in metal—that is, holes which gradually increase in diameter from the outside inward—this method being specially adapted to the preparing of surfaces to receive Babbitt or similar metals which are to be poured upon that surface. The surfaces to receive Babbitt and other metals are frequently prepared by boring numerous holes of slight depth, but of uniform diameter, into the surface to be covered, and so that the metal so poured onto the surface will enter these holes or recesses; but as these holes or recesses are of equal diameter the engagement with the metal so poured upon the surface is weak and frequently permits the metal to escape. In some cases the holes are undercut, but in so doing the method employed has been to mechanically operate the cutting portion of the tool to produce such under-cut.

The object of my invention is to make the under-cut automatic; and it consists in first forming a cavity in the center of the surface where the hole is to be made, which cavity diminishes in diameter according to the required expansion of the hole to be cut, and then introducing a boring-tool adapted to bear upon the surface of the said cavity formed opposite that portion of the tool which is to cut the metal, the said cavity serving as a guide for the tool, and so as to gradually force the tool radially outward, thereby producing a gradually-increasing diameter or undercut hole or recess, and as more fully hereinafter described.

In Fig. 1, A represents a piece of metal having a hole or cavity B therein of the required shape, it being of gradually-increasing diameter from the outer surface inward. To automatically produce this hole, I first make a recess or cavity C in the center of the surface where the hole is to be formed, (see Fig. 2,) this cavity C gradually diminishing in diameter corresponding to the increasing diameter required for the recess to be cut.

D, Fig. 3, represents the boring-tool. The tool is constructed with a center or projection E, and which may bear upon the surface of the cavity C, as seen in Fig. 3. This projection E is best made of conical shape, as shown, the incline of its surface corresponding to the incline of the sides of the cavity C. Radially from the projection E the cutting portion F of the tool extends, and the outer edge G of the cutter inclined backward at least to an angle as great as that of the inclined side of the hole or recess to be cut.

In Fig. 6 the boring-tool D is represented as secured in the head-stock mandrel H, and the block A to be bored is supported against the face-plate I of the tail-rest mandrel J, these representing the tool-mandrel and the tail-rest mandrel and face-plate of a common boring-lathe.

a represents the axial line of revolution of the boring-tool. The working incline on the projection E is on the opposite side of that line to the cutting portion F, and this line of axis will be the axial line of the hole to be bored; hence the length of the cutter from the said axial line is equal to half the surface diameter of the hole to be cut.

The metal in which the hole is to be cut is applied, as seen in Fig. 3, and held against the projection E, represented in Fig. 6 as applied in a common boring-lathe, where the piece to be bored is held in the usual manner for holding metal or wood in such position to be bored, but so that the inner surface of the

cavity C comes against that projection E opposite the cutter. The cutter then revolving is forced toward the metal in the usual manner for boring, as seen in Figs. 3 and 6, and commences its cut. The tendency of the cutter is to force the metal radially from the cutter, and so as to hold it against the opposite side of the projection E of the cutter. The result of this is that as the cutter enters the metal it first cuts a diameter corresponding to twice the length of the cutter from the axis; but as the projection E rides upon the surface of the cavity C it forces the cutter radially outward until the required depth of cut is produced, as seen in Fig. 4, that cut gradually increasing, and according to the inclination of the sides of the cavity C.

I prefer to construct the cutter with the conical projection E, as represented, but as the side of the cutter opposite the cut works against one side only of the cavity, that projection is not necessary, as the cutter may be made as represented in Fig. 5, its side opposite the cutter projecting sufficiently far to take a bearing in the cavity as a guide.

I claim—

The herein-described method of boring holes undercut or of gradually-increasing diameter, consisting in first forming a cavity in the center of the surface where the hole is to be formed, the said cavity gradually diminishing in diameter corresponding to the increase in diameter required for the hole to be cut, then introducing the cutter so that one side may work upon the surface of the said cavity as a guide, while the cutter from the other side will operate upon the surface, the said cavity serving to force the metal radially against the cutter as the depth of the cut advances, substantially as described.

HENRY JAMES.

Witnesses:
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