

(No Model.)

F. H. RICHARDS.
METAL DRILL.

No. 500,213.

Patented June 27, 1893.

Fig. 1

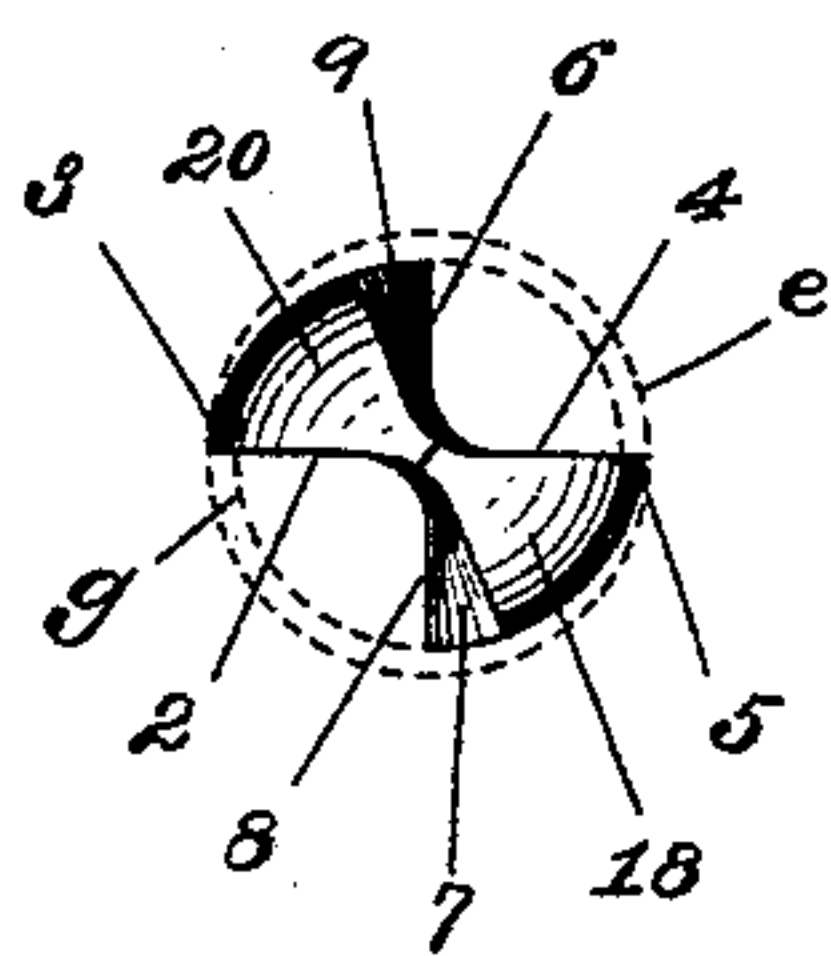


Fig. 3

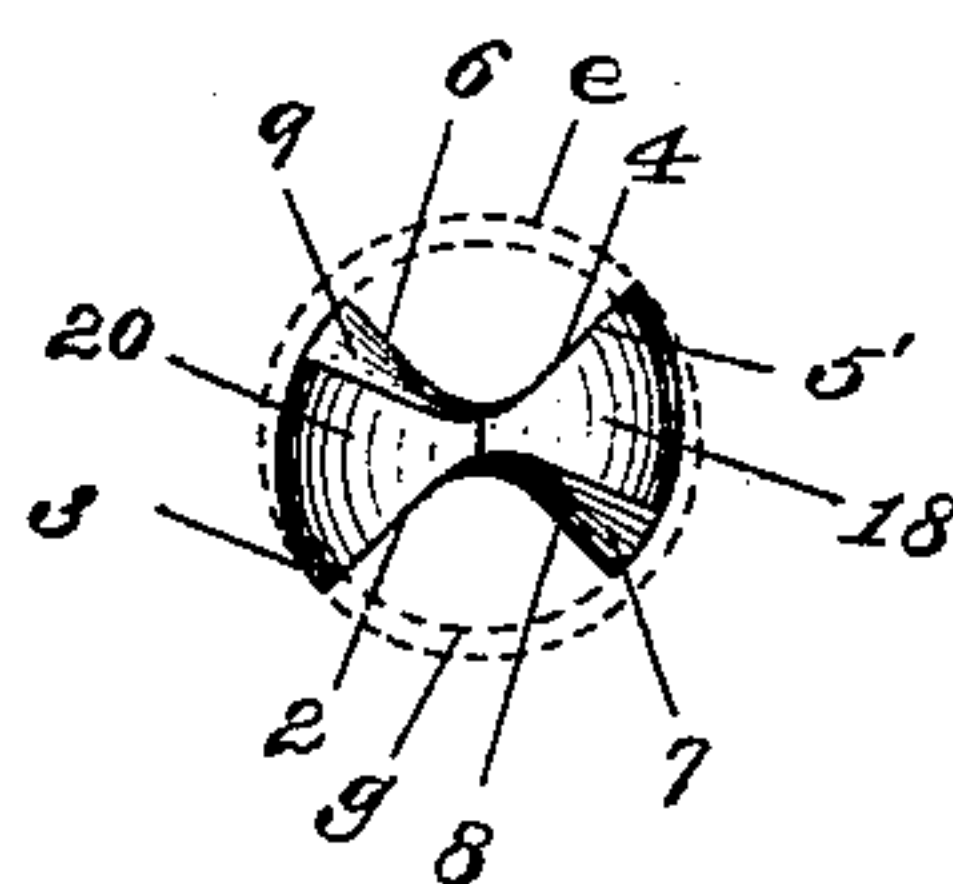


Fig. 5

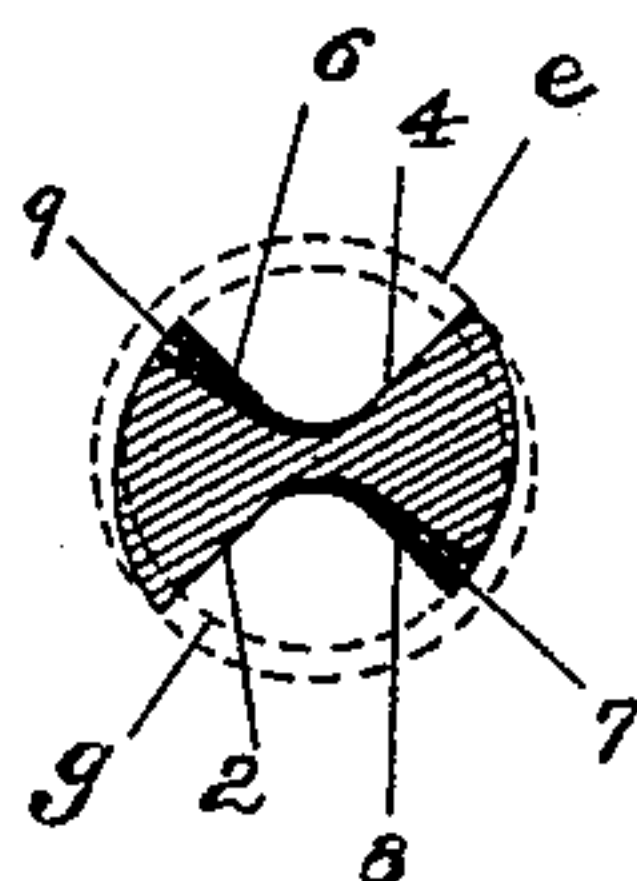


Fig. 4

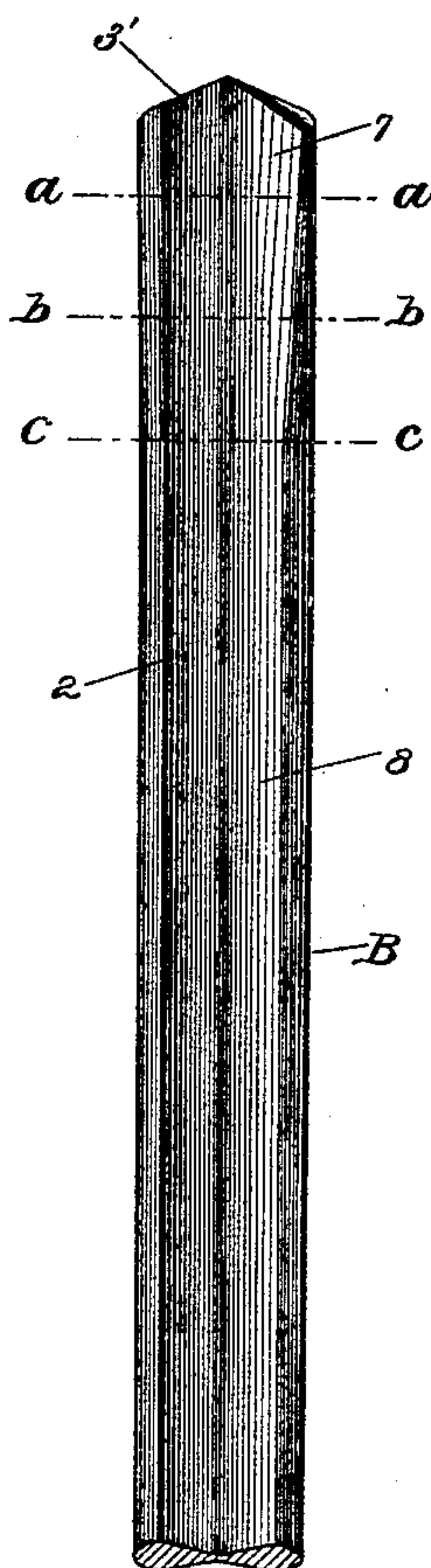


Fig. 2

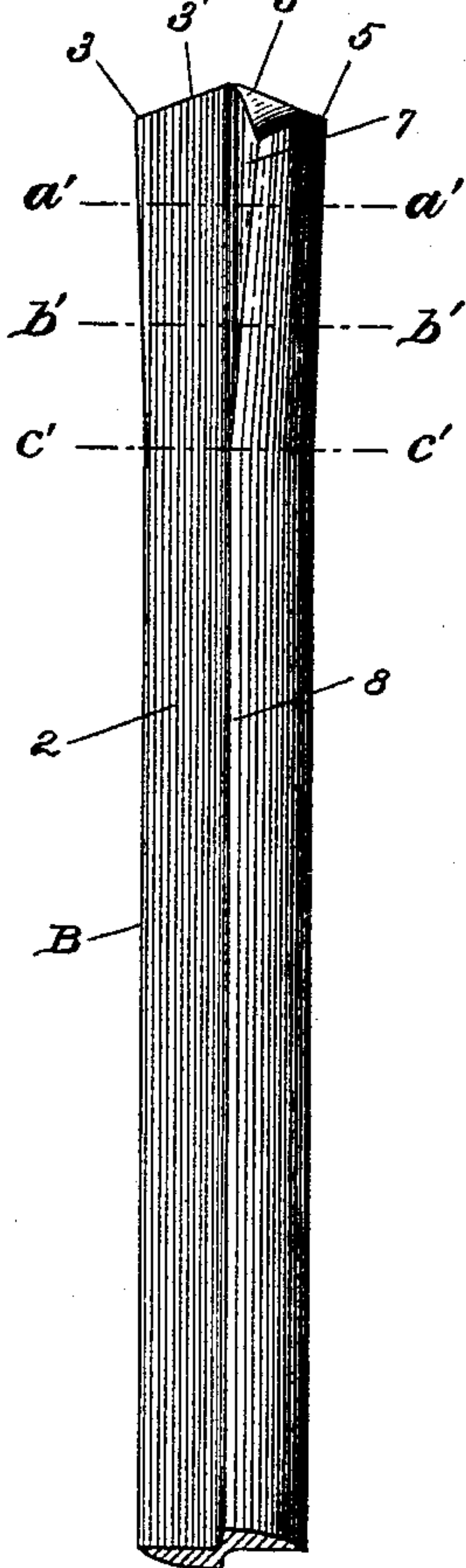


Fig. 6

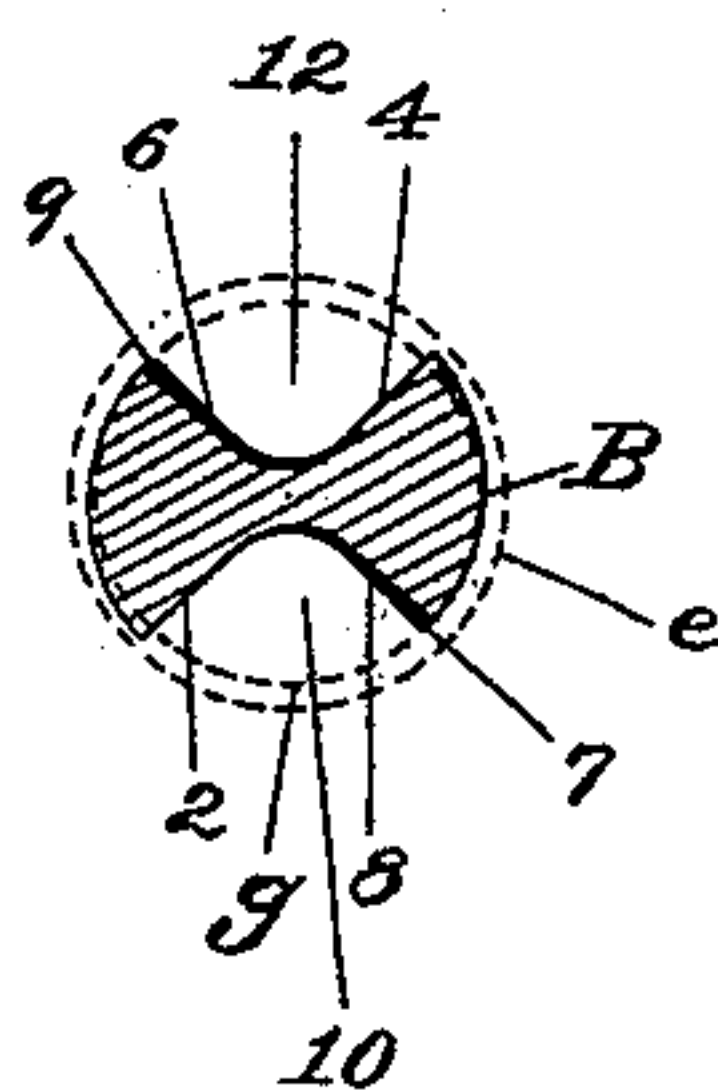
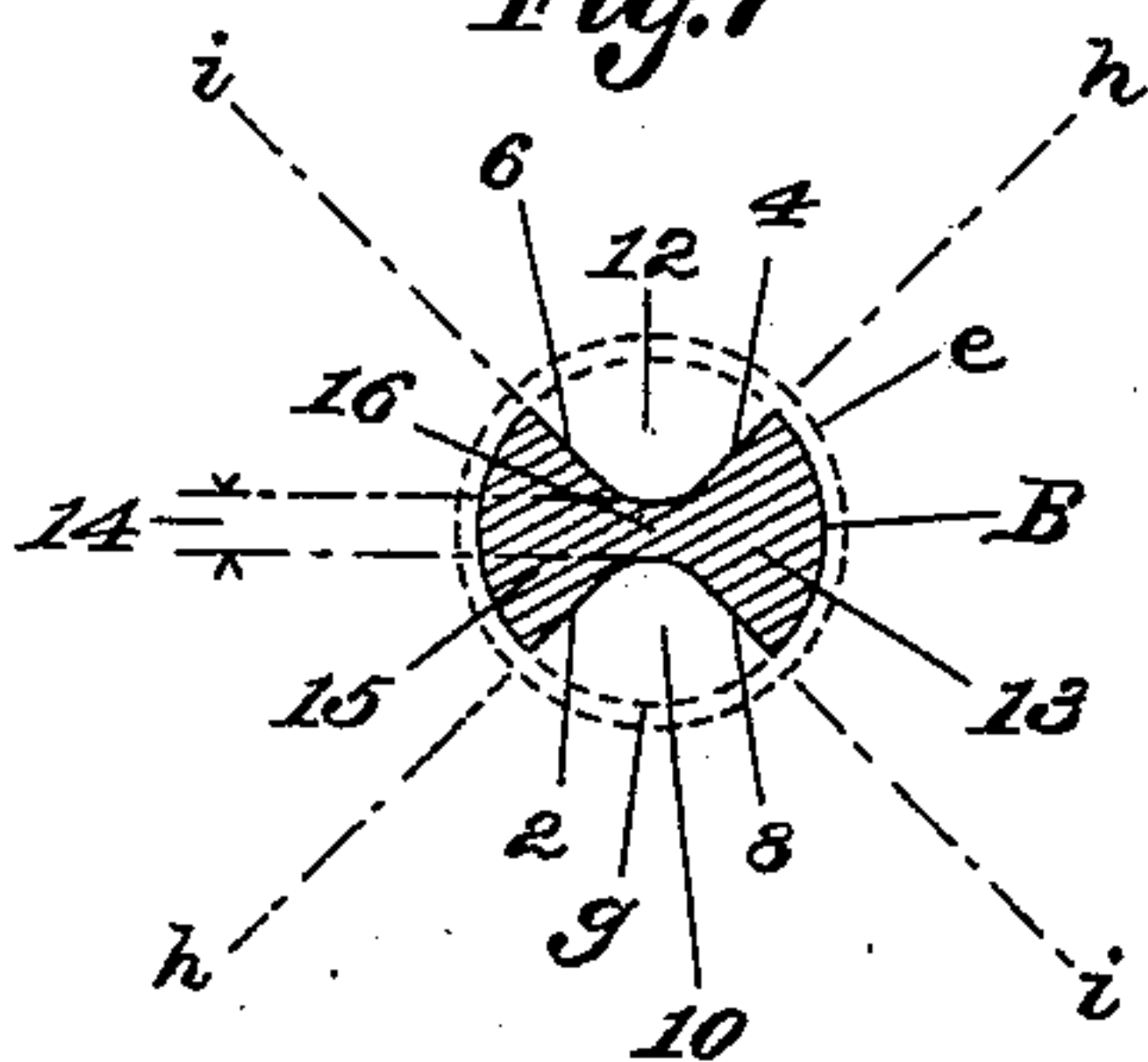


Fig. 7



Witnesses:

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UNITED STATES PATENT OFFICE.

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METAL-DRILL.

SPECIFICATION forming part of Letters Patent No. 500,213, dated June 27, 1893.

Application filed March 25, 1892. Serial No. 426,434. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Metal-Drills, of which the following is a specification.

This invention relates to that class of drills which are of the general form of a cylinder 10 grooved in the opposite sides thereof; the object being to provide a drill of improved construction adapted to be cheaply manufactured, and having its point relieved longitudinally and circumferentially, so that the drill will 15 cut freely, and have proper clearance.

In the drawings accompanying and forming a part of this specification, Figure 1 is an end view of my improved metal-drill. Fig. 2 is a side view of the drill, drawn in projection 20 with Fig. 1, and in the position which best illustrates the spread of the point, or longitudinal relief, thereof. Fig. 3 is a view similar to Fig. 1, but drawn in a different position. Fig. 4 is a view similar to Fig. 2, but 25 drawn in projection with Fig. 3. Figs. 5, 6, and 7 are cross-sectional views of the drill, in lines *a a*, *b b*, and *c c* of Fig. 4, corresponding to lines *a' a'*, *b' b'*, and *c' c'* of Fig. 2.

Similar characters designate like parts in 30 all the figures.

My improved metal-drill is adapted to be made from steel rod or bar, forged or rolled into suitable cross-sectional form, as shown, for instance, in Fig. 7, and cut to any required 35 length. Said drill-rod is of a substantially cylindrical form, as indicated by the circle *g*, Fig. 7, and is grooved on the two sides thereof to form the faces 2 and 4 on the line *h h*, and the faces 6 and 8 on the line *i i* crosswise 40 to said line *h h*. Both of said lines *h h* and *i i* are shown intersecting each other at the center of the circle *g*, (which is the axis of the drill,) and are also shown crossing each other at right angles, this being the preferred arrangement thereof. The thickness of the 45 drill between the bottom of its grooves 10 and 12 is represented by the distance 14, Fig. 7, this distance being determined by the arcs, or curves, forming the bottom of said grooves 50 10 and 12, as will be understood by comparison of the several diagrammatic lines, Fig. 7.

The normal section (Fig. 7) of the drill consists, practically, of the two oppositely-disposed quadrant-sections 13 and 15, their points joining at the axis of the drill, and connected 55 by the thin web 16. This section being symmetrical, the drill-rod may be pointed at either end, with the same result.

As shown in the drawings, the drill, designated in a general way by B, is spread at the 60 cutting-end thereof to give the required circumferential clearance represented by the space between the lines *g* and *e*, Figs. 1, 3, 5, 6, and 7. The spreading of the drill is continued only a short distance, relatively, from 65 the drill-point backward therefrom, being shown extending only to the section-line *c c*; the sides of the remaining length of the drill are in parallel lines. As seen in end view, Figs. 1, 3, 5, 6, and 7, the circumferential relief 70 extends from the cutting-faces 2 and 4, backwardly and inwardly, on spiral lines, to the opposite faces, 6 and 8, respectively, of the ribs, or quadrant-sections, 13 and 15.

The operation of shaping the end of the 75 drill-rod to spread the same to have the longitudinal and circumferential relief described, is effected by means of forging-dies of peculiar construction, which dies form the subject-matter of a separate application, Serial 80 No. 426,952, filed March 29, 1892.

The manner in which the drill-rod is spread to form the relieved cutting-points 3 and 5, respectively, is by spreading or throwing out the metal in a plane parallel with the faces, 85 2 and 4, of the quadrant-sections 13 and 15, said plane being represented by the line *h h*, Fig. 7. The spreading of the blank begins at about the line *c c* (and *c' c'*, Fig. 2), and increases regularly from thence to the point 90 of the drill. As a means for obtaining the required widening of the drill-point without misshaping the cutting-faces 2 and 4 of the drill, the opposite faces 6 and 8 of said quadrant-sections are thrown forward as indicated 95 at 7 and 9, thereby furnishing the metal required for filling out the cutting-edges in the plane, *h h*, described. This will be understood by comparison of the several figures of drawings, in connection with the preceding 100 description.

In manufacturing the drills, after the ends

thereof have been spread to obtain the required relief, the points are ground to the proper angle, and are relieved to form the cutting-edges 3'—5', after the manner of ordinary twist-drills. When the drill has, by use and continued re-sharpening, been reduced in length to about the line *aa*, it should then be reformed to bring the longitudinal relief up to its original proportions, after which the drill may be re-sharpened as before; these operations may be repeated until nearly the whole length of the piece of drill-rod has been used.

As hereinbefore stated, the drill-rod B consists of the two oppositely-disposed sections 13 and 15, set point to point and joined by the thin web at 16, Fig. 7. In the finished drill, the metal at the back of each said section, or rib, 13 and 15, is displaced by throwing the same forward to furnish the stock necessary for extending the cutting-faces 2 and 4 in the normal planes thereof, (thereby permitting of this construction of the drill-point,) and also to reduce the grinding-faces, 18 and 20, Figs. 1 and 3, of the drill.

The amount of metal necessary to be supplied for properly forming the drill-faces above described, increases, of course, with the increasing width of the drill, as will be understood by comparison of Figs. 6, 5, and 1 with Fig. 2.

Having thus described my invention, I claim—

1. The improved drill herein described, consisting of the drill-rod comprising the two oppositely-disposed parallel quadrant-sections

joined at their apexes by a web in the axis of the drill, and each of said sections having its ends widened in the plane of its cutting face to give longitudinal relief, and having the outer surface of its said widened end reduced eccentrically to the drill axis and backwardly from said cutting-face to give circumferential relief to the drill, substantially as described.

2. The improved drill herein described, consisting of the substantially cylindrical drill-rod having the opposite parallel grooves whose respective faces are in planes intersecting each other at the axis of the drill, and having its cutting end widened on tapering lines in the plane of the cutting-faces to give longitudinal relief, and having said tapered portion reduced diametrically on lines eccentric to the axis of the drill to give circumferential relief, substantially as described.

3. The improved drill herein described, consisting of the drill-rod, grooved and shaped to form two oppositely-disposed quadrant-sections, diametrically converging from their outer ends inward for a portion of the length of the drill, joined at their inner edges by an axial web, and having their outer faces eccentric to the axis of the drill, and their grinding faces of reduced width, whereby longitudinal and circumferential relief is secured to the drill, substantially as described.

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