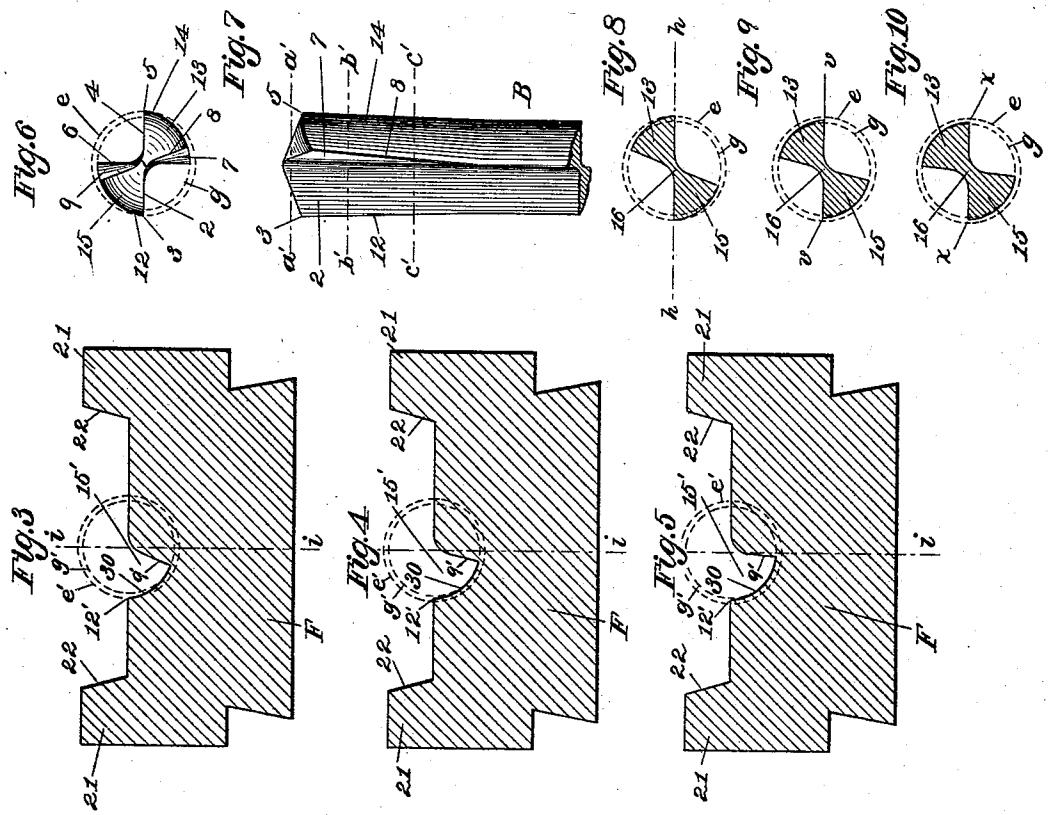
(No Model.)

F. H. RICHARDS.

DIE FOR POINTING METAL DRILLS.

No. 494,226. Patented Mar. 28, 1893.



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DIE FOR POINTING METAL-DRILLS.

SPECIFICATION forming part of Letters Patent No. 494,226, dated March 28, 1893.

Application filed March 29, 1892. Serial No. 426,952. (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 Dies for Pointing Metal-Drills, of which the following is a specification.

This invention relates to dies for pointing metal-drills of the class described in my application, Serial No. 426,434, filed March 25, 1892; the object being to furnish a pair of dies whereby one end of a drill-blank may be spread to broaden the cutting-lips in the normal plane thereof, to give the required clearance.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of a pair of drill-pointing dies embodying my invention. Fig. 2 is a plan view of the lower die. Figs. 3, 4 and 5 are vertical sections, in lines *a a*, *b b*, and *c c* of Fig. 2. Fig. 6 is an end view, and Fig. 7 a side view, of a drill pointed by means of the dies. Figs. 8, 9 and 10 are sections of the drill, in lines *a' a'*, *b' b'*, and *c' c'*, respectively, of Fig. 7, and correspond to the sections of the lower die, Figs. 3, 4 and 5, respectively.

Similar characters designate like parts in all the figures.

The improved metal-drill shown in Figs. 6 to 10, inclusive, is formed of a drill-rod consisting of two oppositely-disposed quadrant-sections, 13 and 15, having their opposite faces in planes which intersect at the axis of the drill, and are preferably, as herein shown, at right angles to each other. The two quadrant-sections join at the axis of the drill, being there connected by the thin web 16. The drill is spread for some distance backward from the point thereof, to give the required relief, the total amount of this relief being represented in Figs. 6 and 8 by the space between the dotted lines *e* and *g*. At some distance back from the point of the drill, as for instance, at the line *b' b'*, the relief is somewhat less in amount, being represented at *v v* in Fig. 9; while still farther back, as at the line *c' c'*, the relief is still less, as indicated at *x x* in Fig. 10.

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, 2 and 4, of the quadrant-sections 13 and 15, said plane being represented by the line *h h*, Fig. 8. The spreading of the blank begins at about the line *c' c'*, Fig. 7, and increases regularly from thence to the point 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 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 the drawings, in connection with the preceding description; reference being had, also, to my aforesaid application.

My present invention relates to dies constructed to shape the end of the drill-rod, B, to have relieved cutting-edges of the character set forth. The dies consist of a lower die, designated in a general way by F, and an upper die, designated by G. For holding the dies in place in a forging machine (not shown), the upper corners thereof may have the usual "dovetailed" form, as shown in Figs. 1, 3, 4 and 5. As a means for properly guiding the upper die relatively to the lower die, this die has the ribs 21—21, whose inner inclined faces, 22—22, engage and serve as guides for the upper die G, as will be understood from Fig. 1.

The drill-forming depressions, 13' and 15', of the two dies F and G, are alike, except that the same are oppositely-disposed. The face 2' of the die G is that on which the face 2 of the drill B is spread; and the face 4' of the die F is that on which the face 4 of said drill is spread, during the drill-pointing operation; these two faces, when the dies are together, as in Fig. 1, correspond to the plane *h h* of said drill-faces 2 and 4. The sections *a a*, *b b*, and *c c*, shown in Figs. 3, 4, and 5, respectively, are of the lower die only; but as the drill-forming depressions of both dies are of similar form, a detailed description of one of them will be sufficient.

The concaved face 30 of the die corresponds

to the relieved surfaces 12 and 14 of the drill, being slightly tapered from the front of the die, (where it corresponds to the normal section of the drill-rod B,) toward the back thereof. By comparing the curved line 30, Fig. 5, with the two circles e' and g', and these with the same line and circles in Figs. 4 and 3, it will be seen that the relief increases from the line $c\ c$ to the lines $b\ b$ and $a\ a$, Fig. 2. From a corresponding comparison of the line 9′ with the circles e' and g' in Figs. 5, 4, and 3, it will be seen how the face 9′ (Figs. 1 and 2) diverges from the plane of line $i\ i$, from the front toward the rearward side of the die. This divergence should be sufficient to reduce the cross-sectional area of the space 15′ in the plane $a\ a$ to a less area than that of said space at the front of the die, so that in the forging operation the space 15′ at the rearward end thereof will be entirely filled with metal, notwithstanding the allowance necessary on account of the slight longitudinal extension of the drill-rod under the pressure of the dies. For this reason, the surface 9′ is shown "warped" away from the plane $i\ i$, by a greater distance than the surface 30 is "warped" away from the circle g'. By this means a sufficient amount of the metal is thrown forward to entirely fill the die at the point 12′ and to assure the proper filling out of the drill-edges 12 and 14, Fig. 7, throughout the relieved portion of the length of the drill.

When, in using the dies, the heated blank is placed in them and force is applied thereto, the metal naturally flows in the direction of least resistance, which direction is in the plane of the die-faces and directly tends, therefore, to spread the metal in the proper direction.

The dies having been properly fixed in a suitable forging machine, as for instance, a drop-press, the heated drill-rod is placed on the lower die and struck by the upper die after the usual manner of drop-forging, thereby forcing the metal, by means of the warped die-faces hereinbefore described, to have the shape of the longitudinally and circumferentially relieved drill-point shown in Figs. 6 and 7 and more fully described in my aforesaid application. In practice, to attain the best results it is deemed preferable when first pointing the drill-blank to insert the point of the blank to about the line $c\ c$, Fig. 2, striking it one blow at this point; next, (after re-heating the blank, should this be required,) the drill-blank is advanced to about the line $b\ b$ and struck a second time, after which it is again advanced to about the line $a\ a$ and given its final size and shape. The number of these successive operations required in any particular case can readily be determined by experiment, due regard being had to the nature and condition of the metal being operated upon and the extent of the relief to be given to the drill.

Having thus described my invention, I claim—

1. The improved drill-pointing dies herein described, consisting in a pair of dies having the corresponding oppositely-disposed drill-forming spaces each corresponding on one side thereof to the plane of the die-faces, and having the other side thereof warped substantially as described for broadening and thinning the quadrant-sections of the drill-blank, substantially as described.

2. The improved drill-pointing die herein described, consisting in a die having the concaved face corresponding to the relieved surface of the drill, and the warped surface for spreading the drill-point, substantially as shown and described.

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