(No Model.)

G. H. BURROUGHS.

TWIST DRILL.

No. 302,235. Patented July 22, 1884.

Fig. 1.

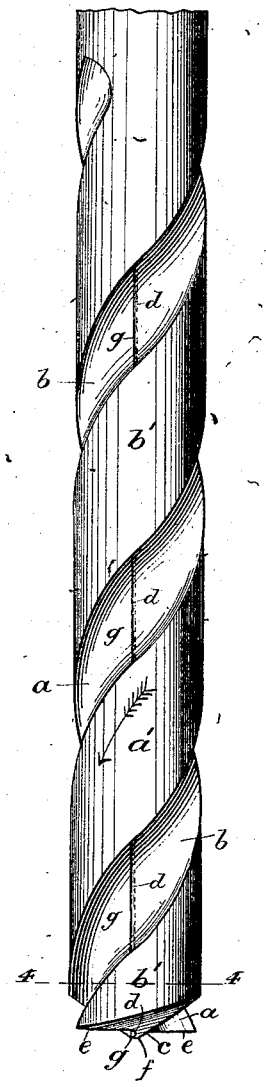


Fig. 3.

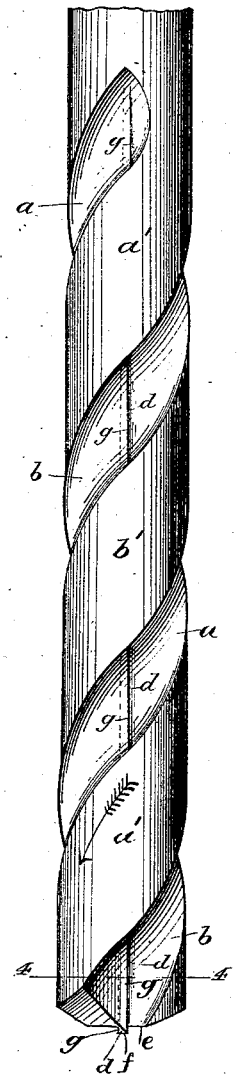


Fig. 5.

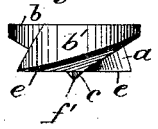


Fig. 6.

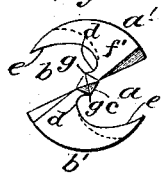


Fig. 7.

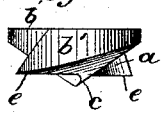


Fig. 8.

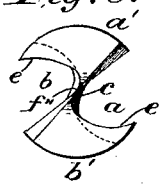


Fig. 2.

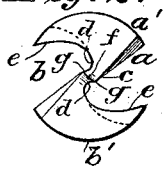
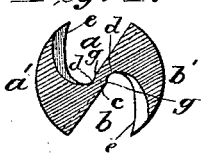


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE H. BURROUGHS, OF PRINCETON, NEW JERSEY.

TWIST-DRILL.

SPECIFICATION forming part of Letters Patent No. 302,235, dated July 22, 1884.

Application filed July 8, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. BURROUGHS, a citizen of the United States, residing at Princeton, in the county of Mercer and State of New Jersey, have invented an Improvement in Drills, of which the following is a specification.

My improved drill simulates somewhat in general form a twist-drill, but there is an important difference in the formation of the cutting-edge, for in the common form of drill, the tool having straight cutting-edges so formed as to meet at a point at a right angle, or one slightly larger, makes its way by a direct thrust, crushing and mashing the metal before it. My drill is formed so as to make a shaving and draw or shear cut from circumference toward the center in a horizontal or nearly horizontal plane, which causes the tool to advance much more rapidly. To this end I construct my drill with blades curved spirally, so as to present a sickle-shaped cutting-edge, the portion of the bit in the rear of the edge being inclined upward to direct the chips or shavings into the winding groove. From actual test I find that the shear cut thus provided enables the drill to work, other things being equal, much more swiftly and effectively than the ordinary drill having a straight or nearly straight cutting-edge. In order to produce the most perfect shear cut, the proper form of the cutting-edge is a curve which cuts every radius at the same angle—viz., a logarithmic spiral, (equation, $r = a^{v}$.) This shape of the blade accounts for the vastly accelerated speed with which the tool cuts. The spiral cutting-edge should lie as near as may be in a plane at right angles to the drill-axis—a construction allowed by the spiral shape thereof, but which would be non-operative with the common drill having a straight cutting-edge. With this construction the drill forms in every instance a full circular hole with a flat clean bottom, instead of the conical and broken one left by the common drill. The winding form of the cutting-edge also is advantageous, by aiding the throwing out of the chips. The drill is also true to gage, and is of the same section the whole length of the groove. It can, therefore, be resharpened and used for a long time. To aid in grinding the tool when being sharpened, so that it may be always correctly centered, I form down the drill in each groove a recess at the inner side, commencing at the point, so as to leave an angle or longitudinal ledge or wall at the juncture of the curved portion with the flat portion of the groove. By keeping the "point" of the drill during sharpening always on a line between the ends of these angles or ledges, the drill will at all times be perfectly centered, and will always cut holes of equal diameters.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 represents an elevation of my improved drill. Fig. 2 is a view of the face of the lower portion thereof removed on the line 4 4, Figs. 1 and 3. Fig. 3 is an elevation of the drill about at right angles to that shown in Fig. 1. Fig. 4 is a plan of a section of the lower end of the drill removed on the line 4 4, Figs. 1 and 3. Fig. 5 is an elevation of the lower portion of a drill, showing a modification in the form of point. Fig. 6 is a face view thereof. Fig. 7 is an elevation of the lower portion of a drill, showing another modification in the form of point. Fig. 8 is a face view thereof.

The drill here represented is formed with a double twist providing two winding grooves, *a* and *b*, between screw-shaped portions *a'* and *b'*, leaving a central longitudinal connecting-web, *c*.

d are longitudinal recesses at the inner sides of the grooves, near the center of the drill, forming angles or ledges *g*, parallel to the axis of the drill, between the lower ends of which stretches the sharp transverse edge, forming the point *f* of the drill. In sharpening the drill, the operator having care to retain the position of the point between the lower ends of the angles, the center will be kept perfectly true.

e e are the cutting-edges, lying in a plane at right angles to the axis of the tool, and spirally curved in this plane, as clearly shown in the drawings. The body of the tool to the rear of the cutting-edges inclines upward, which forms means to direct the shavings or chips away from the point.

Figs. 1, 2, and 3 represent the drill with a simple chisel-shaped point, *f*, at the junction

of the cutting-edges. Figs. 5 and 6 show the tool with a pyramidal central point, *f'*, square in cross-section, and Figs. 7 and 8 one with the extremity projecting beyond the cutting-edges, ground to a sharp point, *f''*. Any one of these or other form of central point may be used, as desired. The pyramidal and the sharp-edge forms, however, aid materially in effecting the entry of the drill.

It is evident that the construction herein described is not only applicable to metal drills, but to all instruments—as reamers, milling-tools, &c.—cutting after the manner of a drill, together with all combinations of the same, provided these employ the spiral blade and sliding cut.

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

1. A drill having a spirally-curved cutting-edge adapted to make a draw or shear and shaving cut, substantially in the manner and for the purpose set forth.

2. A drill having a curved cutting-edge lying in or nearly in a plane at right angles to the axis of the drill, so as to give the drill a draw or shear and shaving cut, substantially as set forth.

3. A drill having longitudinal recesses at the inner sides of the grooves, forming ledges or angles adapted to guide in sharpening the drill, as set forth.

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