

J. W. KELLY.
 DRILL.

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Fig. 1.

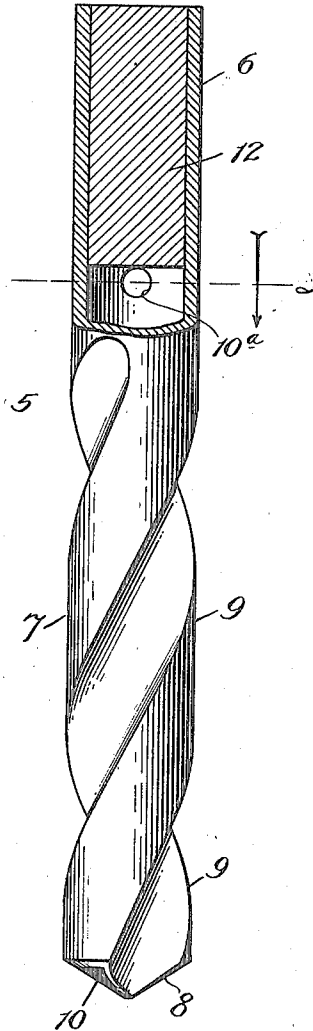


Fig. 3.

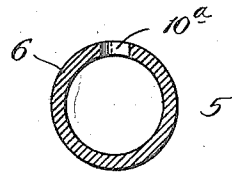


Fig. 4.

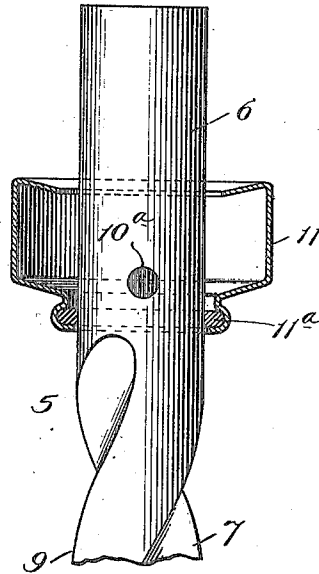
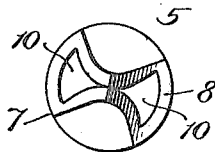


Fig. 2.



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UNITED STATES PATENT OFFICE.

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DRILL.

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To all whom it may concern:

Be it known that I, JAMES W. KELLY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Drills, of which the following is a specification.

The primary object of my invention is to economize in the use of the costly high-speed steel for drills, and provide a drill made of a tube, and thus of a comparatively small amount of metal, which shall be as strong for resisting torsional strains as the ordinary solid-metal drill. To this end I make my improved drill out of suitable tubular metal by pressing opposite longitudinal wall-sections of the tube inwardly toward each other, thereby rendering it longitudinally concave along diametrically opposite sides, and spirally twisting the concaved portion to produce the drilling section, which is provided with a cutting extremity.

In the accompanying drawing, Figure 1 is a view in elevation, partly sectional, of my improved drill; Fig. 2 is an end view of the same presenting the cutting extremity; Fig. 3 is a section on line 3, Fig. 1, and Fig. 4 is a broken view in elevation showing a lubricant-feed cup in section, surrounding the straight end-section of the drill for insertion into a chuck and provided with an opening for lubricant from the supply in the cup.

To make my improved drill a metal tube of desired diameter and preferably of the kind or quality of steel known as "high speed steel," is compressed, as by drawing it in heated condition between suitable dies, to concave or groove it longitudinally along diametrically opposite sides throughout a length that is designed to constitute the cutting section of the drill, and leaving uncompressed the chuck-section 6, or part for insertion into a chuck. The longitudinal grooves should, for purposes of strength, be sufficiently deep to bring their central portions into contact with each other, as represented in Fig. 2. The grooved section is spirally twisted to form the section 7 of the drill, which is provided with a cutting extremity 8. The edges 9 of the spiral should be sharpened, as indicated, to afford a new cutting extremity 8 each time the latter is ground.

The twisted grooved section of the tube

forms spiral ducts 10, 10 extending through it to the cutting end 8, for conducting to the latter lubricant fed to the ducts through an opening 10^a provided in the chuck-section, which may carry a cup 11 (Fig. 4) for holding a supply of the lubricant and automatically feeding it into the drill. This cup, which is preferably of sheet-metal, is provided in its neck-portion with an elastic gasket 11^a to hug the drill and support the cup in place thereon at the feed-opening 10^a.

The tubular section 6 requires reinforcement to resist the pressure of fastening it in a chuck, and to that end it has a plug 12, preferably of relatively cheap metal, driven into it.

The amount of metal required for my improved drill does not much, if at all, exceed about one-third of that for a solid drill. The incidental lubricating facility which the construction affords, by directing the lubricant through the spiral interior of the section 7 to the drill-point 8, tends to keep the cutting end cool and thus to prolong the life of the drill. Moreover, the construction renders the drill, when made of low-speed steel, adequately strong for its purpose; and the feed of lubricant which it provides through the tortuous ducts to the cutting point, by keeping the latter cool, so prolongs the life of the drill as to render it, as to the matter of impairment by the heat from friction in drilling, almost, if not quite as resistant as when made of high-speed steel.

What I claim as new and desire to secure by Letters Patent is—

1. A drill comprising a metal tube formed into an exterior and interior spirally-twisted section, the internal spiral forming a lubricant-duct leading to the cutting extremity of the drill.

2. A drill comprising a metal tube formed into a straight chuck-section and an exterior and interior spirally-twisted section, the internal spiral forming a lubricant-duct leading to the cutting extremity of the drill.

3. A drill comprising a metal tube provided with concave wall-sections and formed into an exterior and interior spirally-twisted section provided with a cutting extremity, the interior spiral forming a lubricant-duct leading to said cutting extremity.

4. A drill comprising a spirally-twisted metal tube provided with concave wall-sections contacting along their inner sur-

faces, the concavities forming external sharp-edged grooves in the twisted tube, extending to the cutting extremity of the drill.

- 5 5. A drill comprising a metal tube having a section formed of longitudinally-concave opposite wall-portions spirally twisted to form external and internal spiral grooves in said section, and a reinforced straight section, the internal spiral forming a lubricant-
10 duct leading to the cutting extremity of the drill.

6. A hollow drill comprising a metal tube having a spirally-twisted section provided with concave wall-sections contacting along their inner surfaces and forming in said section external spiral grooves and tortuous internal lubricant-ducts extending to the cutting extremity of the drill, and a reinforced straight chuck-section provided with a lubricant-inlet opening. 15

JAMES W. KELLY.