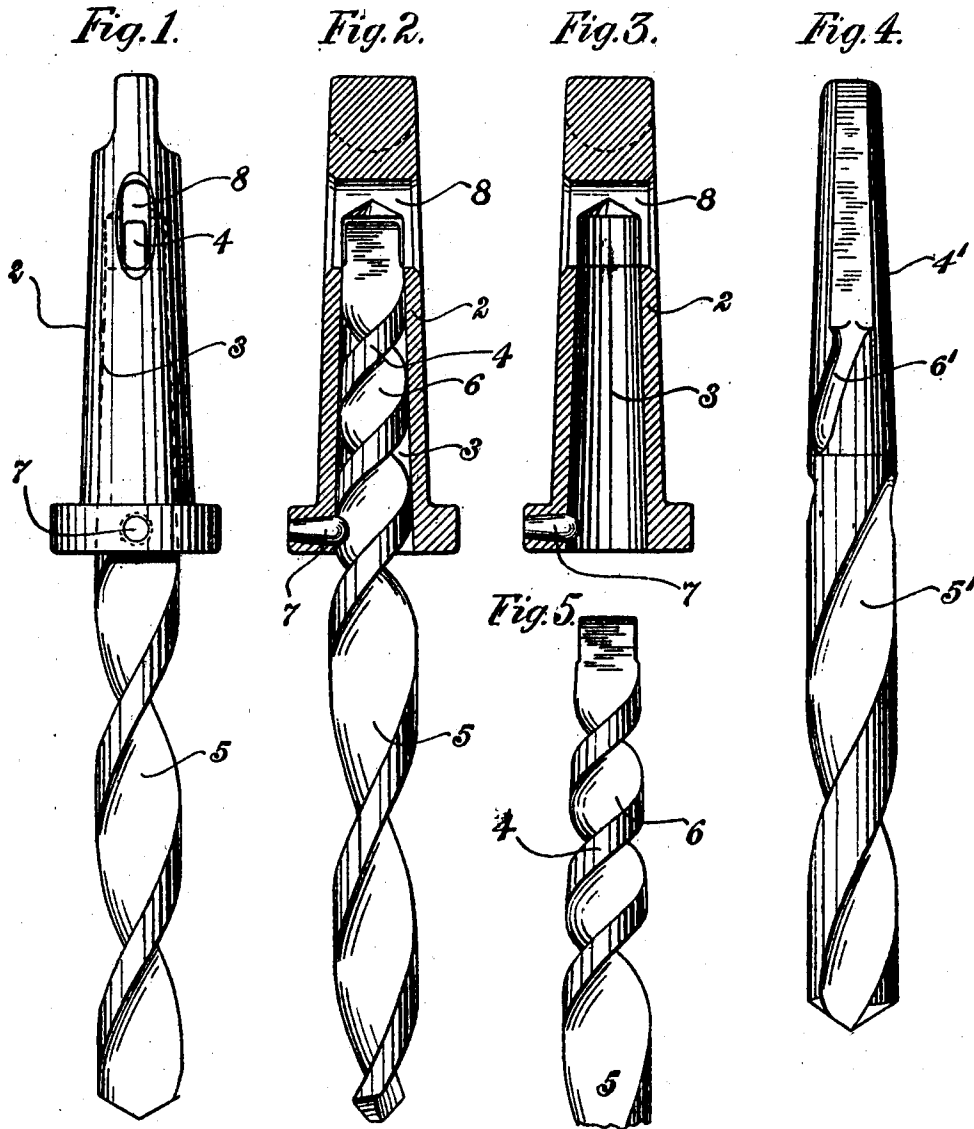


F. G. ECHOLS.
 DRILL AND SOCKET CONSTRUCTION.
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1,020,544.

Patented Mar. 19, 1912.



Witnesses:

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UNITED STATES PATENT OFFICE.

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DRILL AND SOCKET CONSTRUCTION.

1,020,544.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANCIS G. ECHOLS, 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 Drill and Socket Construction, of which the following is a specification.

This invention relates primarily to a drill and socket construction, although as to all features it is not restricted to drills, but may be employed in connection with other tools.

It is usual to make the interior of a drill socket on a taper, and to correspondingly externally taper the shank of the drill, thereby providing a frictional driving relation between the socket member and the drill, such relation being augmented by a flat tang at the end of the drill shank, which tang is fitted to a corresponding recess in the socket. This construction is defective in that the frictional grip of the socket member upon the drill shank is dependent upon endwise pressure upon the drill, such as is developed by feeding the drill into the work. This is frequently insufficient to produce the frictional grip required to drive the drill. Undue strain is then thrown on the tang, causing the same to break in the socket so as to make removal of the drill difficult, and in many cases distorting or injuring the drill shank or socket member, or both, so as to render one or both of the parts defective or useless.

I provide a construction whereby the difficulties mentioned are wholly eliminated.

According to one feature of the invention means are provided whereby a grip of the socket upon the drill shank is produced by the relative turning or rotation of the socket member and drill shank, the construction in its best form being such that, whatever resistance to turning is met by the drill when being forced into a piece of work, there will be automatically and instantaneously produced a corresponding grip of the socket upon the drill shank. This construction is such moreover that the grip due to turning effort or torque is independent of any grip due to endwise pressure, so that even if no endwise pressure be exerted, as when the point of the drill has passed through the work, there can be no slip of the socket and no undue strain upon any part of either

member such as would be apt to distort or destroy either of them.

While in its broader aspects the invention is not restricted to a particular form of the socket and drill shank, I prefer that these parts be on a taper, one of the parts being provided preferably with projecting means and the other with a spiral groove to receive said projecting means, so that when any turning effort is exerted between the parts in the direction required for drilling, the shank will be drawn into the socket and wedged solidly therein. I find that I can secure the best results by locating the projecting means within the socket and by having a spiral groove on the drill shank.

In the drawings accompanying and forming part of the present specification I show in detail certain forms of embodiment of the invention which to enable those skilled in the art to practice the same will be set forth fully in the following description, while the novelty of the invention will be included in the claims succeeding said description. From these observations it will be apparent that I do not restrict myself to the showing made by said drawings and description.

Referring to said drawings: Figure 1 is a side elevation of a drill and socket therefor involving my invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a longitudinal sectional view of the socket. Fig. 4 is an elevation of a modified form of drill. Fig. 5 is an elevation of the shank of the drill shown in Figs. 1 and 2.

Like characters refer to like parts throughout the several figures of the drawing.

In the drawings the numeral 2 denotes a drill socket which has an inwardly tapered opening 3 for receiving the correspondingly tapered shank 4 of the drill 5. The shank 4 has a spiral or worm groove 6 therein, and this worm groove may for example be formed by spirally twisting a flat shank on itself. In Fig. 4 the worm or spiral groove 6' is formed in the shank 4' of the drill 5' by milling. The groove preferably is of a relatively great pitch so that the drill may be removed by pressure applied to the end. Coöperative with the worm or spiral groove 6 is an internal projection 7 in the tapered opening 3, and this projection can be obtained in various ways. It is shown in Figs.

1, 2 and 3 as consisting of the rounded or substantially spherical end of a pin. To connect the drill with the socket, the shank 4 will be introduced into the opening 3 in such way that the projection 7 will enter the worm or spiral groove 6, and it follows that when the drill is introduced into the socket and turned as by hand, it will be drawn inward by the coöperation of the spiral groove and projection 7. The drill will, of course, be turned by hand, until it is seated in place. The socket may be mounted in the usual manner and the drill started to work on stock, and it will be evident that if there is any relative turning motion of the drill and socket, the projection 7 and the spiral groove 6 (or 6') will draw the drill shank into the socket and the greater the resistance met by the drill, the more firmly will the latter be gripped by the socket into which it is drawn. It will be evident also that this gripping action due to the turning effort of the socket member upon the drill will be independent of and in addition to any gripping effect due to any endwise pressure upon the drill. Furthermore, it will be observed that, while some torque may be exerted through the projection and groove walls, any strain, thus exerted will automatically and instantly produce a much greater torque resistance between the socket member and drill shank than could possibly be exerted by the projection and groove. There is no liability therefore that undue strain will be thrown upon the projection or groove walls; or other parts, such as would be apt to distort or injure them, or throw the drill out of true, or cause chattering or other defects in construction or operation.

I prefer that the worm or spiral portion of the appliance, whether the same be on the drill shank or in the socket, be of such pitch that the drill can be freely withdrawn either by thrust applied to the butt or inner end thereof or a pull upon the body portion

thereof. The parts are so organized in the present instance that the drill is removed by a thrust applied to the inner or butt end thereof, and for this purpose the socket 2 may have a slot 8 to receive a drift or key for attaining the object in question.

What I claim is:

1. The combination of an internally tapered socket, and a drill having a correspondingly tapered, spiral portion in the socket, the latter having a projection coöperative with said spiral portion to draw the tapered portion of the drill into the socket on the relative rotative motion of the drill and socket, the pitch of said spiral portion being such as to permit withdrawal of the drill from the socket on the application of forward endwise thrust thereto.

2. The combination of an internally tapered socket, and a drill having a correspondingly tapered, spiral portion in the socket, the tapered portion of said drill being spirally grooved and the socket having projecting means therein extending into said spiral groove to thereby draw the tapered portion of the drill into the socket on relative rotative motion of the drill and socket, the pitch of the groove being such as to permit the shank being driven from the socket while said projecting means is in operative position.

3. The combination of an internally tapered drill socket, and a drill having a correspondingly tapered spiral portion in the socket, the latter having internally fixed projecting means coöperating with said spiral portion, to draw the tapered portion of the drill into the socket on relative rotative motion of the drill and socket.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS G. ECHOLS.

Witnesses:

HEATH SUTHERLAND,
W. U. LARKUM.