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R. H. HOLSING  
ROTARY PERCUSSION DRILL

2,667,373

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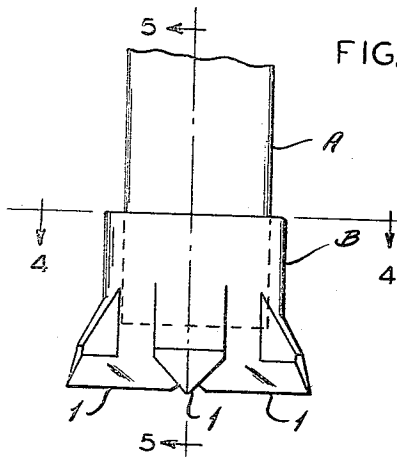


FIG. 1.

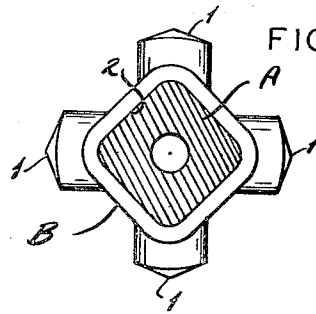


FIG. 4.

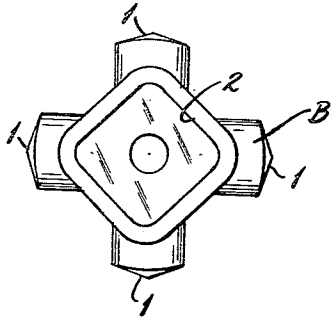


FIG. 2.

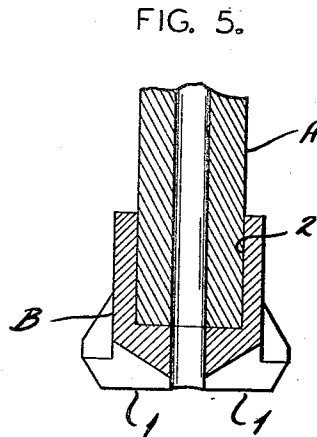


FIG. 5.

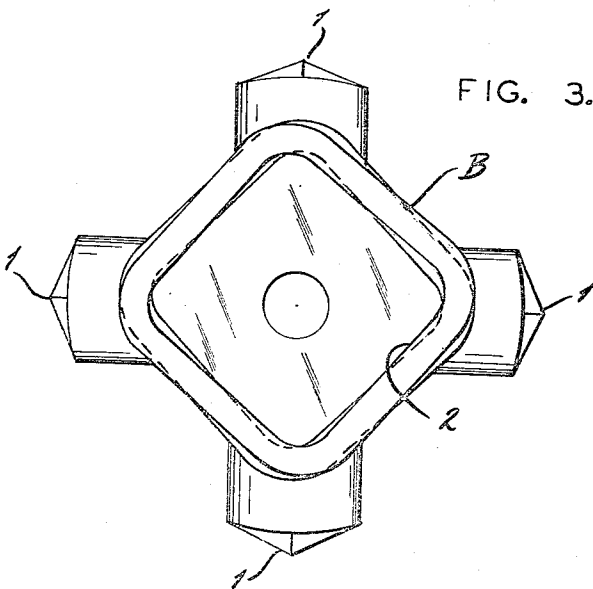


FIG. 3.

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## UNITED STATES PATENT OFFICE

2,667,373

## ROTARY PERCUSSION DRILL

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4 Claims. (Cl. 287—126)

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This invention relates to rotary percussion drills of the kind comprising a drill rod and a separable bit therefor having forward cutting edges and a rearwardly opening central socket adapted to receive one end of the said drill rod. Bits and drill rods of this general type are commonly provided with interengaging threads or with separate devices for removably securing the drill bit to the drill rod; and all of such prior constructions are difficult and expensive to produce and involve danger of breakage of weak parts, accidental separation of the drill bit from the drill rod and binding of the parts to such an extent that separation is prevented.

The present invention is concerned with overcoming the above mentioned disadvantages, and its principal object is to provide a strong automatic friction grip between the drill bit and the drill rod to provide economy of manufacture, to eliminate separate fastening devices and to permit easy separation of the parts, when desired, without accidental separation thereof. The invention consists principally in providing the separable drill bit with a multisided drill rod receiving socket which is twisted upon itself about its central longitudinal axis and in providing the drill rod with a straight multisided end portion adapted to be forced endwise into the twisted socket portion, thus straightening the twisted socket therein, whereby the tendency of the untwisted socket portion to return to its twisted position provides a friction grip between the corresponding sides of the socket and rod end which will firmly hold the parts together against relative endwise and rotary movement and which, at the same time, will permit easy separation of the parts. The invention also consists in making the twisted socket of the bit resilient so as to exert a constant pressure against the drill rod and thereby increase the frictional grip of the twisted socket on the drill rod.

In the accompanying drawing, which forms part of this specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a side elevational view of a separable drill bit and rod assembly embodying my invention,

Fig. 2 is an end elevational view of the socket end of the separable drill bit, showing the socket before it is twisted and heat treated,

Fig. 3 is a view similar to Fig. 2, showing the socket after it is twisted and heat treated,

Fig. 4 is a cross-sectional view on the line 4—4 in Fig. 1; and

Fig. 5 is a central vertical longitudinal view on the line 5—5 in Fig. 1.

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In the accompanying drawing, my invention is shown embodied in a rotary percussion drill comprising a drill rod A and a separable drill bit B therefor having any desired number and arrangement of cutting and drilling edges 1 at the working end thereof and a central rearwardly opening socket 2 adapted to receive the end of said drill rod.

In accordance with the present invention, the socket 2 of the bit B is formed with a flat bottom and a multiplicity of flat side walls, said socket preferably being square in cross-section. The socket engaging end of the drill rod A is also of square section and is equal to or slightly less than the square socket 2 in the bit B. As shown in Fig. 3, the square socket 2 of the separable bit B is twisted upon itself by turning the outer end portion of said socket relative to the inner end portion thereof about the central longitudinal axis thereof, after which the socket is heat treated to increase the resiliency thereof. The drill rod A and separable drill bit B are then assembled by forcing the square end of the drill rod endwise in the square twisted socket 2 of the bit preferably the full depth of said socket, thereby completely or partially straightening or untwisting the twisted socket, depending on the snugness of the fit of the rod in the socket.

With the parts thus assembled, the tendency of the untwisted multisided socket 2 of the bit B to return to its twisted condition creates a strong friction grip between the sides of the socket and the corresponding sides of the multisided portion of the drill rod A therein, thus firmly securing the bit to the drill rod. The socket 2 of the bit is twisted in the direction of the drilling rotation so that the rotative force while drilling is applied at the lower portion of the socket and not against the spring tension of the upper portions of the sides thereof.

The hereinbefore described construction has several important advantages. It is simple and easy to manufacture and provides a strong automatic friction grip between the drill bit and rod merely by forcing the square end of the drill rod into the twisted square socket provided therefor in the bit. The friction grip between the drill rod and socket prevents accidental separation of the parts and also permits easy separation of the parts, when desired, merely by driving the bit off of the engaging end of the drill rod. Special fastening devices and threading of the parts are dispensed with. The drill rods may vary appreciably in size and still provide a firm friction grip between the drill rod

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and the socket provided therefor in the bit. The smaller size drill rods counteract only part of the twist in the socket of the drill bit, but still provide a sufficient frictional grip to prevent separation of the parts and to provide equal contact for drilling. The socket of the drill bit and the portion of the drill rod therein may be provided with any desired number of cooperating flat faces.

What I claim is:

1. A drill comprising a drill rod and a separable drill bit therefor, said drill bit having a non-circular socket that is twisted upon itself about its longitudinal axis in the direction that the drill is to be rotated and said drill rod having a similar untwisted non-circular end portion adapted to be forced endwise into said twisted socket, thereby untwisting said socket and thus providing a frictional grip between the sides of said socket and rod end therein.

2. A drill comprising a drill rod and a separable drill bit therefor, said drill bit having a multi-sided socket that is twisted upon itself about its longitudinal axis and said drill rod having a similar untwisted multisided end portion adapted to be forced endwise into said twisted socket, thereby untwisting said socket and thus providing a frictional grip between the sides of said socket and rod end therein.

3. A drill comprising a drill rod and a separable drill bit therefor, said drill bit having a substantially rectangular socket that is twisted upon itself about its longitudinal axis and said drill rod

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having an untwisted substantially rectangular end portion that is forced endwise into said twisted socket thereby untwisting said socket and thus providing a frictional grip between the flat sides of said socket and rod end therein.

4. A drill comprising a drill rod and a drill bit one of which provides an axially open socket into which the other member is axially inserted, the socket of said one member providing a multiplicity of side walls and the inserted end of said other member having similar side walls, the side walls of one of said members being initially and permanently angularly twisted about a common longitudinal axis and the side walls of the other of said members being axially straight, insertion of said other member into said open socket thereby tending to reverse the angularly twisted side walls of said one of said members for creating a strong frictional grip therebetween.

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