Oct. 1, 1940. B. C. TWISS 2,216,361

BIT FOR RECIPROCATING PNEUMATIC ROCK DRILLS

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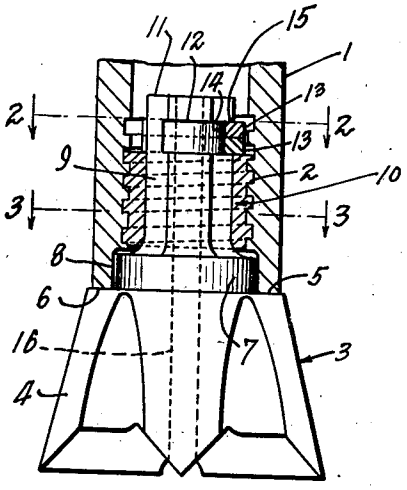


Fig. 1.

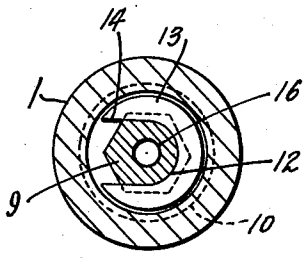


Fig. 2.

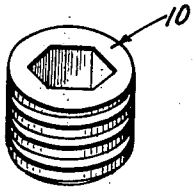


Fig. 4.

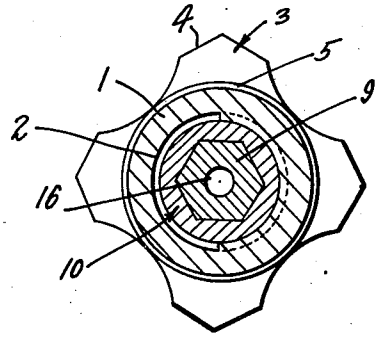


Fig. 3.

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BIT FOR RECIPROCATING PNEUMATIC ROCK DRILLS

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3 Claims. (Cl. 255—63)

This invention relates to a bit such as used on a reciprocating rock drill. The bits of these drills are usually reciprocated by compressed air, and the wear on the bit is considerable. On this account it has been common practice heretofore to mount the bit removably on the forward end of the drill rod or spindle, by threading its shank into a threaded socket. In order to overcome the necessity for discarding these bits when they are worn down considerably, it has been the practice to dress these bits from time to time, and this of course necessitates heating the bit to a high temperature to enable it to be dressed. Incidentally, the shank of the bit becomes highly heated, which is injurious to the threads on the shank, and this is objectionable. The general object of this invention is to produce a construction at the forward end of the drill bar or rod, that will overcome this objection, and which will provide a construction which will employ threads for holding the bit in place, but without necessitating the use of threads on the shank of the bit.

A further object of the invention is to accomplish the above stated object, and at the same time provide the usual contacting shoulders between the bit and the end of the drill rod, to insure that an effective blow will be delivered by the drill bit; also to provide a construction in which the shoulder or face on the end of the drill rod that receives the blow, is in line with the upward stresses that are developed in the periphery of the bit when it strikes the rock.

A further object is to provide a construction for mounting the bit removably without reducing the effective cutting area of the under face of the bit.

In the operation of these drills, the drill rod is rotated automatically during its reciprocation, and one of the objects of the invention is to provide a construction which, while it avoids the necessity for employing a threaded shank, will nevertheless enable the rotary movement of the drill rod or spindle, to be imparted to the bit.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient bit for reciprocating pneumatic rock drill.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a vertical section through the forward end of a drill rod or spindle, and illustrating the bit with the means that I employ for securing the same in place.

Fig. 2 is a horizontal cross-section taken on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section taken about on the line 3—3 of Fig. 1.

Fig. 4 is a perspective of a threaded sleeve in which the shank of the bit is carried.

Before proceeding to a more detailed description of the invention, it should be stated that I am aware that heretofore rock bits have been removably secured to the end of the drill rod. In one such prior construction the bit is provided with a central opening carrying a nipple with a head to support the bit, the upper end of the nipple being threaded into the lower end of the drill rod. This construction, however, leaves a central area on the under side of the bit that is not struck by the bit proper when the blow is delivered to the rock, and hence in order to cut up this portion of the hole it is necessary to construct the head of the nipple so that it can operate as a cutting tool. This is objectionable. In another type of construction in which the bit is removably secured to the drill rod, the bit is carried on the lower end of a centrally disposed nipple that is threaded into the lower end of the drill rod, and the bit is secured to the projecting lower end of the nipple by means of a bayonet slot cut in the face of the projecting portion of the nipple. This type of construction has the same objection noted in connection with the former prior construction referred to above, namely, the presence of the end of the nipple at the lower face of the bit forms a blank cutting center for the bit, which necessitates forming the lower end of the pin or nipple as a cutter. In other types of removable bits, the bit is provided with an internally threaded hub or shank, and these internal threads are apt to scale off and become injured when heating such a bit to dress it. In accordance with my invention, the bit is secured in the lower end of the drill rod in such a way that the lower cutting face of the bit is left unobstructed. In other words, the entire lower face of the bit performs its cutting function except for the presence of the usual water duct that generally passes down through the center of such a bit. Furthermore, the bit is supported in such a way that the rotary movement of the drill rod is positively imparted to it. At the same time, the construction is such that when it is necessary to redress the bit, it can be quickly removed from the drill rod.

Referring more particularly to the parts,

represents the lower end of the drill rod, the lower end of which is formed into a threaded socket 2 to provide for supporting the bit 3. This bit is provided below, with a body 4 of any suitable construction, at the upper portion of which an annular shoulder 5 is formed that seats tight (as shown) against the lower end or shoulder 6 which, in the present instance, is the extreme lower end or end face of the drill rod. Hence the concussion of the blow is imparted through this shoulder to the end of the drill rod. Above the shoulder 5 the bit is preferably formed with an integral cylindrical collar 7, which is received in a counter-bore 8 formed at the end of the drill rod, and from the upper side of this collar 7 a shank 9 extends upwardly. This shank is received in an externally threaded sleeve 10, and the interior or "bore" of this sleeve and the shank 9, are constructed so that the shank is non-rotatably held in the sleeve. In the present instance, I prefer to perform the inner side of the sleeve and the shank with one or more flat faces that engage each other. As illustrated in Figures 1 and 4, the shank and the sleeve are constructed of hexagonal form so that they present a hexagonal cross section.

Any suitable means may be provided for holding the shank up in the sleeve, and so that the shoulder 5 will be held tight against the shoulder 6 of the drill rod. In order to accomplish this, I prefer to form the shank 9 of sufficient length to enable its upper end 11 to project above the upper end of the sleeve 10, and at this point a slot 12 is cut extending around on three sides of the shank. If desired, this slot may have a U-shaped form, illustrated in Figure 2. In this slot I mount one or more washers 13, each of which has a U-shaped slot 14. The uppermost washer extends under the shoulder 15 formed in the upper edge of the slot, the lower end of the washer, or washers, seating on the upper end of the sleeve 10. In this way the shoulder 15 supports the bit.

The bit is preferably provided throughout its length with a central duct 16, which enables water to be supplied at the cutting face of the bit.

In practice, the upper end of the drill rod 1 is attached to the lower head, or cross head, carried by the piston rod, sometimes called the "bare" of the piston head. It is the usual practice for the pneumatic drill in operation, to rotate the drill rod automatically. This of course, is usually a rotation in a left-hand or anti-clockwise direction in the hole, and in that case the threads of the sleeve 10 would be left hand threads, so that rotation in the hole tends to tighten the threads. This insures that the bit will not come loose in use.

Whenever it is necessary to redress the bit, it is merely necessary to hold the drill rod 1 firmly while the drill bit is rotated in a left-hand direction. This will unscrew the sleeve 10, and the sleeve can then be removed from the shank after removing the washers 13. The bit can then be reheated for redressing. If the sleeve is removable as illustrated, then the bit can be heated without the necessity for heating any threads carried by the bit.

Many other embodiments of this invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In a reciprocating rock drill, the combination of a reciprocating drill-rod, having a threaded socket at its forward end, a bit having an annular shoulder seated tight against the drill-rod and having a single shank extending up from the level of the shoulder into the end of the drill-rod, a removable sleeve having external threads engaging the threads of said socket and receiving the said shank, said shank and said sleeve constructed so that the sleeve is non-rotatable on the shank; and means at the upper end of the shank for supporting the same on the upper end of the sleeve, said bit and drill-rod cooperating so that the concussion of the blow is imparted through said shoulder to the end of the drill-rod.

2. In a reciprocating rock drill, the combination of a reciprocating drill-rod, having a threaded socket at its forward end, a bit having an annular shoulder seated tight against the drill-rod and having a shank extending up into the end of the drill-rod, a loose fitting sleeve on the shank having external threads engaging the threads of said socket and receiving the said shank, said sleeve having a bore with a substantially flat face, and said shank having a flat face engaging the flat face of the bore so that the sleeve is non-rotatable on the shank; said shank having means for retaining the sleeve, and said bit and drill-rod cooperating so that the concussion of the blow is imparted through said shoulder to the end of the drill-rod.

3. In a reciprocating rock drill, the combination of a reciprocating drill-rod, having a threaded socket at its forward end, a bit having an annular shoulder seated tight against the drill-rod and having a shank extending up into the end of the drill-rod, a removable sleeve having external threads engaging the threads of said socket and receiving the said shank, said shank having an angular cross-section, and said sleeve having a bore of angular form fitting to the said shank so that the sleeve is non-rotatable on the shank; and means at the upper end of the shank for supporting the same on the upper end of the sleeve, said bit and drill-rod cooperating so that the concussion of the blow is imparted through said shoulder to the end of the drill-rod.

BENJAMIN C. TWISS.