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2,938,709

PERCUSSIVE ROCK DRILL BIT

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FIG. 1.

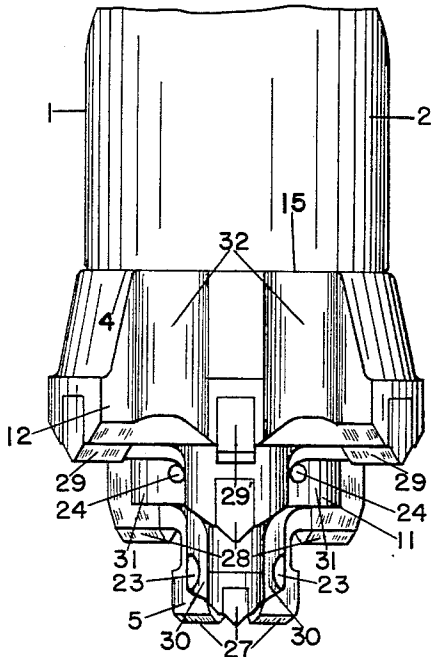


FIG. 2.

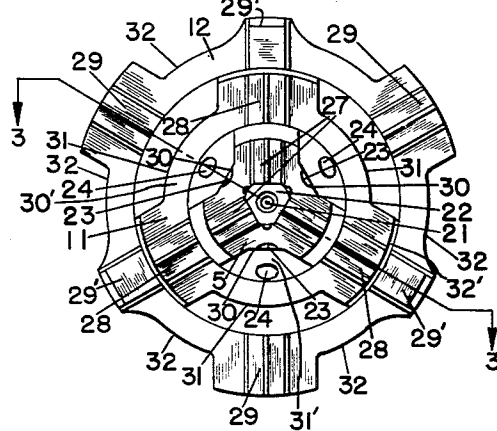


FIG. 3.

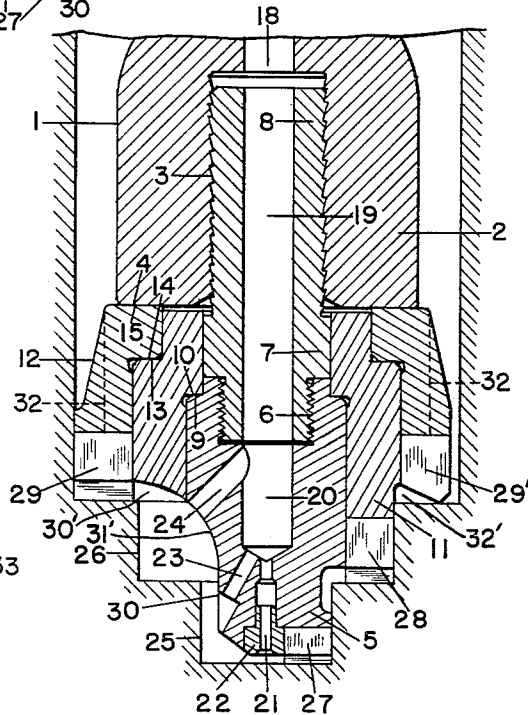
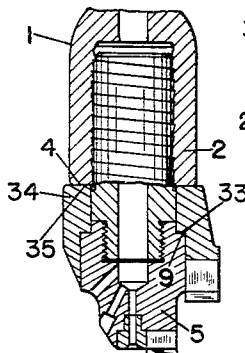


FIG. 4.



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PERCUSSIVE ROCK DRILL BIT

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3 Claims. (Cl. 255—63)

This invention relates to drill bits and more particularly to a multi-cutter rock drill bit having concentric bit elements secured to the percussively actuated drill steel and separately removable for reconditioning or replacement.

In multi-cutter rock drill bits of a conventional design the percussively actuated drill steel has a threaded forward portion to which the outer element of concentric bit elements is attached and the inner and outer bit elements are usually threadedly secured together so that the impact blows are transmitted from the drill steel through the threaded couplings. The present invention contemplates improvements over such known type of bits in that the concentric bit elements are attached to the drill steel in an improved manner so that the impact blows are transmitted by the drill steel to the bit elements independently of the attaching means. In this improved design the inner bit element is attached to the drill steel and the outer bit elements have abutting shoulders with the outer element abutting against the front end of the steel and the inner bit element holds the concentric bit elements together firmly against the steel shoulder. Thus, the impact blows of the steel are transmitted through the abutting shoulders to the bit elements independently of the attaching means.

An object of the present invention is to provide an improved rock drill bit. Another object is to provide an improved multi-cutter rock drill bit having concentric bit elements attached in an improved manner to a percussively actuated drill steel. A further object is to provide an improved rock drill bit having concentric bit elements and improved means for attaching the bit elements to the drill steel whereby the impact blows are transmitted by the drill steel to the bit elements independently of the attaching means. A still further object is to provide an improved rock drill bit having concentric bit elements provided with abutting shoulders and held in position on the drill steel by a threaded coupling whereby the impact blows are transmitted from the drill steel to the bit elements through the abutting shoulders independently of the threaded coupling. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there are shown for purposes of illustration one form and a modification which the invention may assume in practice.

In these drawings:

Fig. 1 is a side elevational view of a rock drill bit constructed in accordance with a preferred illustrative embodiment of the invention.

Fig. 2 is a front end view of the drill bit shown in Fig. 1.

Fig. 3 is a longitudinal axial section taken on line 3—3 of Fig. 2, showing the improved bit attaching means.

Fig. 4 is an axial section similar to Fig. 3, but on a reduced scale, illustrating a modified construction.

In this improved construction, as shown in the drawings, a conventional percussively actuated rock drill steel 1 has an enlarged forward portion 2 provided with a thread-

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ed portion in the form of a threaded socket 3. The enlarged portion has a forward plane abutment surface 4.

In the embodiment shown in Figs. 1 to 3 inclusive a central or inner bit element 5 is threadedly coupled at 6 to a central body member 7, the latter having a threaded portion in the form of a threaded shank 8 coupled within the threaded socket of the drill steel. The central or inner bit element 5 has a rearwardly facing abutment surface 9 engaging a forwardly facing shoulder 10 on an intermediate bit element 11. An outer bit element 12 has a forwardly facing shoulder 13 engaging a rearwardly facing abutment surface 14 on the intermediate bit element. The outer bit element has a rearwardly facing plane abutment surface 15 engaging the forward abutment surface 4 of the drill steel. The central bit element 5 serves to hold the intermediate and outer bit elements firmly in position on the drill steel, and by shouldering the several bit elements and clamping the same axially to the drill steel in the improved manner disclosed the impact blows are transmitted from the drill steel to the bit elements independently of the threaded couplings 6 and 8.

The drill steel has a usual axial bore 18 through which cleansing fluid under pressure may be conducted and the central body member 7 and the inner bit element 5 have communicating axial bores 19 and 20. A small axial passage 21 in a plug member 22 suitably attached to the front portion of the central bit element conducts pressure fluid from the bore 20 to the advance front face of the inner bit element. Obliquely disposed passages 23 and 24 connect the bore 20 with the exterior surface of the inner bit element for conducting cleansing fluid to the advance bore 25 formed by the inner bit element and to the bore 26 formed by the intermediate bit element.

The inner, intermediate and outer bit elements have radial cutters 27, 28 and 29 respectively spaced apart or staggered axially of the bit for forming the stepped bores of the drill hole and cleansing fluid flows from the drill hole bore 26 between the cutters 29 and upwardly along the walls of the drilled hole in a well known manner. Located intermediate the radial cutters 29 on the outer bit element 12 are usual transverse chopping cutters 29'. The cutters of the concentric bit elements desirably have flow recesses or grooves 30, 31 and 32 formed therebetween to provide adequate flow spaces for the cleansing fluid.

The intermediate bit element 11 has its forward face cut away at 30' while the inner bit element 5 is radially cut away at 31' and these cut away portions provide flow spaces for the cuttings. Also the outer peripheries of the cutters 28 of the intermediate bit element 11 are cut away at 32'.

In the modified embodiment shown in Fig. 4, two concentric bit elements are shown instead of the three bit elements of the preferred embodiment. The central bit element 5 has its rearwardly facing abutment surface 9 engaging a forwardly facing shoulder 33 on an outer bit element 34. The outer bit element has a rearward surface 35 abutting the forwardly facing surface 4 on the drill steel. Thus the inner bit element of this embodiment directly secures the outer bit element against the front end of the drill steel. Otherwise this construction is similar to that above described.

As a result of this invention an improved percussive rock drill bit is provided having improved attaching means whereby the impact blows of the drill steel may be transmitted to the bit in an improved manner. By the provision of the abutting shoulders on the concentric bit elements with the outer bit element abutting against the front end surface of the drill steel the bit elements are so coupled to the drill steel that the impact blows of the drill steel are transmitted to the bit elements through the abutting shoulders independently of the threaded coupling.

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By forming the concentric bit elements as separately removable parts the bit may be readily taken apart for reconditioning or replacement. Other advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described one form and a modification which the invention may assume in practice, it will be understood that this form and modification of the same are shown for purposes of illustration and that the invention may be further modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

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

1. A percussive rock drill bit adapted for attachment to a drill steel having a forwardly facing surface comprising a plurality of concentric bit elements, including inner, intermediate and outer bit elements, said outer bit element having a rearwardly facing surface engaging said forwardly facing surface of said drill steel, said bit elements having cutting faces staggered axially of the bit with the cutting face of said inner bit element located forwardly of the other cutting faces to provide a pilot hole, each of said outer and intermediate bit elements having a bore and a forwardly facing rearward shoulder, said inner and intermediate bit elements having cylindric bodies fitting said bores and having reduced rearward portions providing rearwardly facing shoulders respectively abutting said forwardly facing shoulders, and means for attaching said inner bit element to said drill steel and to clamp said intermediate and outer bit elements in position on said steel, the impact blows being transmitted from said drill steel solely through said abutting shoulders progressively to said bit elements independently of said attaching means.

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2. A rock drill bit as set forth in claim 1 wherein fluid cleansing means is provided comprising an axial bore in said inner bit element and separate passages communicating with said bore and respectively leading to the cutting faces of both said inner and intermediate bit elements.

3. A percussive rock drill bit adapted for attachment to a drill steel comprising concentric bit elements including inner, intermediate and outer bit elements, said bit elements having cutting faces staggered axially of the bit with the cutting face of the inner bit element disposed in advance of the others to form a pilot hole, said intermediate and outer bit elements each having a bore and a forwardly facing shoulder, the inner and intermediate bit elements having cylindric portions respectively fitting said bores and rearwardly facing surfaces respectively abutting said forwardly facing shoulders, and means for attaching said inner bit element to said drill steel and for clamping the intermediate and outer bit elements in position on said drill steel with the outer bit element abutting said drill steel whereby the impact blows are transmitted from the drill steel through said abutting shoulders progressively to said bit elements independently of said attaching means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,085,941	Arnold	July 6, 1937
2,149,798	Starkey	Mar. 7, 1939
2,282,596	Wise et al.	Mar. 12, 1942
2,648,524	Dionisotti	Aug. 11, 1953

FOREIGN PATENTS

914,723	Germany	July 8, 1954
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