March 31, 1953 D. W. HART 2,633,335

ROCK DRILLING TOOL

Filed Feb. 20, 1947

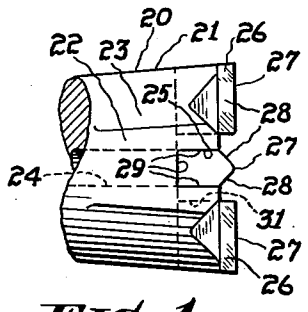

FIG.-1.

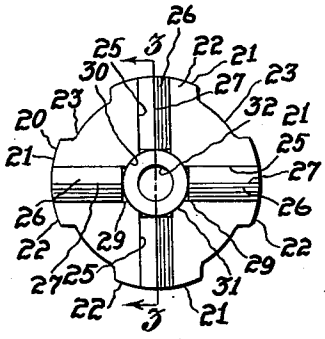

FIG.-2.

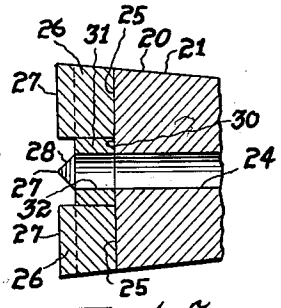

FIG.-3.

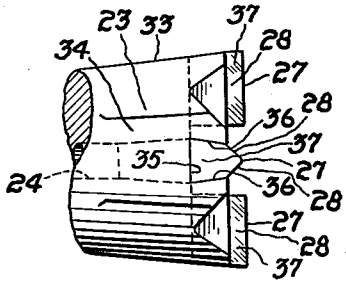

FIG.-4.

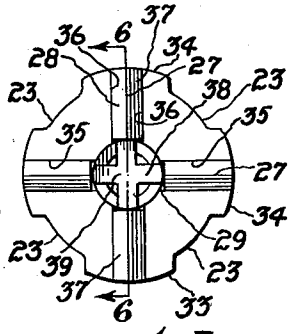

FIG.-5.

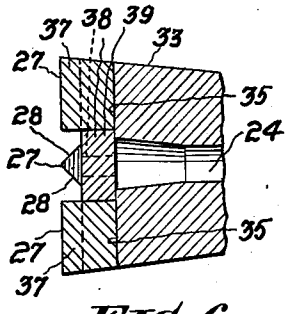

FIG.-6.

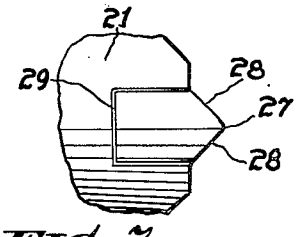

FIG.-7.

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Patented Mar. 31, 1953 2,633,335

UNITED STATES PATENT OFFICE

2,633,335

ROCK DRILLING TOOL

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Application February 20, 1947, Serial No. 729,819

2 Claims. (Cl. 255—64)

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This invention relates to cutting implements, and more particularly to a rock drilling tool having cutting elements of superior metal embedded in a body of a different grade and less costly material than that of the cutting elements.

One object of the invention is to improve the construction of rock drilling tools in order to make them more durable and efficient.

Another object is to eliminate the expense of repeated reconditioning of the rock drilling tool in order to keep it in proper drilling condition.

A further object is to assure a durable and firm connection between the cutting elements and their holder.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal side view of a rock drilling tool constructed in accordance with the practice of the invention,

Figure 2 is an end view of the tool,

Figure 3 is a transverse view taken through Figure 2 on the line 3—3,

Figure 4 is a view similar to Figure 1 showing a modified form of the invention,

Figure 5 is an end view of the tool shown in Figure 4,

Figure 6 is a transverse view taken through Figure 5 on the line 6—6, and

Figure 7 is an enlarged end view of a cutting element and the adjacent portion of its holder showing the metallic connection between the two.

Referring more particularly to the drawings and at first to the form of the invention shown in Figures 1 to 3 inclusive, 20 designates a drilling tool constructed in accordance with the practice of the invention and comprising a body 21 of frusto-conical shape that may be an integral portion of a drill rod or a separate member adapted for attachment to a drill rod in a well known manner.

The body 21 is shown as having four equiangularly spaced wings 22 that are separated by grooves 23 extending longitudinally of the body for the escape of cuttings from the surface of the rock being drilled. The body has a passageway 24 for conveying cleansing fluid to the working surface, and in the large end of the body are slots 25, two in the present instance, that lie at right angles to each other and extend across the wings 22 to the periphery of the body.

The slots 25 are of uniform width throughout their lengths. Their opposed side surfaces lie at

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right angles to the bottom surfaces and in the portions of the grooves lying on opposite sides of the passageway 24 are inserts serving as cutters 26 the outer ends of which lie flush with the peripheral surfaces of the wings 22. The cutters are constructed of hard metal, as for example tungsten carbide, and their cutting edges 27 are defined, as is customary, by inclined surfaces 28. The cutters are bonded to the body, as for example by brazing, and in such case the width of the cutters 26 is slightly less than that of the slots 25, and in the spaces thus existing and between the bottoms of the slots 25 and the opposed surfaces of the cutters are thin brazed joints 29 that secure the cutters fixedly to the body.

Means are provided for preventing the cutters from being shifted endwise in the slots 25 whenever, during the rotation of the drilling tool, the outer ends of the cutters strike against the side wall of the hole being drilled or are forced hard thereagainst by the feeding mechanism of the rock drill actuating the drilling tool. To this end the body is provided with a recess 30 at the intersection of the slots 25 and in said recess is a rigid member 31 against which abut the inner ends of the cutters 26. The abutment member is of cylindrical shape and has a passage 32 to form an outlet opening for the passageway 24. The inner end of the member 31 preferably lies flush with the bottom surfaces of the slots 25 and the bottom and peripheral surfaces of the abutment member 31 are bonded to the adjacent surfaces of the body and the cutters as by thin brazed joints 29.

In the form of the invention illustrated in Figures 4, 5 and 6 of the drawings the body 33 is also shown as being of cruciform shape having four wings 34 and slots 35 in the end of the body lying at right angles to each other. The slots 35 are of dove-tail shape, their opposed side surfaces 36 converging toward the end of the body, and in the slots 35 are cutters 37 shaped to correspond to the contour of the slots and bonded thereto by the brazing material 29.

In this form of the invention the outer ends of the cutters also lie flush with the peripheral surfaces of the wings 34 and their inner ends bear against the ends of arms 38 of a cruciform abutment member 39 overlying the end of the passageway 24. The abutment member is also bonded to the body 21 and to the inner ends of the cutters 26 and the arms 38 of the abutment member are of less width than the diameter of the passageway 24 to provide flow spaces between the arms 38

so that cleansing fluid issuing from the passageway can readily flow past the abutment member to the cutting face of the bit.

In practice, the present invention has been found to possess advantages that are highly desirable in rock drilling tools of the inserted cutter type. By interposing the abutment member between the cutters in the manner set forth the cutters will be restrained against movement endwise of the slots and the bond between them and the body will remain unimpaired by the shocks and the jars to which they are subjected throughout greatly extended periods of use.

I claim:

1. A rock drill bit of the impact type comprising a body having a diametric slot cut in the front face thereof completely across the bit and a central cleansing fluid passage, hard metal inserts providing wear resisting cutting edges and secured by brazing in said slot at the opposite sides of the bit center with the inner ends of said inserts spaced from the bit center, and a separate, centrally located abutment element secured to said bit body and having spaced, rigid lateral abutment portions with which the inner ends of said inserts abut positively to prevent endwise displacement of said inserts in said slots toward the center of the bit, said abutment element being so arranged and constructed as to provide flow spaces at the sides of said lateral portions through which cleansing fluid may flow from said passage past said abutment element to the cutting face of the bit.

2. A rock drill bit of the impact type comprising a body having diametric slots cut in the front face thereof in substantially right angular relation

completely across the bit and a central cleansing fluid passage, hard metal inserts providing wear resisting cutting edges and secured by brazing in said slots with a pair in each slot at the opposite sides of the bit center and with the inner ends of said inserts spaced from the bit center, and an abutment element of generally cruciform shape secured to said bit body and having rigid arms with which the inner ends of said inserts abut positively to prevent endwise displacement of said inserts in said slots toward the center of the bit, said abutment element providing flow spaces between said arms thereof through which cleansing fluid may flow from said passage past said abutment element to the cutting face of the bit.

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