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J. A. S. MALHERBE
ROCK DRILL BIT HAVING HARD INSERTS
FORMING CUTTING EDGES
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2,579,268

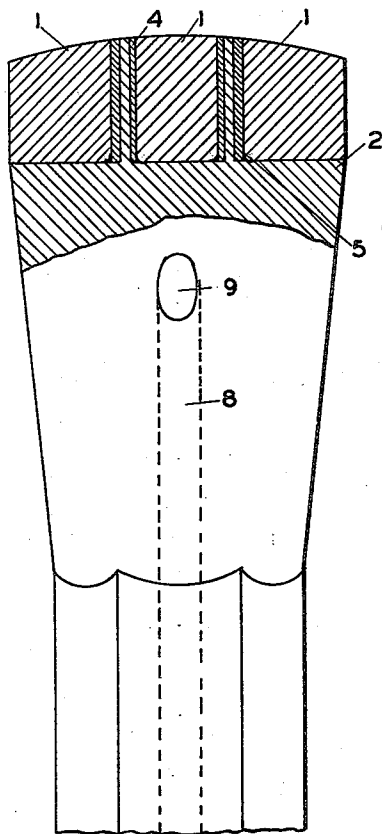


FIG I

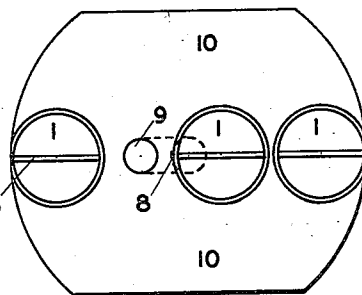


FIG III

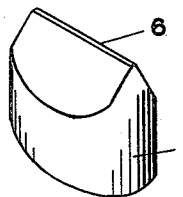


FIG IV

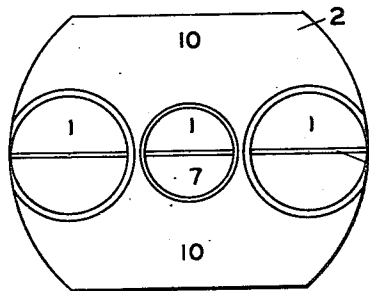


FIG II

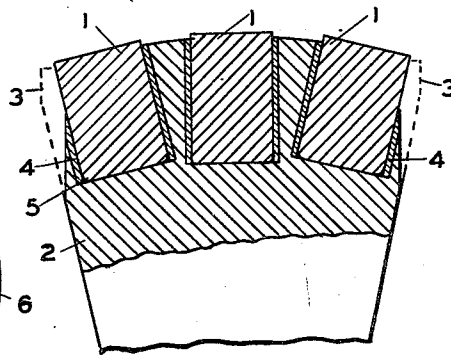


FIG V

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UNITED STATES PATENT OFFICE

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ROCK DRILL BIT HAVING HARD INSERTS
FORMING CUTTING EDGESJohannes Andreas Smuts Malherbe, Delville, Ger-
miston, Transvaal, Union of South AfricaApplication August 28, 1947, Serial No. 771,095.
In the Union of South Africa December 27,
1946

1 Claim. (Cl. 255—61)

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This invention relates to rock drill bits, of that type in which the cutting and/or wearing surfaces are provided by inserted pieces of specially hard materials.

The object of the invention is to provide rock drill bits equipped with inserts of hard material properly shaped to stand up to the work of rock drilling said inserts forming the cutting and/or wearing surfaces.

A further object is to provide drilling bits shaped so as to accommodate said inserts and to hold them in said bits in a workable manner.

This invention is illustrated in the accompanying drawing in which—

Fig. I is a bit partly in section and showing the inserts in place,

Fig. II, a plan of Fig. I,

Fig. III is a plan of a bit with the inserts somewhat different from those of Fig. I,

Fig. IV is a perspective view of an insert, and

Fig. V shows a modification.

According to this invention the inserts 1 (Fig. IV) are usually made of tungsten carbide containing a certain amount of cobalt to modify its brittleness and making it more tough, but other specially hard material may be used.

It is well known to make drill bits with inserts but it has been found difficult to prevent them breaking up, loosening in their sockets or wearing irregularly. Often this is due to the inserts being of an unsuitable shape to carry out the duty required of them. The invention provides inserts in the form of cylindrical slugs with their height approximately equal to their diameter, and having a cutting angle of 105° to 120° with the actual edge slightly rounded or flattened with a good base on which to rest.

The body of the bit according to this invention is formed of drilling steel which may be hollow with the end "bumped up" to swell it larger than that required for the finished bit. The recesses for the slugs are drilled to accommodate the slugs and the brazing compound to hold them in place. When brazed, the excess steel on the diameter of the bit and if necessary or desirable the insert or inserts is ground away so that the inserts 1 form a wearing surface on the side of the bit.

In the drawings 2 is the steel bit holding the inserts 1 and in Fig. V the dotted lines 3, indicate the excess metal of the bit which serves to allow the holes 4 to be drilled for the slugs 1 and is then ground off to bring the bit to gauge size, with the slugs 1 placed to maintain such size. The holes 4 are flattened on their bottoms but

preferably with their bottom peripheral edges 5 radiused. The holes 4 are made with a depth equal to the height of the cylindrical portion of the slug.

In Figs. I and II is shown a chisel bit 2, having three slugs 1 inserted. The two outside slugs are larger than the central one. By this arrangement the cutting edge 6 is almost completely formed by the slugs or inserts 1. The provision of the central slug 7 blocks the water hole 8 in the hollow steel and in this case the water outlet 9 is taken out at the side of the chisel bit as shown.

The steel forming the lands adjacent to the inserted cutting edges can be appropriately shaped back and the lands 10 diametrically on opposite sides of the cutting edge 6, may be cut away to provide a passage past the cutting end of the drill for the sludge formed during drilling operations.

Where it is desired to have the water hole 8 brought up to the chisel edge 6 but at the same time avoid bringing it to the central position, the slugs 1 may be placed as shown in Fig. III. In this case the slugs 1 may all be of the same diameter as shown and be inserted all in line; one with its periphery at one edge and two together with the periphery of the outside one on the opposite edge of the bit 2. This arrangement leaves a space on the centre line but off-centre of the bit in which the water hole 9 can be drilled but at an angle to meet the axial hole 8 in the steel jumper. With this construction in use no central undrilled boss is left on the rock at the bottom of the hole.

As shown in Figs. I, II, and III, the slugs 1 are placed vertically that is with their axes parallel to the axis of the bit 2 but in Fig. V the outside ones have their axes inclined slightly to the axis of the bit. Such inclination of the axes of slugs 1 which are set into the steel at the edges of the drill bit result in their cutting edges 6 extending beyond the steel 2 to maintain the gauge of the bit as shown in Fig. V.

As an indication of the sizes of the slugs 1 which may be used, a chisel bit $1\frac{3}{8}$ inches across its cutting edge 6 may have three slugs 1 as shown in Figs. I and II inserted; a central one $\frac{3}{8}$ inch diameter and one on each side $\frac{1}{2}$ inch diameter, and all in line, the slugs at the ends being placed at $\frac{1}{8}$ inch centres. This will require $\frac{1}{64}$ inch to be removed from each side of the bit to bring it to gauge size.

In a drill formed according to this invention the cutting edges are formed on inserts 1 which

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have a solid slug-like shape affording a large seating area and unlikely to be subjected to bending or other strains. Each slug has a large surface area and is therefore well held by the brazing or other fixing medium. Furthermore the insert has an appreciable thickness which can be ground down repeatedly and still provide the same wearing area around the cutting edge. As far as the reaming edge is concerned the area of the insert increases as the diameter of the drill decreases.

At the same time the hard inserts form a cutting tip and are so placed and shaped to avoid excessive hammering and distortion of the metal between them during drilling operations.

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

A rock drill bit shaped to have a cutting edge approximately at right angles to the axis of the bit, true cylindrical recesses formed in the face of the bit having their axes substantially parallel with the axis of the bit and their centres located on the cutting edge of the bit, said recesses having flat bottoms, true parallel flat bottomed cylinders of tungsten carbide filling said recesses

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with their tops projecting from said recesses and shaped to conform to the cutting edge of the bit and the walls of said recesses at the ends of the cutting edge of the bit meeting the periphery of the bit.

JOHANNES ANDREAS SMUTS MALHERBE.

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