May 26, 1936. W. J. McCALLUM 2,042,114

DRILL

Filed April 23, 1934

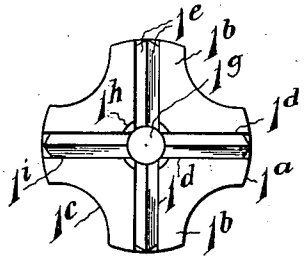


Fig. 2.

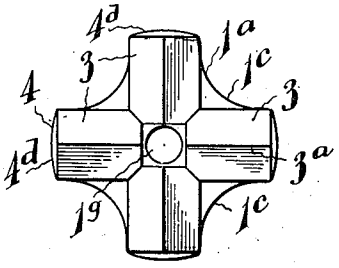


Fig. 7.

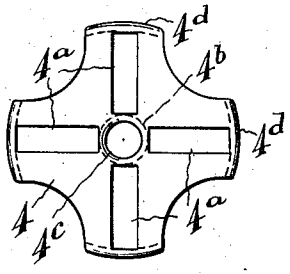


Fig. 4.

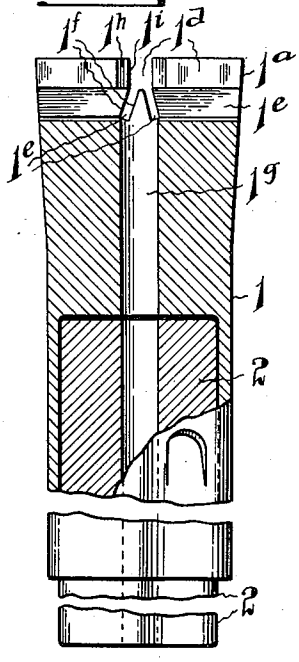


Fig. 1.

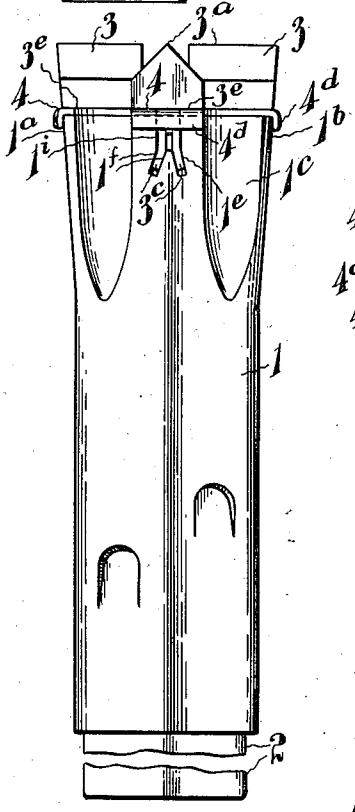


Fig. 6.

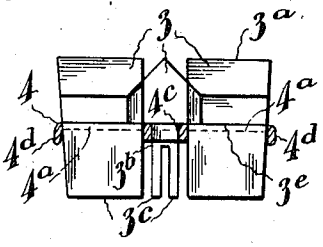


Fig. 5.

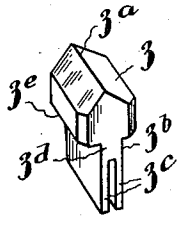


Fig. 3.

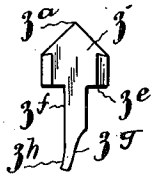


Fig. 8.

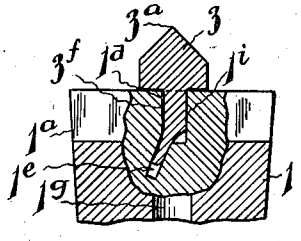


Fig. 9.

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Patented May 26, 1936 2,042,114

UNITED STATES PATENT OFFICE

2,042,114

DRILL

William J. McCallum, Islington, Ontario, Canada

Application April 23, 1934, Serial No. 721,851

9 Claims. (Cl. 255—64)

This invention relates to drills and more particularly to those employed in boring rock and the like wherein it is economical to use removable bits. The object of this invention is to provide apparatus of this character in which the means for locking the bits are so formed that the bits will remain in position on the end of a drill-head under all working conditions and without danger of accidental removal therefrom.

I attain my object by forming the locking means integral with the bits and drill-head. Each bit is provided with a tang having its free end reduced in thickness or bifurcated so that it will respectively enter one or two parallel sided slots formed in the end of the drill-head. These slots are directed outwardly relative to a plane passing through the axis of the drill-head and in the case of the tangs having bifurcated ends, the slots diverge from the said plane whereby the reduced part of the tang is displaced laterally when it is driven into a slot and the bifurcated parts are spread apart as they are driven into the slots. The bits are thus locked from longitudinal displacement and as the locking means is positioned within the drill-head and takes no percussive thrust, all danger of its being damaged by contact with the rock or other material being drilled is eliminated.

The constructions are hereinafter more fully described and are illustrated in the accompanying drawing in which

Fig. 1 is a longitudinal section of part of a drill-head;

Fig. 2 an end view thereof;

Fig. 3 a perspective view of a bit;

Fig. 4 an end view of a retainer;

Fig. 5 a cross section of a retainer showing the bits in position therein;

Fig. 6 a side elevation of part of a drill-head showing the bits and retainer in position thereon;

Fig. 7 an end view of the parts shown in Fig. 6;

Fig. 8 an end view of a modified form of bit; and

Fig. 9 a detail showing the bit in Fig. 8 in position in a drill-head.

In the drawing like numerals of reference indicate corresponding parts in the different figures.

1 is a drill-head which may be formed on or secured in any suitable manner to the drill-rod 2. The end 1^a of the drill-head remote from the drill-rod is provided with a plurality of radially directed wings 1^b having flutings 1^c therebetween. In the end faces of these wings may be formed grooves 1^d which extend transversely of the axis of the drill-head. In the bottom of each groove are formed one or two slots 1^e, each having its sides 1^f substantially parallel to one another. When two slots are formed at the bottom of each groove they converge in the direction of the axis of the drill-head towards the end 1^a. The drill-head is provided with the usual central passage 1^g and this passage is counterbored at 1^h adjacent the grooves and slots.

The bits or nibs 3 are provided with cutting edges 3^a and with tangs 3^b adapted to be received in the grooves 1^d. When each of the grooves is provided with two slots 1^e, each tang is bifurcated and the bifurcated parts 3^c of a tang are adapted to be received in the outer ends of the slots 1^e. As the parts 3^c are driven into the slots they are displaced laterally by the inner sides of the slots and are thus spread apart to engage the outer sides of the slots whereby the bits are locked from longitudinal displacement. Preferably the bifurcated parts 3^c of each tang 3^b do not extend the full length thereof so that a neck is formed at 3^d whereby that portion of each tang in engagement with the sides 1^i of its groove 1^d is of maximum width and strength.

The above mentioned inner sides of each slot 1^e form a wedge having its apex adjacent the front end 1^a of the drill-head. Preferably the wedges are formed by milling the drill-head to form the slots but, if desired, the wedges could be separate parts secured in position between the outer sides of the slots.

To facilitate the assembly of the bits 3 and drill-head 1, I mount the bits in a retainer 4 which is shaped to correspond to the end 1^a and is provided with a plurality of tang receiving openings 4^a which are spaced to correspond to the grooves 1^d and thus the slots 1^e. The underside of the retainer is provided with a flange 4^b adapted to be received in the counterbore 1^h to align the central opening 4^c in the retainer with the central passage 1^g in the drill-head. By placing the tangs 3^b carried by the retainer in the grooves 1^d and using a hammer having a head large enough to engage all the bits, the tangs may be simultaneously forced into locking engagement with the slots 1^e.

The excess metal 4^d around the ends of the openings 4^a, which metal is necessary to close the latter and hold the tangs from lateral displacement while the bits are carried in the retainer, is subsequently hammered over the sides of the wings 1^b. This metal is soon worn away when the drill is put in use but there is no tendency for the bits to be displaced laterally from the drill-head.

The retainer 4 is preferably made of steel which is milder than that used in the drill-head 1 so that it forms a shield for the end of the drill-head and a cushion between the latter and the undersides 3^e of the bits 3. Clearance is provided between the ends of the bifurcated parts 3^c and the bottoms of the slots 1^e so that, should the retainer be compressed and the tangs moved farther into the slots, the tangs will be further spread to lock them in their new position. Of course a new retainer is used every time the bits are replaced.

The cutting edges of the bits are hardened and the tangs thereof are annealed to condition them for their particular use.

Referring to Figs. 8 and 9, a modified form of my device is shown therein in which the bit 3 is provided with a tang 3^f having its free end 3^g reduced in thickness and preferably directed outwardly at 3^h. With this construction only one slot 1^e is required at the bottom of each groove 1^d thus increasing the amount of metal between the slots 1^e in adjacent wings 1^b and reducing the chances of breakage of the heads between the slots especially in small drills. When the single slot 1^e is used it is necessary to make it and the reduced end of the bit in accordance with the direction of rotation of the drill so that the resultant of the forces acting against the cutting edge 3^a will be so directed that any tendency to rock the bit will be resisted by the outwardly directed end of the tang.

It will be distinctly understood that the diverged slots 1^e may be formed at the end 1^a of the drill-head instead of forming them at the bottoms of the grooves without departing from the spirit of my invention.

What I claim as my invention is:

1. A drill-head having two substantially parallel sided slots extending transversely of and diverging in the direction of the axis of the drill-head; and a bit having a bifurcated tang, the parts of which are adapted to be received in the slots and to be displaced laterally thereby to lock the bit from longitudinal displacement.

2. A drill-head constructed as set forth in claim 1 in which a transverse groove is formed in the end of the drill-head, the slots communicate with the bottom of the groove, and the tang is formed with a solid neck adapted to engage the sides of the groove.

3. A drill-head having a plurality of substantially parallel sided slots extending transversely of and directed at an acute angle to a plane passing through the axis of the drill-head; a plurality of bits, each having a tang adapted to be received in a slot and to be bent laterally thereby to lock the bit from longitudinal displacement; and a retainer having a plurality of openings for the passage therethrough of the tangs, the openings being spaced to correspond to the slots so that the tangs will be positioned for entrance therein whereby all the tangs may be forced simultaneously into the slots.

4. A drill-head having a plurality of substantially parallel sided slots extending transversely of and directed at an acute angle to a plane passing through the axis of the drill-head; a plurality of bits, each having a bifurcated tang adapted to be received in a slot and to be bent laterally thereby to lock the bit from longitudinal displacement; a retainer having a plurality of openings for the passage therethrough of the tangs, the openings being spaced to correspond to the slots so that the tangs will be positioned for entrance therein whereby all the tangs may be forced simultaneously into the slots; and means for centering the retainer relative to the drill-head.

5. A drill-head provided with a central passage; a plurality of wings projecting radially from the axis of the drill-head, each wing having a substantially parallel sided slot extending across its end and directed at an acute angle to a plane passing through the axis of the drill-head, the central passage being counterbored adjacent the slots; a plurality of bits having tangs adapted to be received in the slots and displaced laterally thereby to lock the bits from longitudinal displacement; a retainer for carrying the bits to position their tangs for simultaneously entering the slots; the retainer having a central opening; and means carried by the retainer for engaging the counterbore to align the central opening with the central passage.

6. A drill-head having two substantially parallel sided slots in its end extending transversely of the axis of the drill-head and converging in the direction of the said axis towards the said end; and a bit having a bifurcated tang, the parts of which are adapted to be received in the slots and be spread apart thereby to lock the bit from longitudinal displacement.

7. A drill-head having a groove extending across the end thereof; a substantially parallel sided slot in the bottom of the groove directed at an acute angle to a plane passing through the axis of the drill-head; and a bit having a tang adapted to be received in the groove, the free end of the tang being adapted to be received in the slot and to be displaced laterally thereby to lock it from longitudinal displacement.

8. For use with a drill-head formed with a parallel sided groove parallel to the axis of the bit and with a substantially flat sided slot of less width than the groove extending from the bottom of the groove at one side thereof transversely of the drill-head and at an angle to the axis of the drill-head; a bit formed with a parallel sided neck adapted to fit the groove and a tang to fit the slot, the said tang being of ductile material whereby though normally substantially straight it will be bent when forced into the slot to lock the bit in place.

9. For use with a drill-head formed with a parallel sided groove parallel to the axis of the bit and with two substantially flat sided slots of less width than the groove extending from the bottom of the groove and diverging in the direction of the axis of the drill-head, a bit formed with a parallel sided neck adapted to fit the groove and with tangs to fit the slots, the said tangs being of ductile material whereby though normally substantially straight, they will be bent when forced into the slots to lock the bit in place.

WILLIAM J. McCALLUM.