

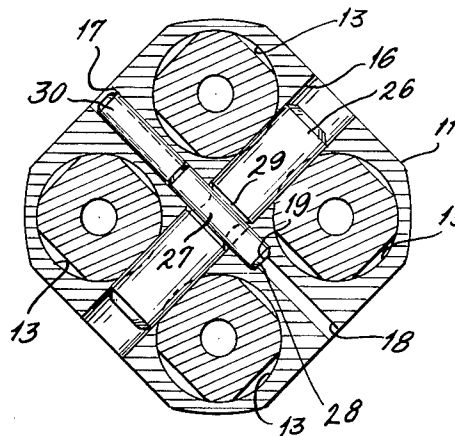
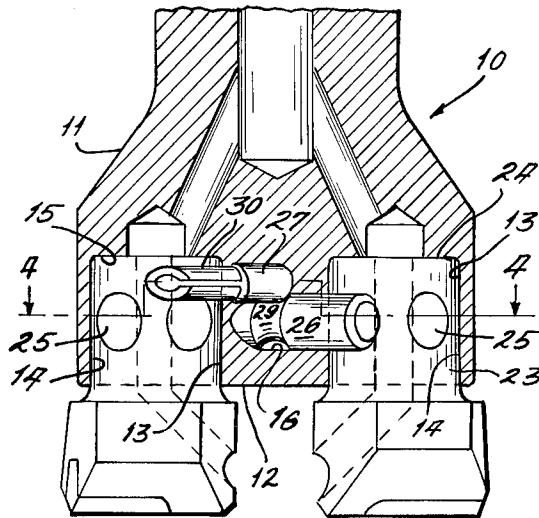
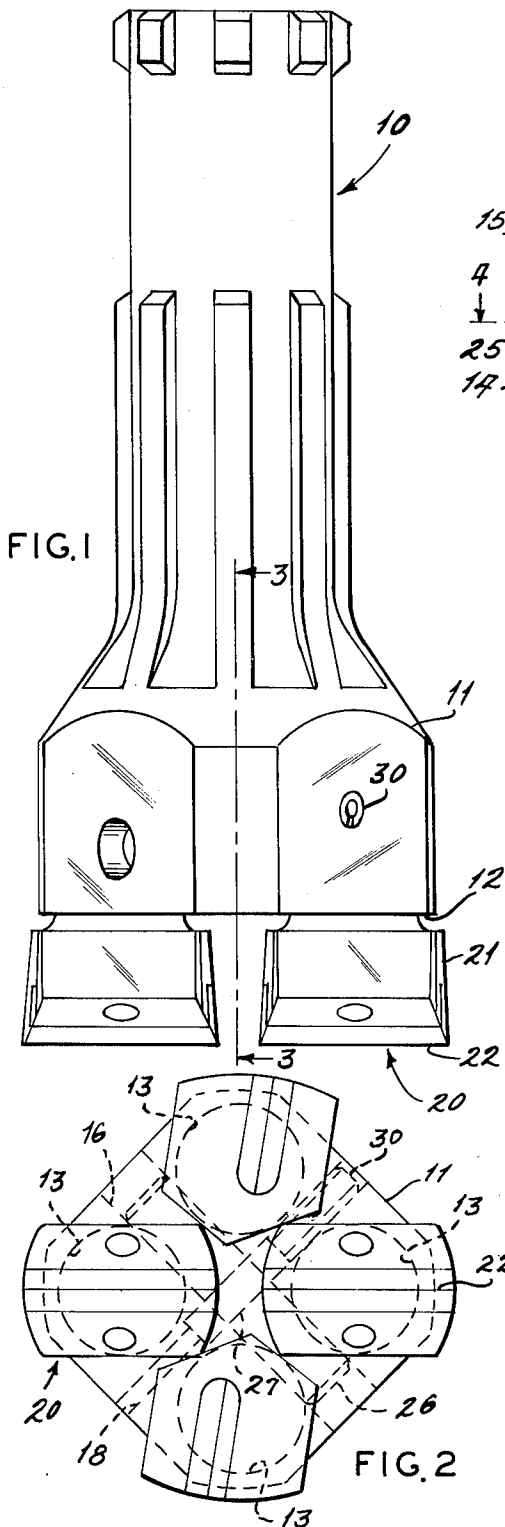
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DRILL BIT AND LOCKING MEANS

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DRILL BIT AND LOCKING MEANS

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The present invention is an continuation-in-part of my copending application Serial No. 199,145, now Patent No. 3,152,654 filed May 31, 1962.

The present invention relates to drill bits of the type in which a plurality of cutting bits are removably retained on the face of the bit holder. The present invention further relates to a novel means for positively locking the bits in the bit holder.

In my prior copending application, a structure is disclosed for retaining a plurality of insert cutting bits in a bit holder using a solid locking pin to engage the shanks of the cutting bits and a compressible pressure pin which locks the locking pin to the bit holder. It has been found that the structure of Serial No. 199,145, although effective and a substantial improvement over prior locking devices, tended to have a limited life under very heavy field duty because of failure of the pressure pin at the point of intersection with the solid locking pin. The present invention obviates this difficulty and provides a novel and unique structure for retaining a plurality of insert bits in a bit holder by means of a pair of intersecting solid locking pins which are retained in the holder by a pressure pin locking means.

One of the principal objects of the present invention is to provide a cluster bit having a durable locking means for retaining the cutting bits in the bit holder.

Another object of the present invention is to provide a three-pin locking device for retaining a plurality of cutting bits in a bit holder.

Other objects and advantages will become apparent hereinafter.

In the drawings wherein like numbers refer to like parts wherever they occur,

FIG. 1 is a side elevational view of a bit,

FIG. 2 is an end elevational view of the bit shown in FIG. 1,

FIG. 3 is fragmentary sectional view taken along line 3—3 of FIG. 1 showing the unique locking mechanism in full lines, and

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3 showing the locking pins in solid lines.

The present invention comprises a bit holder having a plurality of insert cutting bits positioned in the working end thereof and a locking means for retaining the cutting bits in the bit holder including a solid locking pin engaging flattened notches on the insert bit shanks and a second solid locking pin engaging a groove in the first locking pin and retained in a transverse passage in the bit holder by a pressure pin which is compressed in the transverse passage.

The present invention comprises a drill bit 10 including a bit holder 11 whose shank portion is adapted to engage a percussion drill (not shown). The bit holder 11 has a forward face 12 which is provided with a plurality of pockets or sockets 13. Each pocket 13 opens to the bit holder face 12 and has vertical side walls 14 terminating in a flat base 15. Extending laterally through the bit holder 11 from side to side is a first transverse passageway 16 which engages the inner side walls 14 of the sockets 13. The opening 16 defines a semicircular groove in each pocket side wall 14. A second transverse passageway 17 engages the first passage 16 and is vertically positioned with respect thereto so as to intersect the upper edge

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thereof. The second transverse passage 17 includes a reduced passage portion 18 which defines an internal shoulder 19. The reduced portion 18 communicates the outer surface of the holder 11 with the internal shoulder 19 and to the large portion of the second transverse passage 17.

A plurality of cutting bits 20 are positioned in the bit holder 11 and each includes a head portion 21 having a cutting face provided with slots wherein cutting inserts 22 are retained. A shank portion 23 having a vertical side wall terminating in a small butt end 24 is connected to the head portion 21. The shank portion 23 is provided with four equally spaced milled flats or notches 25, which are aligned with the first transverse passage 16 in the bit holder 11, when the cutting bit 20 is received in the socket 13. A first solid pin fastening means 26 is inserted into the first transverse passage 16 and engages the groove in the pocket side wall 14 and also engages the notch 25 in the insert bit shank 23. The first locking pin 26 engages one of the notches 25 in each of the bit shanks 23 and securely locks the insert bit 20 to the bit holder 11. Since the notches 25 have a flattened bottom or base, the engagement of the flats 25 with the lock pin 26 restrains the insert bits 20 from rotating in the holder during drilling.

The solid locking and retaining pin 26 resists the torque developed by the insert bits 20 during drilling, and has long service life, since it also resists the vibration of the bit shanks 23 against the pin 26 during drilling.

The single solid lock pin 26 also locks the four insert bits 20 to the holder 11, thus effecting a considerable savings in material and fabrication costs.

Since the engagement of the pin 26 and the bit shanks 23 is internal (within the holder 11), there is no danger of erosion of the engaged metal surfaces during drilling. If the means for preventing rotation of the insert bits 20 in sockets 13 during drilling were external, the engaging surfaces would be subjected to possible erosion effects of drilling.

A second lock pin 27 is positioned in the second passage 17 with one end 28 adjacent to the internal shoulder 19. The second lock pin 27 engages an annular groove 29 provided in the first lock pin 26 to secure the first lock pin 26 to the bit holder 11 and retain the first lock pin 26 therein.

A retaining means 30, which is a pressure pin of variable diameter and which is compressed when inserted into the second passage 17 and expands against the walls of said passage 17 to lock itself securely to the holder 11, is positioned in the end of the second transverse passage 17 and retains the second lock pin 27 therein.

The second lock pin 27 cannot be removed from the second transverse passage 17 until the pressure pin 30 is first removed. Similarly, the first lock pin 26 cannot be removed from the first transverse passage 16 until the second lock pin 27 is withdrawn from engagement with the notch 29.

The second solid lock pin 27 withstands the concentrated shock loads transmitted at the point of contact with the first lock pin 26 during field use. High energy pneumatic rock drills transmit high loads to the point of contact of the lock pins 26 and 27, and the solid pin 27 does not crush or fail in shear or compression during use.

To remove the pressure pin 30 and the second lock pin 27, a punch (not shown) is inserted through the reduced passage 18 against the end 28 of the solid lock pin 27, and a force is applied thereto to urge the pressure pin 30 from the second transverse passage 17. When the pressure pin 30 is removed, the second lock pin 27 is easily removed from the second passage 17.

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When one of the insert bits 20 becomes worn, the pressure pin 30 and the lock pins 27 and 26 are removed from the holder 11, thus freeing the insert bits 20. Depending on the type of insert bit 20, it may be rotated a quarter turn, a half turn, or entirely replaced and re-ground, to renew the cutting edge and the gage diameter of the bit 10.

Other conventional aspects of rock bit manufacture may be incorporated into the present structure as is more fully explained in copending application Serial No. 199,145.

This invention is intended to cover all changes and modifications of the examples of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A cluster bit comprising a bit holder having a plurality of sockets in the working face thereof, a plurality of insert bits having cutting edges and having shanks positioned in said sockets, said shanks being provided with notches in the periphery thereof, said bit holder having a first transverse passage therein aligned with the insert bit shank notches, said passage engaging each of said sockets, said bit holder having a second transverse passage intersecting said first transverse passage, a first locking pin positioned in said first passage and engaging said insert bit shank notches to restrain all of said insert bits from rotating in the holder during drilling, said first locking pin having means for receiving a second lock pin in interlocking engagement, a second lock pin positioned in said second passage and engaging said first pin to lock said first pin to said bit holder, and means retaining the second lock pin in said holder in interlocking engagement with the first locking pin.

2. The structure of claim 1 wherein the second lock pin and the means retaining the same in the holder are aligned in the second passage.

3. The structure of claim 2 wherein the second lock pin is a solid pin and the retaining means is a compressible pressure pin of variable diameter which is compressed when inserted in the second passage.

4. The structure of claim 3 wherein the second passage terminates in a reduced passage which defines an internal shoulder with the lock pin being positioned between the

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shoulder and the compressible pressure pin, the reduced passage communicating the exterior of the holder with an end of the lock pin.

5. A cluster bit comprising a bit holder having four equally spaced pockets around the axis of the bit in the working face thereof, a pair of intersecting transverse passage provided in said holder, said passages being transverse of the pockets, one of said passages intersecting all four of said pockets, four insert bits having substantially straight walled shank portions positioned around the axis of the bit in said pockets, the ends of said shank portions resting on the bases of said pockets, each of said insert bits having a cutting head portion extending forwardly of the working face of said holder, said head portions having cutting inserts retained therein, the outer periphery of which defines the gage diameter of said cluster bit, each of said shank portions having a plurality of flat bottomed notches therein, said notches being vertically aligned with the intersections of said passage with said pockets, a first solid lock pin positioned in said passage and engaging a notch on each of said bit shanks to retain said insert bits in said holder sockets and to restrain rotation of said bits within the pockets during drilling, said first solid pin having a notch therein aligned with the intersection of said transverse passages, a second solid lock pin in the other of said transverse passages engaging said first lock pin notch, and an expansible retaining pin in said other passage retaining the second solid lock pin in engagement with the first lock pin notch.

6. The structure of claim 5 wherein the second passage terminates in a reduced passage which defines an internal shoulder with the second solid lock pin being positioned between the shoulder and the compressible pressure pin, the reduced passage communicating the exterior of the holder with an end of the second solid lock pin.

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