

Jan. 11, 1944.

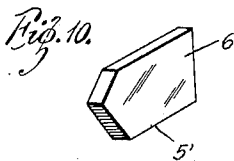
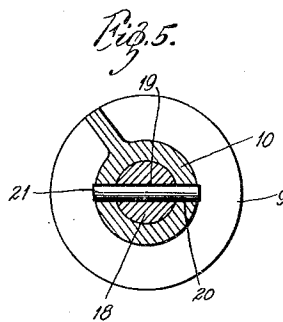
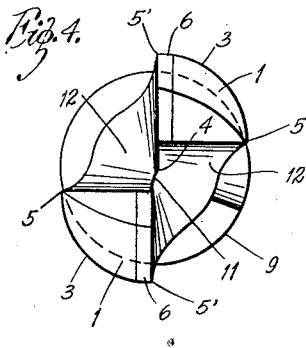
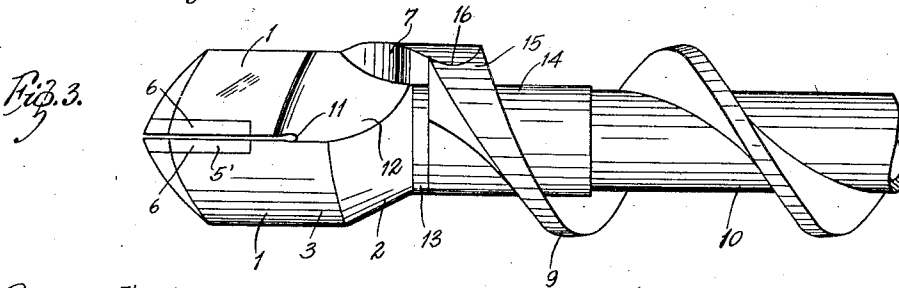
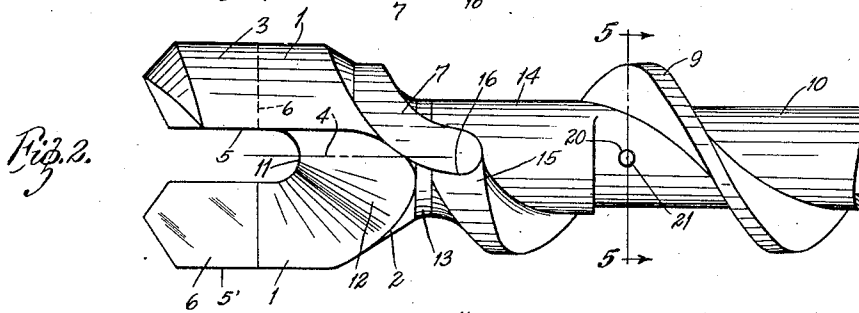
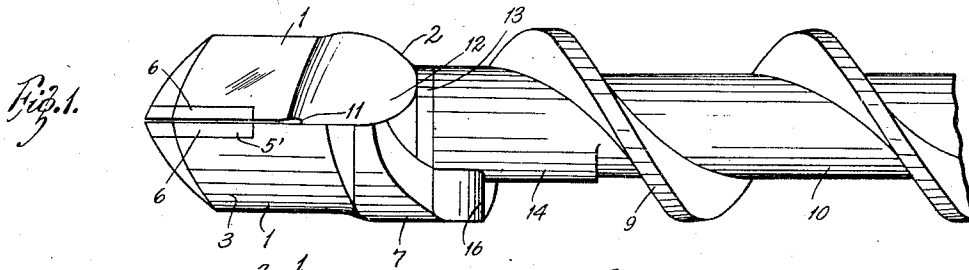
O. PHIPPS

2,339,104

DRILL BIT

Filed June 10, 1943

2 Sheets-Sheet 1



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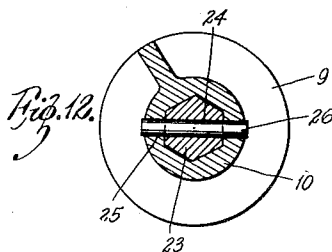
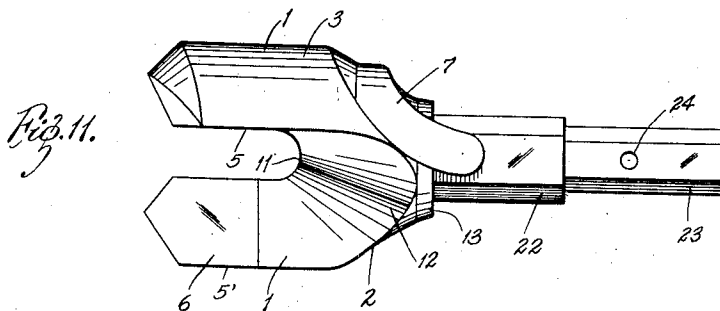
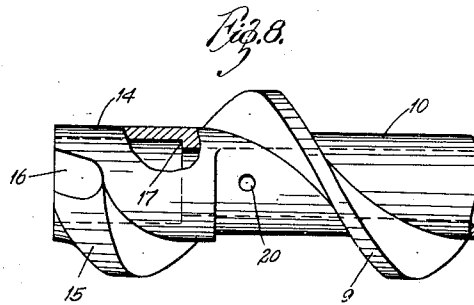
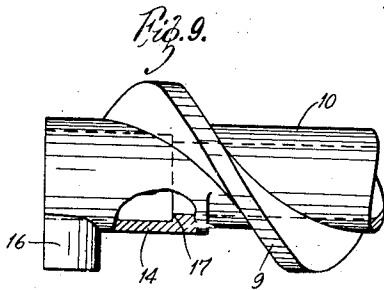
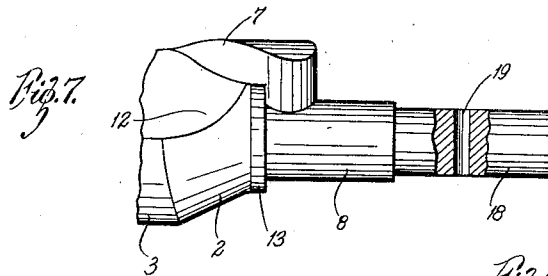
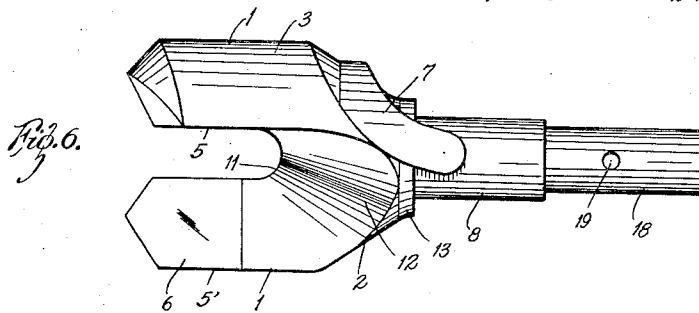
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DRILL BIT

Filed June 10, 1943

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,339,104

DRILL BIT

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ration of Missouri

Application June 10, 1943, Serial No. 490,292

2 Claims. (Cl. 255—69)

This invention relates to drill bits; and has special reference to rotary drill bits and augers for operating in minerals.

Objects of the invention are to provide an improved drill bit for detachable connection with one end of a rotary spiral screw auger, and interengageable portions on the adjacent ends of the auger and the bit, functioning for the purpose of preventing relative rotation of the bit and auger, and also functioning for the purpose of feeding chipped or waste particles loosened or formed by operation of the drill through the mineral along the bit and thence along the auger; to provide means whereby said interengageable portions additionally function to reinforce and strengthen the connection between the bit and the auger; to provide an inclined waste feed device on the bit interengageable with the spiral of the auger in a manner to effect free and easy feed and movement of the chipped or waste material along the auger, and to prevent clogging of said material at the bit; and to provide a bit having hard removable and replaceable cutting blades integrally attached to the forward faces of the bit arms so that, when any blade or blades become worn or damaged, they may be removed and others substituted therefor.

Other objects will be apparent from the following description, reference being made to the annexed drawings, in which—

Fig. 1 is a side elevation of my improved drill bit attached to the end of an auger.

Fig. 2 is a side elevation, viewed at right angles to the bit as shown in Fig. 1, and more clearly showing the combined interlock and material feed.

Fig. 3 is a side elevation showing the diametrically opposite side of the drill bit from that shown in Fig. 1.

Fig. 4 is an end elevation of the bit.

Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 2.

Fig. 6 is a side elevation of the drill bit as shown in Fig. 2, detached from the auger.

Fig. 7 is a side elevation of a portion of the drill bit detached from the auger as in Fig. 3, a part of the shank being shown in section.

Fig. 8 is a side elevation of the attaching end portion of the auger apart from the drill bit, a part of the socket being in section.

Fig. 9 is a view similar to Fig. 8, showing the attaching end portion of the auger turned about 90° from the position of Fig. 8.

Fig. 10 is a perspective view of the cutting blade apart from the drill bit.

Fig. 11 is a side elevation like Fig. 6, showing a drill bit having a shank of modified construction.

Fig. 12 is a cross-sectional view of the auger and shank of the drill bit similar to Fig. 5, and showing the shank and auger socket of modified construction.

My improved bit, whether provided with the cylindrical shank shown in Fig. 6 or with the hexagonal shank shown in Fig. 11, comprises two arms 1 projecting forwardly in parallel planes and integrally united by a rearwardly tapered body connection 2. The outer walls 3 of the arms 1 are uniformly and symmetrically curved on eccentric arcs, which arcs are also eccentric to the axis 4 of the bit. As shown in Fig. 4, the bit is intended to be rotated in a counterclockwise direction. The walls 3 curve outwardly and forwardly, uniformly and symmetrically, from their rear longitudinal edges 5 to their forward longitudinal edges, so that the outer edges 5' of the cutting blades 6 are spaced farther from the axis 4 of the bit than are the rear edges 5. The longitudinal edges 5 and 5' are parallel. The side cutting edges 5' of the blades 6 define the diameter of the hole drilled by the bit while the walls 3 of the bit arms 1 curve inwardly away from the wall of the hole formed by the bit. The edges 5 are in alignment with the outer edge of a screw spiral 7 formed integral with the body 2 of the bit at the rear end of one of the arms and extending rearwardly along and in integral connection with the portion of the shank 8 adjacent to the body 2. The outer or peripheral surface of the screw spiral 7 is in continuation of the outer or peripheral surface of the screw spiral 9 of the auger 10 to which the bit is intended to be attached. By this construction, the forward outer cutting edges 5' of the blades 6 are beyond the plane of the periphery of the screw spiral 9 far enough to drill a hole substantially larger than the diameter of the screw spiral to facilitate rotation of the bit and feed of the chips and waste material by and along the auger.

The body 2 or integral connection between the arms 1 is formed with a sharp or attenuated forward edge 11 from which the walls 12 of said body connection diverge outwardly and rearwardly from the axis 4 of the bit to the cylindrical abutting portion 13 of greater diameter than the diameter of the shank 8 and having approximately the same diameter as the end of the auger socket 14 which receives said shank 8. One of the walls 12 also intersects the outer side of the screw spiral 7, as shown, so that the waste material passing along said wall 12 is received by and

caused to move along said screw spiral 7. The socket 14 is of greater outside diameter than the outside diameter of the auger 10 with which it is integral, and the auger screw spiral 9 continues along said socket and is formed with a thicker end portion 15 which substantially strengthens the socket 14 and forms a strong interlock with the bit. When the shank 8 is extended into the socket 14 in proper position, the circumferentially inclined end of the bit screw spiral 7 is received within an inclined notch 16 in the end of the socket 14 in abutting contact with the end portion 15 of the screw spiral 9. Thus, the outer walls or peripheral surfaces of the screw spirals 7 and 9 are aligned, and the curved or abutting ends of the spirals 7 and 9 form curved and substantially smooth feed surfaces for the material cut or chipped by the bit.

In assembly, the end of the shank 8 preferably abuts against a shoulder 17 at the inner end of the socket 14 while a cylindrical axial extension 18 of said shank projects beyond the end thereof into the body of the tubular auger 10. When the end of the screw spiral 7 is engaged in the notch 16, a radial hole 19 through the extension 18 registers with a radial hole 20 through the end of the tubular auger 10 in order to receive a retaining pin 21. When the bit is properly assembled on the end of the auger as described and as shown in the drawings, the pin 21 may be driven or forced into the holes 20 and 19 and frictionally retained therein to hold the bit positively in connection with the auger and prevent accidental detachment. When it is desired to remove the bit from the auger for any purpose, the pin 21 may be driven out, leaving the bit freely detachable from the auger.

The cutting blades 6 are of very hard synthetic alloy and are welded or brazed on the arms 1 in parallel planes and at opposite sides of the diametrical plane of the bit extended parallel to the forward surfaces of said blades (Figs. 1 and 3). The blades 6 are of equal width and have their inner edges equidistant from and aligned with the sharp or attenuated edge 11. This provides means facilitating feed of the mineral chips and particles along the inclined walls 12 to the spiral 7-9. This construction prevents clogging of the waste material at the end of the bit.

In the modified specific form of the invention shown in Figs. 11 and 12, the cylindrical shank 8 with its cylindrical extension 18 are omitted. Instead, a hexagonal shank 22 is formed integral with the cylindrical abutting portion 13 of the bit body, and has a hexagonal extension 23 projecting beyond the end thereof. The sides of the hexagonal shank 22 and hexagonal extension 23 are in parallel planes. Said shank 22 is designed and adapted to fit within a complementary hexagonal socket while the hexagonal extension 23 extends into a complementarily shaped end por-

tion of the auger 10, and the end of the cylindrical abutting portion 13 of the bit abuts and seats against the end of the auger 10. The extension 23 is formed with a hole 24 adapted to register with a hole 25 in the auger when the bit and auger are properly assembled and the end of the screw spiral 7 is engaged in a notch 16. The hexagonal shank 22 and hexagonal extension 23 cooperate directly with the interlock comprising the abutting ends of the screw spirals 7 and 9 and the notch 16 receiving the end of the screw spiral 7. A pin 26 driven into and through the holes 24 and 25 functions as does the pin 21 to hold the bit in connection with the auger and prevent accidental detachment of the two.

From the foregoing, it is apparent that my improved bit operates and functions very efficiently and feeds the chipped or waste particles by direct cooperation of the bit structure with the auger screw. The specific arrangement and abutting interengagement of the bit screw spiral 7 with the end of the auger screw spiral 9 provides a very strong interlock that will resist breakage at these points. In cases where greater or maximum strength is required for drilling into the hardest minerals, the hexagonal shank 22 may be used to fit within a complementarily shaped socket in the end of the auger and cooperate directly with the interlocked screw spirals to prevent breakage under the severest uses. Feed of the chipped or waste particles which are loosened or formed by operation of the drill is facilitated by the diverging walls 12, and the attenuated or sharp edge 11 formed by intersection of said walls between the arms 1. I contemplate equivalent variations from the structure disclosed as may be required to adapt the invention to preferred forms.

I claim:

1. In a metallic drill bit comprising a rearwardly tapered body having two arms projecting forwardly therefrom and separated by an intervening space; a screw spiral formed integral with said body rearwardly beyond said arms and extending rearwardly beyond the rear end of said body, and a shank integral with the end of said body and with said screw spiral for extension into the end of an auger for which said bit is intended and having a notch in its end for receiving the end of said screw spiral.

2. A drill comprising an auger, a socket integral with one end of said auger having a notch in one side thereof, a screw spiral integral with said auger having an end at the rear side wall of said notch, a bit abutting against the end of said socket and having a shank extended into said socket, and a screw spiral integral with said body and said shank engaging in said notch and against the end of said first screw spiral when said shank extends into said socket.

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