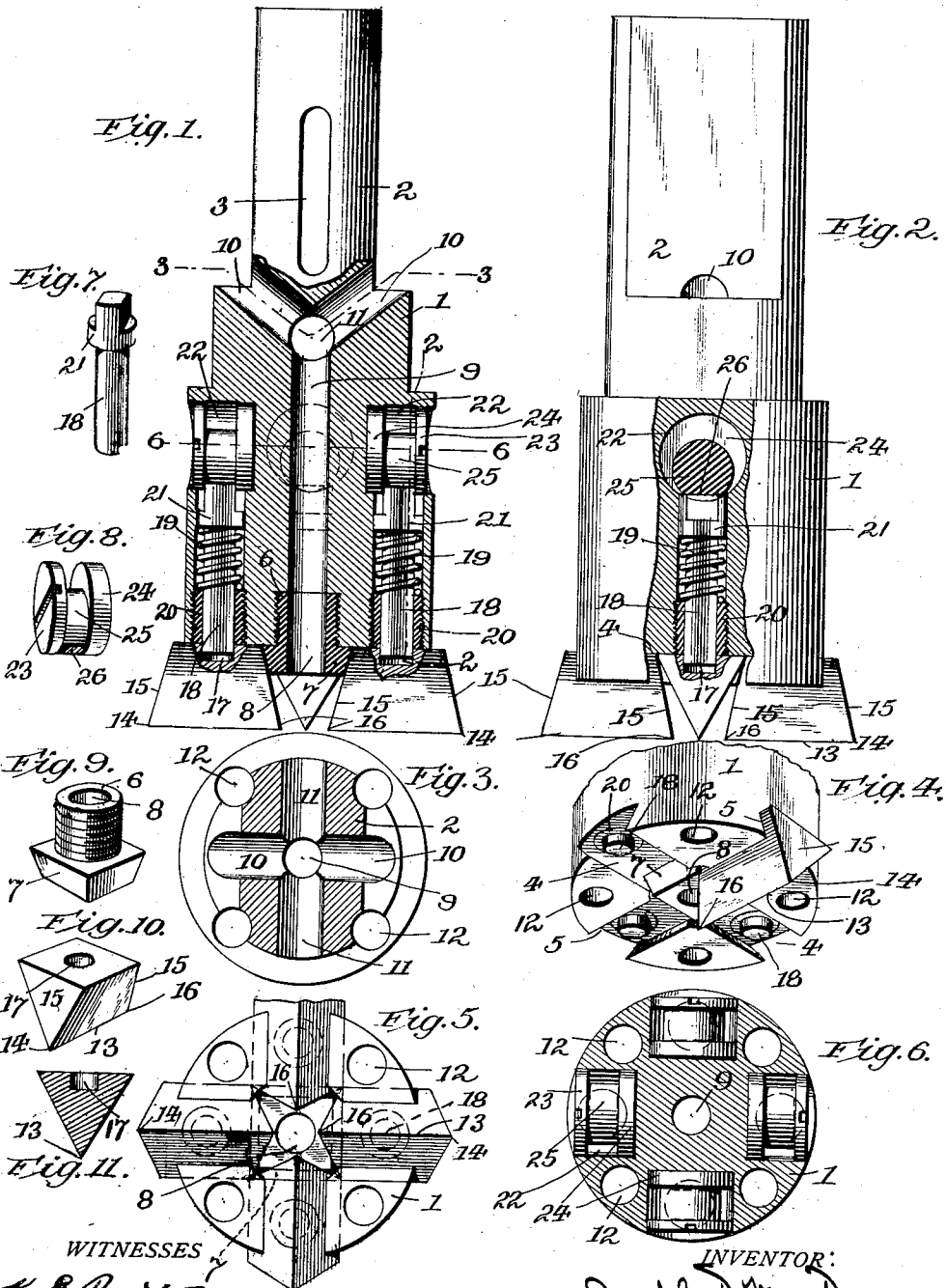


J. D. MacDONALD.
 DRILL.
 APPLICATION FILED FEB. 27, 1911.

1,114,497.

Patented Oct. 20, 1914.

2 SHEETS—SHEET 1.



WITNESSES
H. C. Montague
C. H. Raeder

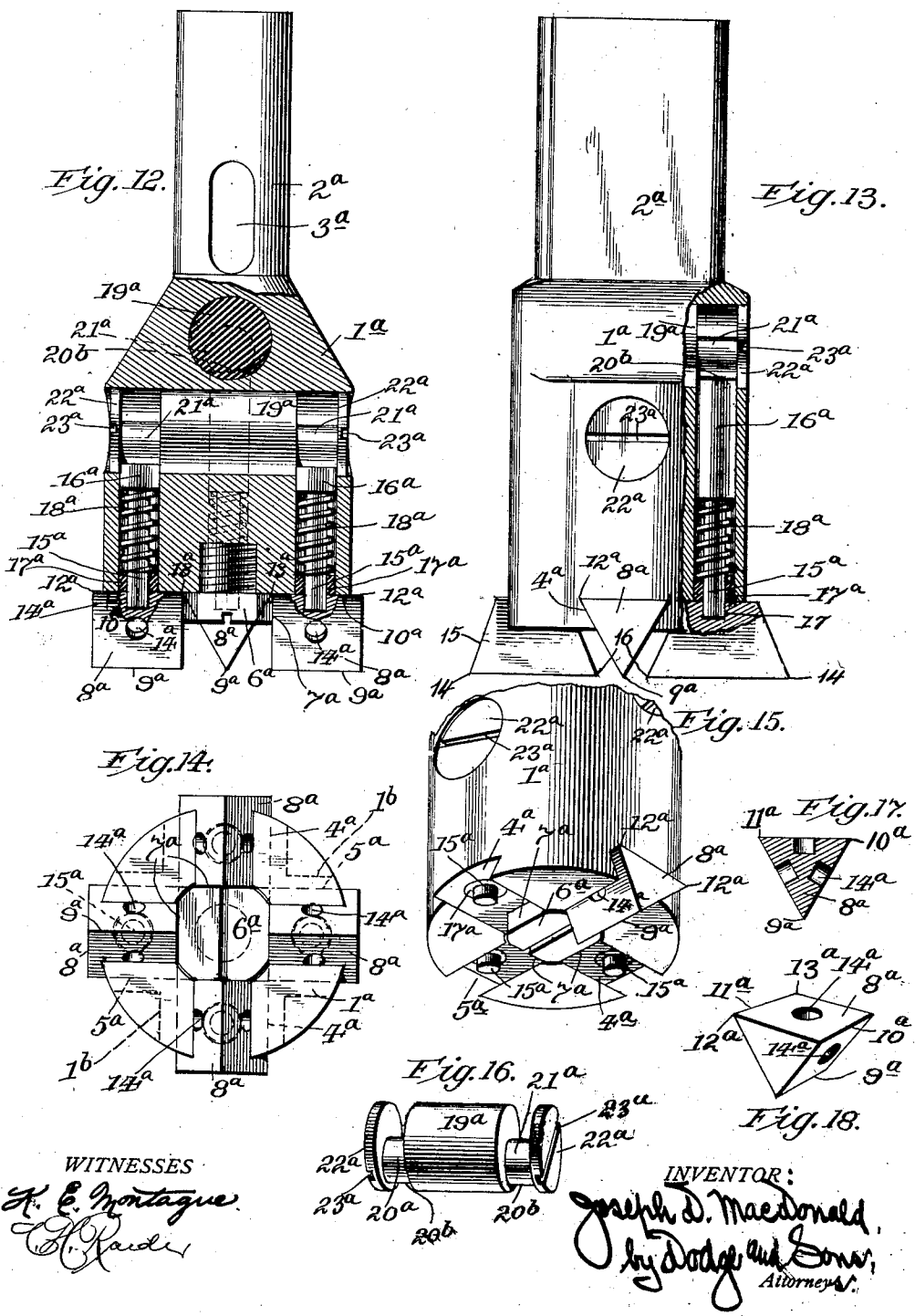
INVENTOR:
Joseph D. MacDonald
 by *Dodge & Sons*
 Attorneys

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UNITED STATES PATENT OFFICE.

JOSEPH D. MACDONALD, OF BUTTE, MONTANA.

DRILL.

1,114,497.

Specification of Letters Patent.

Patented Oct. 20, 1914.

Application filed February 27, 1911. Serial No. 611,009.

To all whom it may concern:

Be it known that I, JOSEPH D. MACDONALD, a citizen of the United States, residing at Butte, in the county of Silverbow and State of Montana, have invented certain new and useful Improvements in Drills, of which the following is a specification.

My present invention pertains to improvements in drills adapted more particularly for use in connection with power-hammers of various types, the drill being designed more especially for use in mining, rock-drilling and the like.

The invention is illustrated in the annexed drawings in two forms, Figures 1 to 11 inclusive showing the preferred form, and Figs. 12 to 18 inclusive a modification.

In the drawings: Fig. 1 is a longitudinal sectional view of the drill; Fig. 2 a side elevation thereof, partly in section, the sectional portion being taken on the line 2—2 of Fig. 1; Fig. 3 a horizontal sectional view, taken on the line 3—3 of Fig. 1; Fig. 4 a perspective view of the base of the drill, with one of the bits in place; Fig. 5 a bottom plan view of the drill, showing all of the bits in position; Fig. 6 a horizontal sectional view, taken on the line 6—6 of Fig. 1; Fig. 7 a perspective view of one of the locking pins or bolts; Fig. 8 a similar view of one of the cams which operate said locking pins or bolts; Fig. 9 a perspective view of the abutment member or screw against which the inner ends of the bits bear when the same are positioned; Fig. 10 a perspective view of one of the bits; Fig. 11 a sectional view thereof; Fig. 12 a longitudinal sectional view of the modified form of the drill; Fig. 13 a side elevation thereof, a portion being broken away to show one of the bit-retaining bolts or pins and its operating parts; Fig. 14 a bottom plan view of the drill; Fig. 15 a perspective view of the lower portion of the drill, all of the bits but one being removed; Fig. 16 a perspective view of the double cam employed in this modified construction; Fig. 17 a cross-sectional view of the modified form of bit; and Fig. 18 a perspective view of said bit.

The main object of the present invention is to provide a drill head in which provision is made to place, lock, unlock and remove cutting bits, said bits being so made as to permit the use of two or more of their cutting corners by reversing the ends or sides.

A further object of the invention is to

provide a bit which in one form presents a single cutting edge, and two cutting points or corners, and in the modified form presents three cutting edges and six cutting points or corners, any of which may be readily brought into operative position.

Another object of the invention is to produce a bit of relatively small size, which by reason of such size may be cheaply manufactured and readily tempered, the bits being so inexpensive that it is cheaper to throw them away after they have been worn down than to reshape and retemper them.

A further object of the invention is to provide a bit-stock having ports extending therethrough which will afford a passage or passages for the exhaust air from the hammer and keep the dust and other material produced in the act of drilling from working back and entering the hammer cylinder.

Referring to Figs. 1 to 11 inclusive, 1 denotes the head or bit-stock, provided with a shank 2 having a transverse opening 3 formed therein, by which the tool may be secured to the ordinary bar or directly to the engine or hammer, as the case may be. Any other means of fastening may, of course, be employed. The outer end of the head or bit-stock is provided with two intersecting, dovetail-shaped grooves 4 and 5, the grooves being readily formed by a shaper machine or the like. The grooves are cut through from side to side in the form shown, though this is not necessary, and is only done for the reason that it is cheaper than to stop short of the center. In order to produce an abutment for the inner end of each of the bits the head at its center, at the point of intersection of the grooves, is tapped, and an abutment member, having a threaded an abutment member, having a threaded stem 6 and a head provided with an inclined face 7, is screwed into the opening. This abutment member is provided with a longitudinally-extending opening 8, which coincides with a channel or passage 9 formed in the head of the bit-stock and opening into inclined cross-channels 10 and 11, which open outwardly at the point of junction of the shank and the head 1. Other openings or channels 12 (four in the present instance) extend through the head from end to end, forming passages for air, which will blow the dust produced by the drilling from the hole being drilled.

The bit, as will be seen upon reference to

Figs. 4, 10 and 11, has the form in cross-section of a triangle, and in the present instance is provided with a single cutting edge, 13, and two cutting points, 14 and 16. Both ends of the bit are beveled, as at 15, and when said bits are positioned (see Fig. 1) the beveled portion contacts with the beveled face 7 of the abutment. Each of the bits is provided with a socket or recess 17 in its upper or innermost face, which is adapted to coact with a latching bolt or pin 18, mounted in the bit-stock or head 1 in the manner best shown in Figs. 1 and 2. The bits are alike in form and the locking devices are also similar in form, so that a description of one will suffice. The pin or bolt 18 is mounted above the bit in a recess formed in the head and is urged inwardly by a spring 19, which is interposed between the inner end of a threaded sleeve 20, screwed into the outer end of the recess, and a shoulder or head 21, formed upon the upper end of the pin. To force the pin outwardly and hold it in locking engagement with the bit I provide a cam or eccentric, which is mounted in a recess or chamber 22, formed directly above the chamber in which the pin works. Said cam is provided with two heads 23, 24 and an intermediate cam or eccentric member 25, provided with a flat face 26. The outermost head, 23, is provided with a cross slot into which may be inserted a screw-driver or any other suitable tool for turning the cam. The upper end of the pin or bolt, 18, extends inwardly between the heads 23 and 24 and bears upon the cam 25, and is forced outwardly as the cam is rotated, until the flat face 26 of the cam rides over the pin. At this time rotation of the cam is stopped and the flat face will tend to prevent further rotation of the cam until force is applied thereto. In other words, the spring tends to force the upper end of the pin against the flat face and the rotation of the cam is prevented. When one desires to remove a bit for any reason, it is only necessary to rotate the cam, and the spring 19 will withdraw the pin from the recess 17 and permit the bit to be moved out laterally. The inclined side faces of the bit make a relatively close fit with the walls of the slot in which they are mounted and when positioned it is preferable to have the outer end of the bit extend outwardly beyond the side face of the bit-stock to a slight degree, as indicated in the drawings. This affords clearance for the bit-stock and enables the loosened material to readily pass outwardly. With such clearance, there is no difficulty in keeping the hole clear and free of all loosened material. This, of course, is assisted by an air-blast introduced into the hole being drilled, in any desired manner.

In Figs. 12 to 18 inclusive a slightly modi-

fied form of the invention is illustrated. The bit-stock 1^a has secured to it a shank 2^a provided with the transverse opening 3^a, the parts being similar to those in the other form except that the bit-stock is not provided with air-conveying ports. The lower face of the bit-stock is provided with two transversely-disposed dovetail-shaped channels 4^a, 5^a, which as in the other form, intersect each other, and at the point of intersection there is mounted a machine screw 6^a, which forms an abutment for the bits. The side faces 7^a of the abutment are flat, or parallel to the axis of the head-stock. Each of the bits under this modification has the form of an equilateral triangle in cross-section, see particularly Fig. 17, thus producing three cutting-edges 9^a, 10^a and 11^a, each of which edges has two cutting points or corners 12^a, 13^a. Each of the side faces of the bit is provided with a socket or recess 14^a which is adapted, when properly positioned in the head or bit-stock, to function with a retaining latch, a separate latch being provided for each bit. The size of the bit is such that it will make a fairly close fit with the undercut or dovetail walls of the cross-channels 4^a, 5^a, and when positioned with the inner end of the bit abutting against the flat face 7^a the bit will project outwardly beyond the side face or wall of the bit-stock, as shown in the drawings. It is, of course, conceivable that the bit may be of the form specifically shown in Figs. 1, 2, 4, 5, 10 and 11. Two of such bits are disclosed in Fig. 13 and are lettered accordingly.

The latches are similar to those shown in the other form, each comprising a bolt 15^a provided at its upper end with a head 16^a, said bolt and head working in a recess formed in alinement with a recess 14^a in the bit when the bit is positioned. The bolt is guided and held in place by a sleeve or bushing 17^a forced or otherwise secured in the bit-stock, and a spring 18^a bears against said sleeve and the head and serves to retract the bolt from the bit and to thus release the same. The latches or bolts are designed to be forced outwardly into the recesses in the bits and held in such position by cams or eccentrics. To this end the head or bit-stock is bored through in opposite directions and in different planes to receive suitable cams or eccentrics which operate upon the heads of the bolts. The cams or eccentrics operate in pairs, one pair functioning with the oppositely-disposed bolts, while the other pair function with the other pair of bolts. One of the cams is shown in detail in Fig. 16. It comprises a central cylindrical member or barrel 19^a, adapted to make a close fit with the bore of the transverse opening in which it is mounted, and a pair of cams or eccentrics

20^a, 21^a, each provided with a flattened face 20^b to hold the cams against rotation when the bolts or latches are protruded. The heads 22^a are located outside of the cams and are adapted to substantially close the ends of the transverse openings formed in the bit-stock. Each head is preferably formed with a cross-slot 23^a for the reception of any tool by which the eccentrics may be rotated. It will thus be appreciated that upon giving the eccentrics a half turn from the position illustrated in Fig. 12, the bolts shown in said figure will be simultaneously retracted from the bits through the action of the springs 18^a.

While in actual practice the latch herein shown and described has been found to give eminent satisfaction, still in so far as the generic invention pertaining to the removable bit is concerned it will be appreciated that other forms of locking devices may be employed.

The bit-stock in the form last described may, as shown in dotted lines 1^b in Fig. 14, be formed with channels extending lengthwise of the outer face thereof, to provide passages for the escape of dust, etc.

Having thus described my invention, what I claim is:

1. In a drill, the combination of a bit-stock or body provided with a plurality of undercut grooves in its outer end; a plurality of bits adapted to be mounted in said grooves, each of said bits being triangular in cross-section and adapted to make a relatively close fit with the walls of one of said grooves and to be held thereby; a bolt mounted in the bit-stock adjacent to each of said bits, the bolt when protruded being adapted to enter a recess formed in the side face of the bit; and positively-actuated means mounted in and carried by the bit-stock for forcing said bolts outwardly into operative relation with the bit.

2. In a drill, the combination of a bit-stock or body provided with a plurality of undercut grooves in its outer end; a plurality of bits adapted to be mounted in said grooves, each of said bits being triangular in cross-section; a bolt mounted within the body in line with each of said bits, and adapted when moved outwardly to enter an opening formed in the adjacent side face of the bit; a spring operating upon each of the

bolts to withdraw the same; and an eccentric working upon the inner end of each bolt and adapted to force the same outwardly into locking engagement with the bit.

3. In a drill, the combination of a bit-stock or body provided with a plurality of undercut grooves in its outer end; a plurality of bits adapted to be seated in said grooves, each of said bits being triangular in cross-section, each bit being adapted to make a relatively close fit with the walls of the groove in which it is mounted; a bolt mounted in the body adjacent to each of said bits and adapted to enter an opening formed in the adjacent side face of the bit; a spring tending to draw the bolt inwardly away from the bit; and a pair of rotatable members mounted in the bit-stock, one for each pair of bolts, each of said rotatable members being provided with a pair of eccentrics located in line with the respective bolts, whereby upon rotation of the eccentrics the bolts may be protruded or moved outwardly into locking engagement with the bits.

4. In a drill, the combination of a bit-stock or body provided with intersecting undercut grooves upon its outer end; a screw mounted in the outer end of said body at the point of intersection of said grooves and forming a fixed abutment for the bits, the outer end of the screw extending a relatively slight distance from the face of the body; a plurality of bits mounted in said grooves, each of said bits being triangular in cross-section; a bolt located in the body adjacent to each of said bits and adapted to enter a recess formed in the adjacent face of the bit; and means for actuating said bolts, whereby they may be protruded into the sockets in the bits.

5. A bit for drills, triangular in cross-section, the ends of the bit converging somewhat sharply toward each other in one direction, whereby two sharp points are formed at the ends of the cutting edge of the bit.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH D. MacDONALD.

Witnesses:

JAMES W. WEIR,
HENRY C. FRESHOUR.