

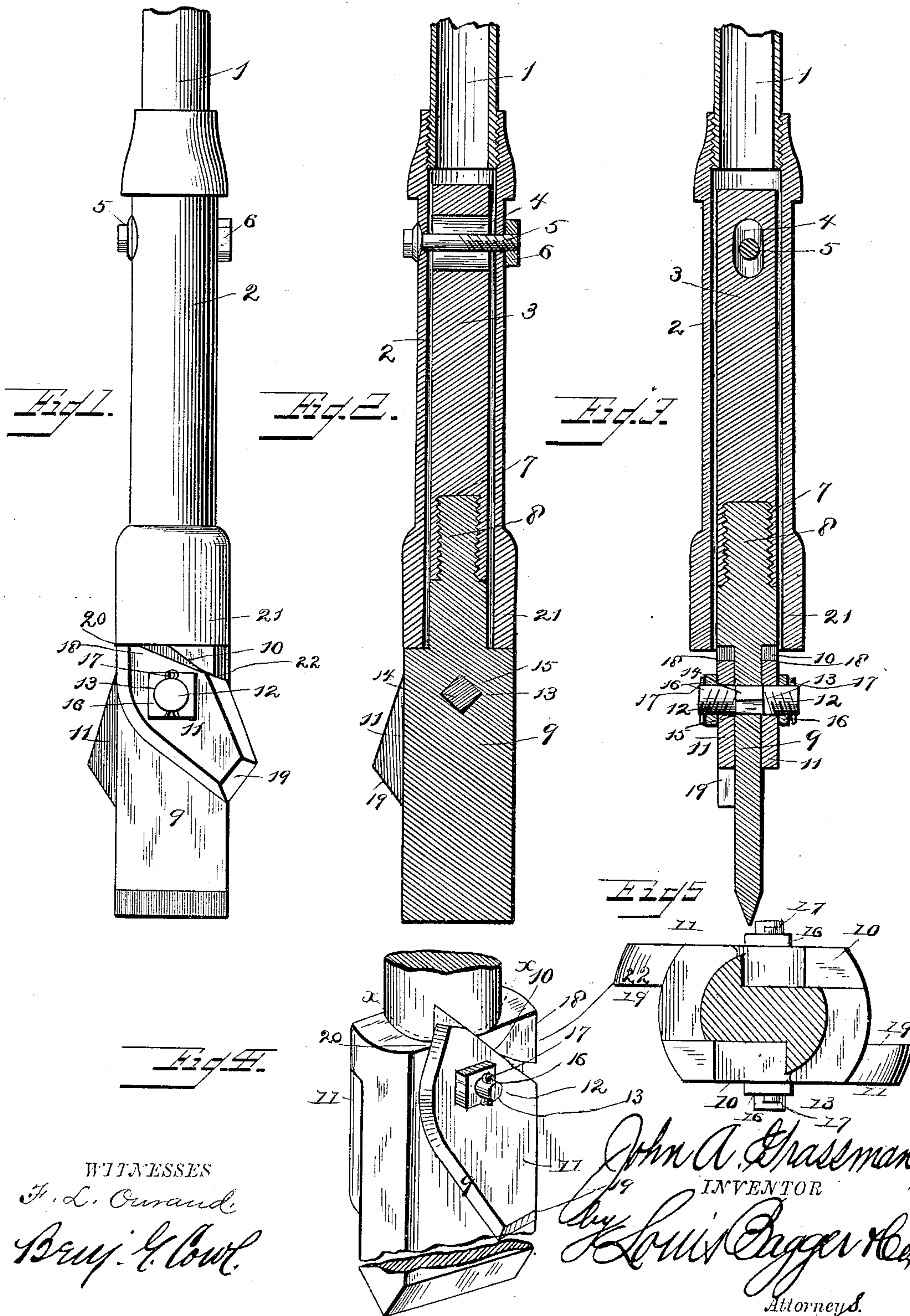
(No Model.)

J. A. GRASSMAN.

DRILL.

No. 377,249.

Patented Jan. 31, 1888.



UNITED STATES PATENT OFFICE.

JOHN A. GRASSMAN, OF FLORID, ILLINOIS.

DRILL.

SPECIFICATION forming part of Letters Patent No. 377,249, dated January 31, 1888.

Application filed March 19, 1887. Serial No. 231,501. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. GRASSMAN, a citizen of the United States, and a resident of Florid, in the county of Putnam and State of Illinois; have invented certain new and useful Improvements in Drills; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a side view of my improved rock-drill. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a similar view taken at right angles to the former view. Fig. 4 is a perspective view, on an enlarged scale, of the lower end of the drill; and Fig. 5 is a cross-section taken on line $x x$ of Fig. 4, showing the reamers in cutting position.

Similar numerals of reference indicate corresponding parts in all the figures.

My invention has relation to that class of rock-drills having expanding reamers pivoted to the sides of the bit; and it consists in the improved construction and combination of parts of such a drill, as hereinafter more fully described and claimed.

In the accompanying drawings, the numeral 1 indicates the hollow drill-rod, which extends to the upper end of the bore, and to which the reciprocating mechanism and the water-injecting mechanism are secured, and the lower end of this tubular rod, which may be extended by attaching additional lengths or joints to it, has a cylindrical casing, 2, of a slightly larger diameter, attached to it. A rod, 3, fits loosely within this casing, having a space between it and the inner side of the casing, and the upper end of the rod is provided with a longitudinal slot, 4, through which passes a bolt, 5, inserted diametrically through the upper end of the casing and secured by means of a nut, 6. The lower end of this slotted rod is formed with a socket, 7, into which the upper reduced and screw-threaded end, 8, of the drill-bit 9 is secured, and the upper end of this bit is formed upon the opposite faces with oppositely-inclined shoulders 10, facing downward.

The reamers 11 are pivoted near their upper ends upon the rounded ends 12 of a bolt, 13, fitting with its square central portion, 14, in a

corresponding perforation, 15, in the bit, and nuts 16 are secured upon the outer screw-threaded ends of this bolt and prevented from working off by means of split keys 17, inserted through the ends of the bolt.

The reamers have inclined upper edges, 18, with which they bear against the shoulders 10, and the lower cutting ends, 19, of the reamers are oblique, adapted to cut outward and downward. The upper corners of the upper inclined edges are slightly cut off, as shown at 20, and a shoe, 21, formed by enlarging the lower end of the cylindrical casing, bears against these cut-off corners.

It will be seen that when the tubular drill-rod is reciprocated it will first raise the cylindrical casing, and the bolt passing through the casing and through the slot in the rod having the bit will slide upward in the slot until it arrives at the upper end of the same, when the bit-rod and the bit will be raised; and it will be seen that by first raising the casing the lower edge of its shoe will be raised off from the cut-off corners of the reamers and will permit the latter to drop down, whereupon the descent of the drill-rod and of the casing will force the bit down and the shoe will strike the reamers at the corners, forcing them outward. This shoe striking the upper ends of the reamers and thus spreading them, will do away with the drawback experienced in many expansion-drills—viz., the failure of the expansion-bits to be forced out, so that the drill would not ream, and consequently fail to make a bore sufficiently large to receive the casing of the well, these drills being especially adapted to be used in the drilling of wells. The bit being movable within the casing, it will act as a jar in drilling.

A constant stream of water is pumped into the tubular drill-rod and will pass down and out at the shoulders of the drill-bit, washing away all the dust formed by the working drill and reamers, and carrying the same upward between the drill and the sinking casing or tube, thus clearing away all débris in the bore while drilling.

By withdrawing the drill from the bore the bit may be unscrewed and sharpened or repaired, and the reamers or expanding bits may be removed for the purpose of sharpening or renewing them by removing the keys and the

nuts, the said keys preventing the nuts from becoming loose, and thus dropping off during the operation of the drill.

The inclined shoulders upon the sides of the upper end of the bit have their outer portions, 22, cut off at an angle to the upper portions of the shoulders, so that the inclined edges of the upper ends of the reamers will bear with their lower portions against these cut-off portions when they are expanded, while they may bear with their upper portions against the upper portions of the shoulders when they are swung downward, the shoulders thus stopping the play of the reamers.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a rock-drill, the combination of a bit having a cutting-edge at its lower end formed with divergingly-inclined shoulders at the opposite sides, and the said shoulders formed at their lower portions with slightly cut-off ends, with expansion-bits or reamers pivoted near their upper ends upon the sides of the bit and having inclined edges bearing against the inclined shoulders, as and for the purpose shown and set forth.

2. In a rock-drill, the combination of a bit having a cutting-edge at its lower end formed with divergingly-inclined shoulders at the opposite sides, and the said shoulders formed at their lower portions with slightly cut-off ends, and formed with a square perforation through the upper portion below the shoulders, a bolt having its square central portion fitting in the perforation and formed with rounded portions outside of the square portion and provided with nuts and split keys upon the outer screw-threaded ends, and reamers or expansion-bits pivoted near the upper ends upon the round

portions of the bolt, and having inclined edges at one side of the upper portion bearing against the shoulders and having oblique lower cutting-edges, as and for the purpose shown and set forth.

3. In a rock-drill, the combination of a bit having reamers or expansion-bits pivoted upon its sides and secured to the end of a rod having a longitudinal slot, with a casing or tube having a shoe at its lower end bearing against the upper ends of the reamers, and having a diametrical bolt passing through and sliding in the slot of the rod and formed with a tubular drill-rod at its upper end, as and for the purpose shown and set forth.

4. In a rock-drill, the combination of a rod having a female-threaded socket at its lower end and having a longitudinal slot near the upper end, a bit secured in the socket and having inclined shoulders upon opposite sides formed with slightly cut-off lower ends, reamers or bits pivoted near their upper ends upon the sides of the bit, and formed with inclined edges upon the upper portions bearing against the inclined shoulders and having the upper portions slightly cut off, and a cylindrical casing having a shoe upon its lower end bearing against the cut-off portions of the inclined edges of the reamers, and having a transverse bolt fitting and sliding in the slot of the rod and secured to the lower end of a tubular drill-rod, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JOHN A. GRASSMAN.

Witnesses:

THOS. A. HETRICK,
JOSEPH B. ALBERT.