No. 680,376. Patented Aug. 13, 1901.

J. FORSYTHE.

EXPANSION DRILL.

(Application filed Aug. 3, 1900.)

(No Model.)

Fig. 1.

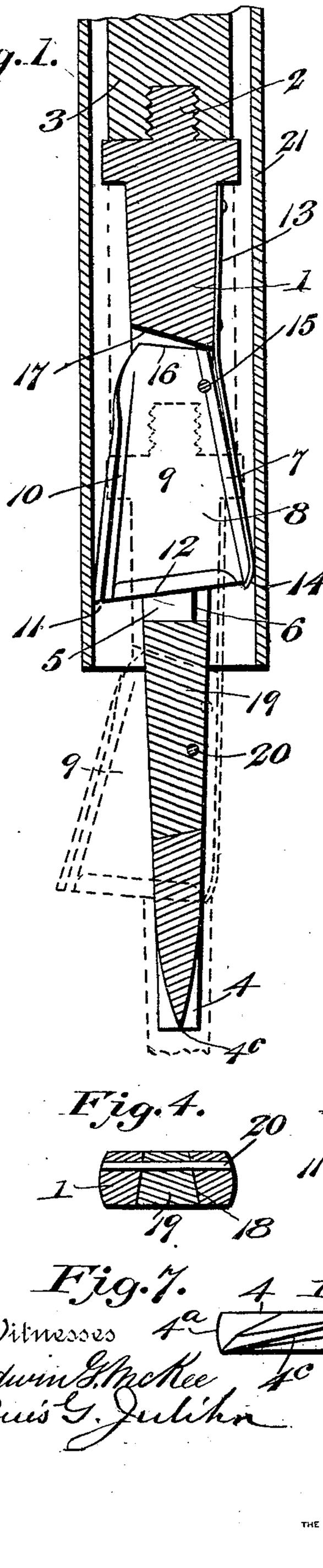

Fig. 2.

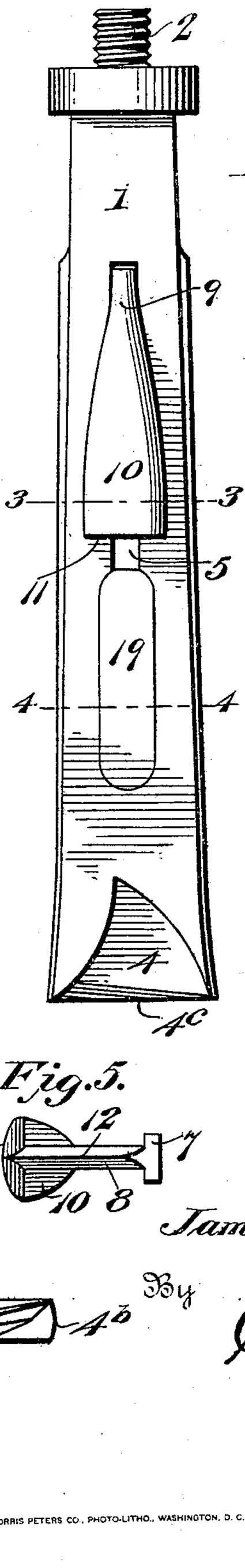

Fig. 3.

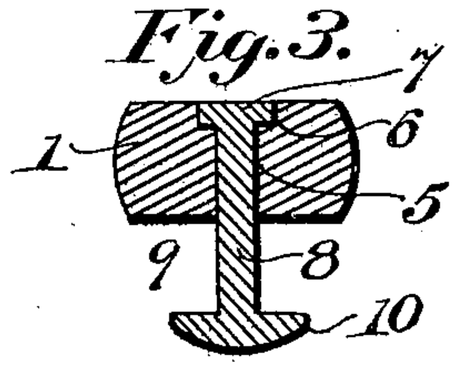

Fig. 6.

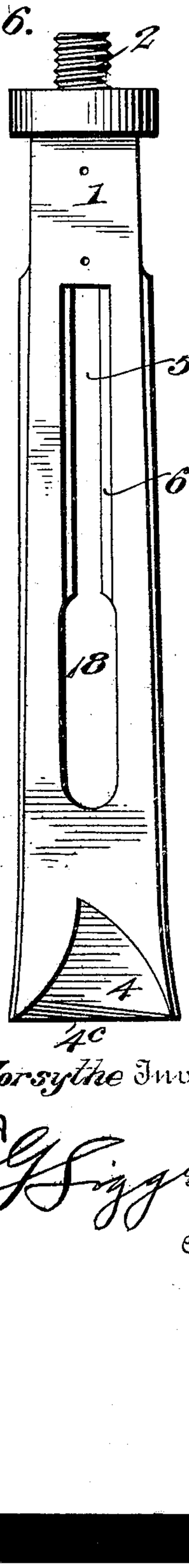

Fig. 4.

Fig. 5.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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EXPANSION-DRILL.

SPECIFICATION forming part of Letters Patent No. 680,376, dated August 13, 1901.

Application filed August 3, 1900. Serial No. 25,823. (No model.)

To all whom it may concern:

Be it known that I, JAMES FORSYTHE, a citizen of the United States, residing at Onslow, in the county of Jones and State of Iowa, have invented a new and useful Expansion-Drill, of which the following is a specification.

This invention relates to a novel expansion-drill of that class which comprehends the employment of a supplemental or reaming bit expansibly carried by the drill bit or stock and designed when the latter has been passed below the end of the well tube or casing to expand for the purpose of reaming or counterboring the opening made by the cutting edge of the drill proper.

The object of the invention is to provide the drill-stock with an expanding bit of peculiar form calculated to increase the efficiency of its operation and mounted in a manner to preclude the possibility of its accidental derangement or release from the stock, said mounting being arranged with special reference to the easy removal of the bit for the purpose of facilitating repair or the replacement of the bit when no longer serviceable.

To the accomplishment of this object and others subordinate thereto, as will hereinafter more fully appear, the invention consists in the construction and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In said drawings, Figure 1 is a sectional view through a well-casing, showing the drill located therein and illustrating in dotted lines the position assumed by the expanding drill-bit when the latter has been passed below the lower end of the tube or casing. Fig. 2 is a side elevation of the drill complete. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a sectional view on the line 4 4 of Fig. 2. Fig. 5 is an end view of the expanding or supplemental bit. Fig. 6 is a side elevation of the main or primary drill bit or stock detached from the elements which are connected thereto in use, and Fig. 7 is an end view of the primary drill-bit.

Referring to the numerals of reference designating corresponding parts throughout the views, 1 indicates the body or stock of the drill, provided at its upper end with a threaded projection 2 for the attachment of the shank 3 and having its lower end formed with a cutting edge 4, which constitutes the main or primary bit of the drill. This cutting edge 4 is substantially of **Z** form, comprising a pair of arcuate cutting edges 4^a and 4^b, connected by a diagonal rectilinear cutting edge 4^c, extending between the opposite ends of the arcuate edges 4^a and 4^b.

The stock or body 1 is given a general contour in accordance with the individual tastes of the manufacturer, but is preferably flattened somewhat and slightly flared toward its lower end. At the longitudinal center of the stock is formed an elongated slot 5, widened at one side face of the stock to form shoulder-defining recesses 6 for the reception of a transverse stop-flange 7, formed along one longitudinal edge of the web 8 of the supplemental or expanding bit 9. The web 8 is passed through the slot 5 and is formed at its edge opposite the flange 7 with a bit 10, disposed transverse to the web and extending beyond the opposite sides thereof. The lower end of the bit 10 is formed with an arcuate cutting edge 11, bisected by a straight cutting edge 12, formed at the lower end of the web 8. While the cutting edge 12 may be omitted in some instances, it is a highly desirable feature of my drill, for the reason that it prevents the accumulation of dirt or small pieces of stone behind the bit 10, which would obviously interfere with the effective manipulation of the latter and would prevent its being swung for withdrawal through the tube or casing of the well. By reference to Figs. 2 and 3 of the drawings it will be seen that the stop-flange 7 in one position of the expanding bit is seated within the recessed side of the slot 5, with its outer face flush with the side face of the stock 1. This is the normal position of the parts during the use of the drill and is maintained by means of a leaf-spring 13, secured at one end to the stock and having its opposite end opposed to the outer face of the stop-flange 7 and its extremity bent under the lower edge of the flange, as indicated at 14 in Fig. 1.

As clearly shown in Fig. 2 of the drawings, the bit 9 is pivoted in the stock 1 by a pintle 15, and its upper edge 16 is slightly inclined to permit it to abut squarely against the in-

clined upper end 17 of the slot 5, which constitutes a rigid seat sustaining the thrust of the bit 9 to prevent the strain of the latter from being exerted upon the pintle 13 during the operation of the tool. The lower end of the slot 5 opens into a considerably wider elongated bit-removing opening 18 of sufficient width and length to permit the removal therethrough of the bit 9, which is displaced first by the removal of the pintle 15 and then by sliding the bit into the opening 18, which is sufficiently wide to permit the stop-flange 7 to be drawn laterally therethrough. The side and end walls of the opening 18 converge somewhat to conform to the contour of a wedge-shaped key-block 19, which ordinarily plugs the opening 18 and is retained therein by a retaining-pin 20.

The manipulation of my drill in use is as follows: The well tube or casing 21 being of just sufficient internal diameter to receive the stock 1 and the bit 9, the latter is swung against the resistance of the spring 13 to a central position within the stock—that is to say, the flange 7 and the bit 10 are disposed at like distances from the adjacent side faces of the stock. The retention of the expansion-bit in this position may be insured by a binder of twine or other like material; but this is not essential and may be omitted, if desired. The drill, retained upon the lower end of the shank 3, is, as usual, passed through the well tube or casing 21, and when the expansion-bit 9 reaches the end of the tube the spring 13 will cause it to swing laterally to the dotted position shown in Fig. 1, the cutting edge of the bit-flange 10 being located a considerable distance beyond the wall of the tube and being effective for the reaming of a hole of considerably greater diameter than the diameter of the casing. If now the retraction of the drill is desired, it is elevated to the tube in the ordinary manner and the expanding or supplemental bit is swung to the position indicated in full lines in Fig. 1 by coming into contact with the lower edge of the tool.

From the forgoing it will be observed that I have produced a simple, durable, and effective drill equally adapted for well-boring or rock-drilling and comprehending an expanding bit which, while capable of being passed through the tube, is effective for the boring or reaming of a hole of larger diameter than the tube to facilitate the positioning of the latter; but while the present embodiment of the invention appears at this time to be preferable I wish to reserve the right to effect such changes, modifications, and variations as may be suggested by experience and experiment or required by the various contingencies of use, so long as such variations are embraced clearly within the spirit of the invention.

What I claim is—

1. A rock-drill comprising a stock having a longitudinal slot, and an expansion-bit pivoted within the slot and provided with flanges at its opposite edges, said flanges being disposed to permit its pivotal movement but to prevent its withdrawal.

2. A rock-drill comprising a stock having a longitudinal slot, and an expansion-bit pivoted within the slot, said bit being provided at its upper end with a flat face arranged to abut against the end wall of the slot in the expanded position of the bit, and formed at its lower end with an arcuate cutting edge and a stop-flange disposed at one side of the bit and located to be seated against the stock when the bit is expanded.

3. A rock-drill comprising a stock having a longitudinal slot, and an expansion-bit pivoted within the slot and having at its upper end a flat face arranged to abut against the end wall of the slot in the expanded position of the bit, said bit being provided with a web having a straight cutting edge formed at its lower end and a bit-flange disposed along the longitudinal edge of the bit and terminating in the plane of the lower extremity of the web, the lower end of said flange being formed with an arcuate cutting edge bisected by the straight cutting edge of the web and a stop-flange disposed at one side of the bit and located to be seated against the stock when the bit is expanded, said bit-flange and stop-flange being disposed at opposite edges of the bit to permit the pivotal movement of the bit but to prevent its withdrawal from the stock.

4. A rock-drill comprising a stock having a longitudinal slot widened at one side face of the stock, and a pivoted expansion-bit comprising a web located within the slot, a stop-flange along one edge of the web for reception within the widened end of the slot, and a bit-flange along the opposite edge of the web, the lower ends of said bit-flange and web being provided with cutting edges.

5. A rock-drill comprising a stock having a cutting edge formed at one end and provided with a slot having an inclined end wall, an expansion-bit pivoted within the slot and comprising a web having an inclined upper end arranged to abut against the inclined wall of the slot in the expanded position of the bit and having its lower end formed with a cutting edge, a stop-flange located along one longitudinal edge of the bit and designed in the working position of the latter to lie flush with the face of the stock, a bit-flange formed at the opposite edge of the web and formed at its lower end with an arcuate cutting edge, and a spring located upon one side of the stock and bearing against the stop-flange.

6. In a rock-drill, the combination with a stock formed with a slot extending entirely therethrough and with a bit-removing opening likewise extending through the stock and of greater width than said slot, a bit mounted within the slot, means preventing the lateral withdrawal of the bit from the slot and a key-block closing the bit-removing opening.

7. A rock-drill comprising a stock formed with a bit-removing opening and with a comparatively narrow slot opening therein, pivoted bit located within the slot and provided with flanges at its opposite edges of greater width than the width of the slot and disposed upon opposite sides of the stock, one of said flanges being capable of withdrawal through the opening in the stock, and a removable key-block located within the bit-removing opening.

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

JAMES FORSYTHE.

Witnesses:
T. B. JOHNSTON,
T. H. LIGHTFOOT.