

No. 786,952.

PATENTED APR. 11, 1905.

S. B. CLARK.
ROCK DRILL BIT.

APPLICATION FILED FEB. 26, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

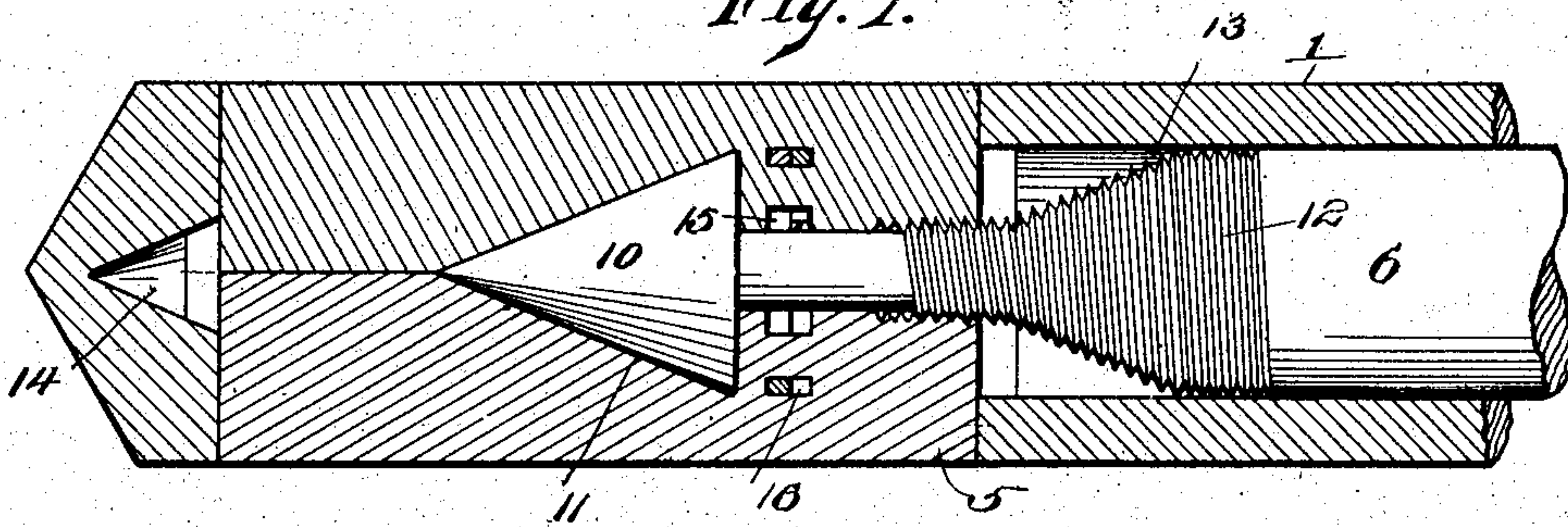


Fig. 2.

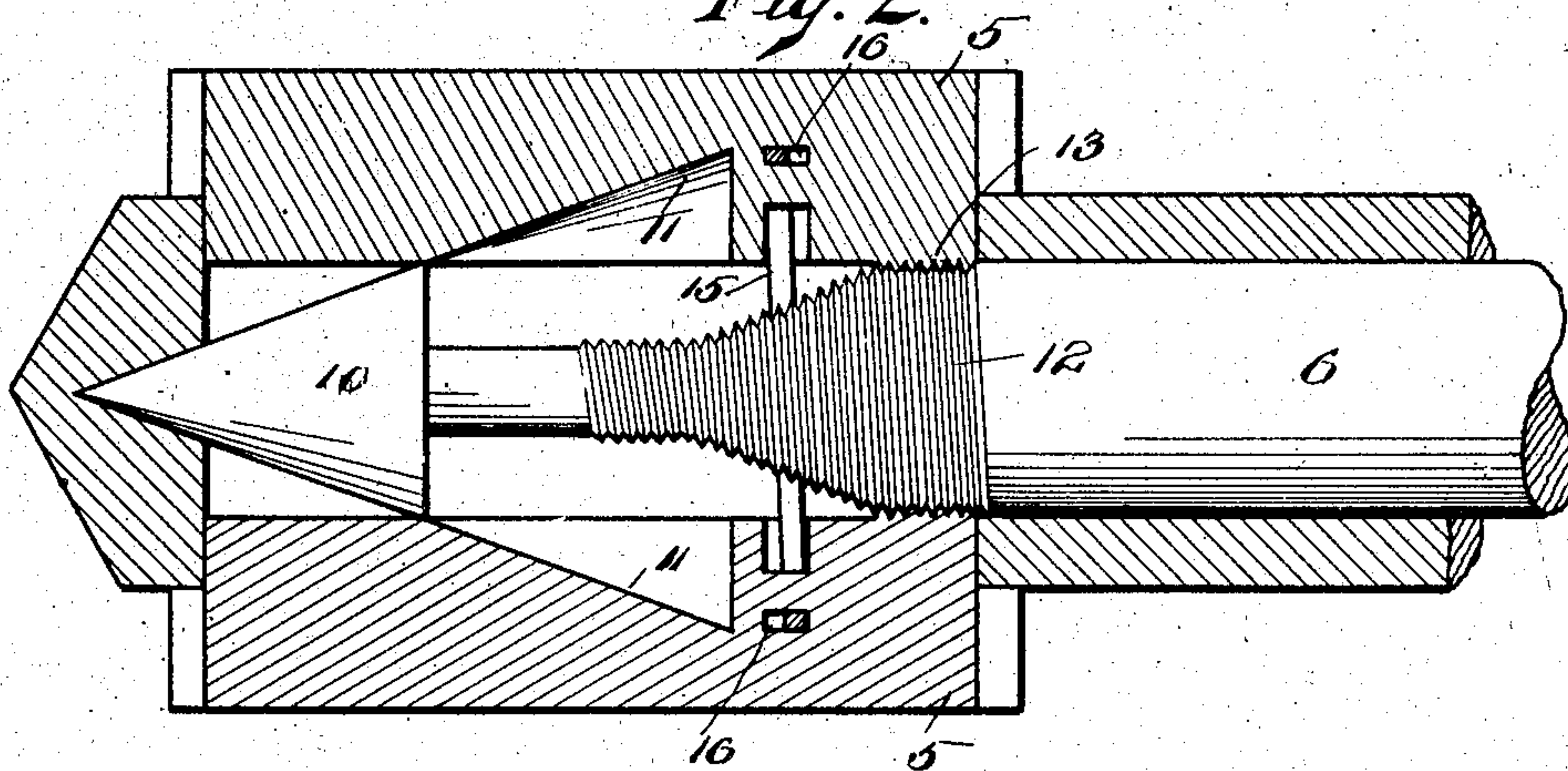


Fig. 3.

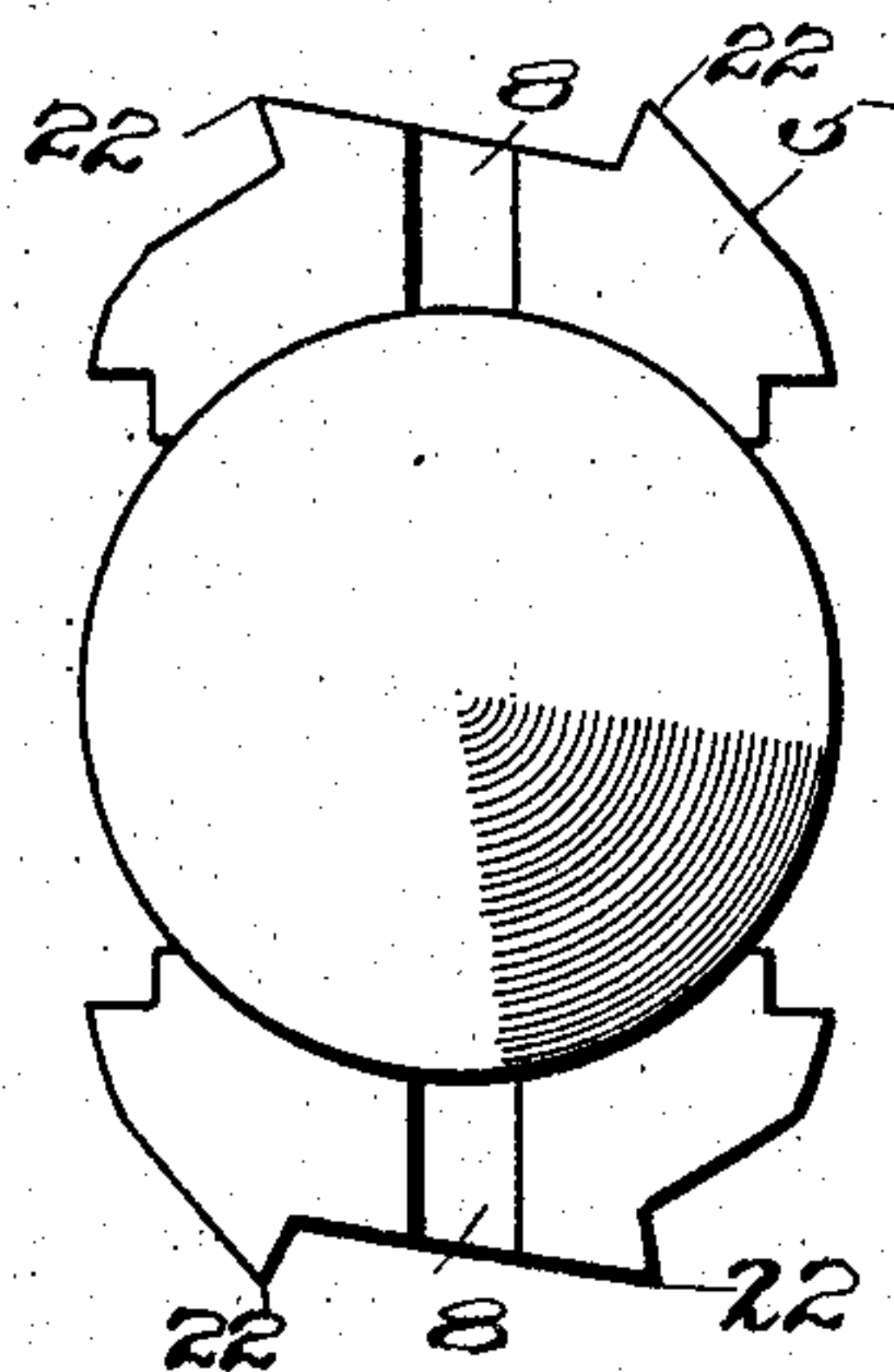
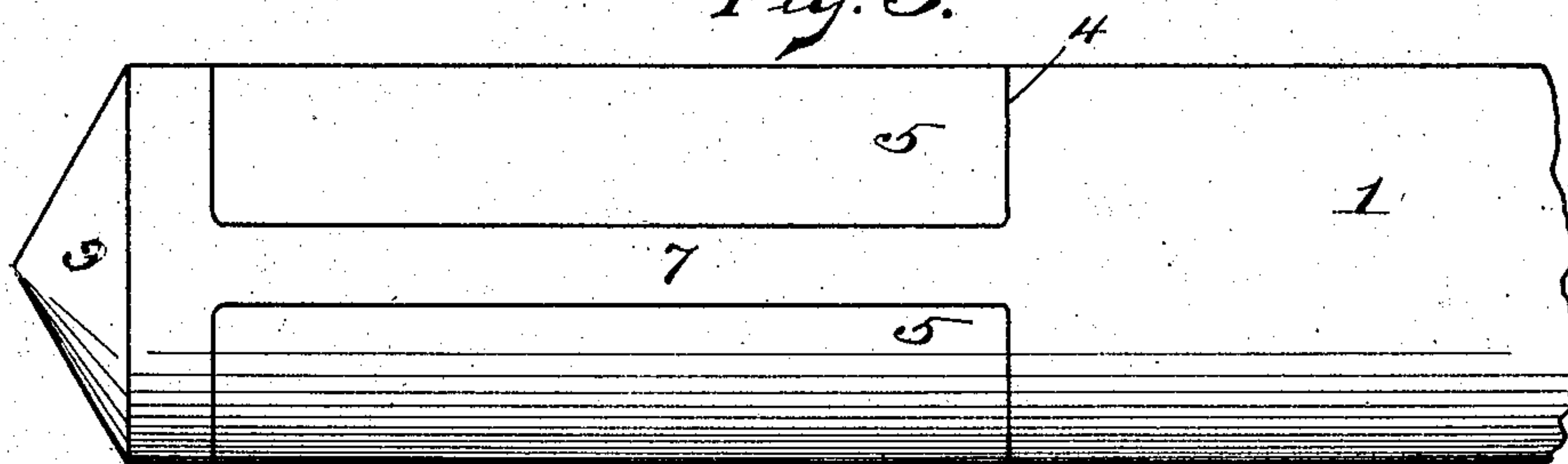


Fig. 4.

WITNESSES:

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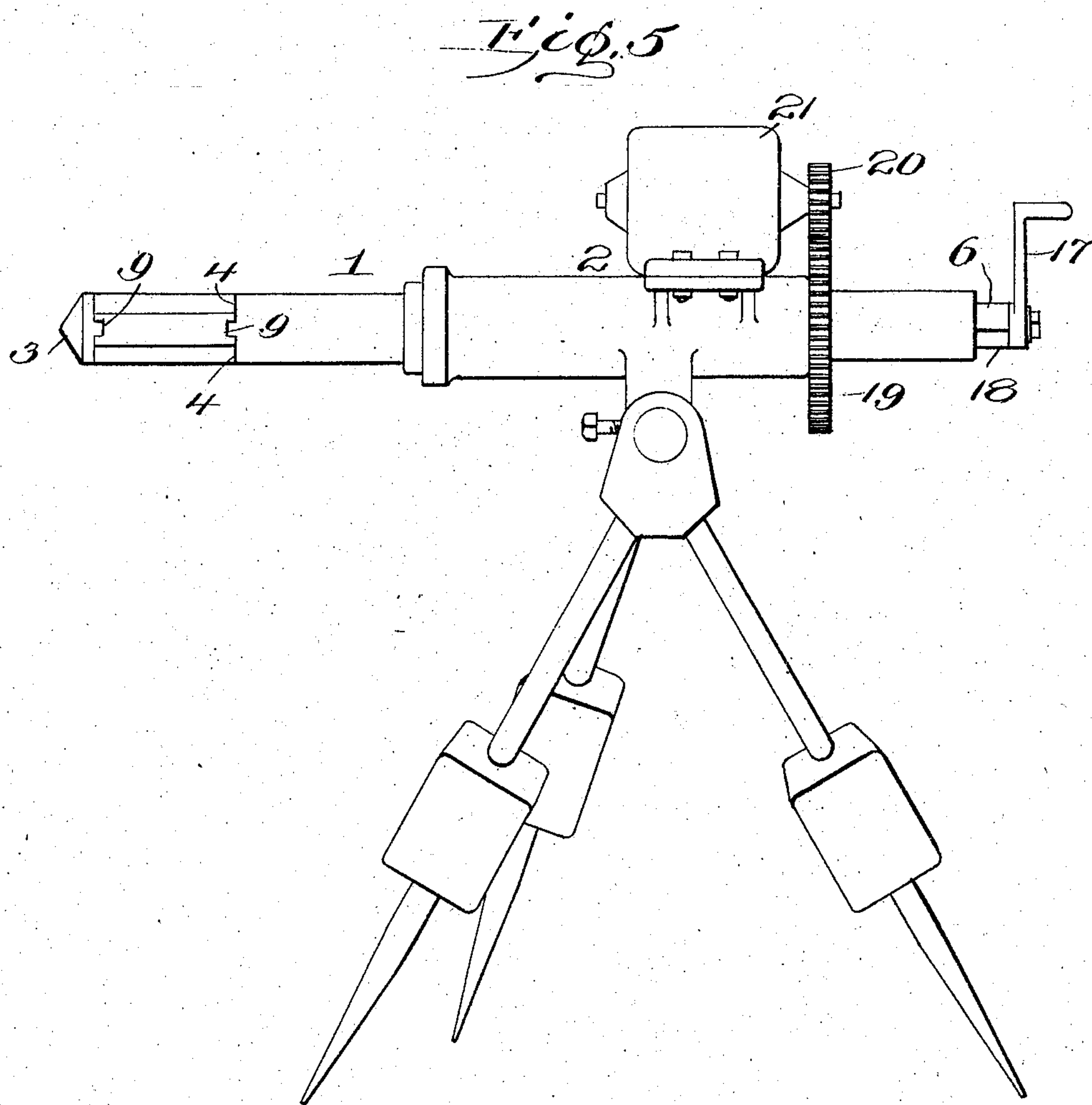
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

SAMUEL B. CLARK, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF
TO JOHN WILLIAM GRAHAM, JR., AND STEPHEN GILBERT SHAW,
OF DENVER, COLORADO.

ROCK-DRILL BIT.

SPECIFICATION forming part of Letters Patent No. 786,952, dated April 11, 1905.

Application filed February 26, 1904. Serial No. 195,474.

To all whom it may concern:

Be it known that I, SAMUEL B. CLARK, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Rock-Drill Bits; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in bits, and especially bits which are employed for enlarging openings made by drills.

The invention consists in an enlarging drill-bit comprising a hollow bit-shaft, cutters movably mounted therein, and spreading means movable longitudinally within the hollow shaft for forcing the cutters outwardly.

The invention also consists in certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a central longitudinal section through the end of a drill-bit constructed in accordance with the present invention, the cutters carried thereby being shown in their collapsed position. Fig. 2 is a similar sectional view, but showing the cutters spread apart or forced outwardly for enlarging a portion of a drilled aperture. Fig. 3 is a side elevation of the end of the drill-bit in its closed condition. Fig. 4 is an end elevation of my improved enlarging-bit with the cutters forced outwardly into their expanded positions. Fig. 5 is a side elevation of a rock-drill mechanism employing my improved enlarging-bit.

The present invention is designed for use in connection with drilling apparatus, and the device embodying the features of the invention is so constructed that it may be inserted in an aperture or hole which has been drilled by an ordinary drill in rock, ore, or other material and then enlarged, so as to cut a recess of greater diameter than the bore of the drilled aperture at any desired point along said bore.

The accompanying drawings illustrate a

practical embodiment of the invention, in which—

1 represents a hollow bit-shaft, the said shaft being capable of use in connection with any ordinary drilling apparatus, as 2. (Illustrated in Fig. 5.) The shaft 1 is preferably formed with a pointed end, as 3, and adjacent to the said point the shaft 1 is provided with lateral apertures 4, which receive movable cutters 5. Interiorly of the shaft 1 is a solid shaft or mandrel 6, capable of movement revolubly and longitudinally within the hollow shaft or casing 1. The point 3 of the shaft is connected with the remainder of the shaft by longitudinally-extending bars or shaft portions 7, which are arranged between the apertures 4 of the cutters. The cutters are formed with grooves 8 in their ends, which engage lugs or guiding projections 9, carried by the hollow shaft 1. These lugs hold the cutters in such relation to the hollow shaft 1 that they are actuated and turned by the rotation of the same and yet are capable of movement inwardly and outwardly radially with respect to the shaft. The cutters 5 are made of sufficient width to fit the apertures 4, formed in the hollow shaft 1, when the said cutters are in their collapsed position. The cutters when in their collapsed position are approximately flush with the outer surface of the hollow shaft 1, as shown in Fig. 3. The internal shaft 6 is capable of spreading the cutters when it is moved longitudinally within the hollow shaft 1. For the purpose of effecting this adjustment the internal shaft 6 is formed with a conical wedge-shaped hub 10, which engages correspondingly-shaped recesses 11, formed upon the inner surface of the cutters. The said shaft or mandrel 6 is also formed with a conically-threaded portion 12, which engages screw-threads 13 at one end of the cutters. The conical surface of the threaded portion of the shaft is preferably parallel with the conical hub 10, carried by said shaft, so that each end of the cutters will be spread simultaneously to the same extent when the said shaft is moved longitudinally between the cutters. It will be seen that by rotating the

shaft 6 the threads upon the conical portion 12 will tend to force the shaft toward the point 3 of the bit and the wedges 10 and 12 will gradually spread the cutters, the extreme separation of the cutters being shown in Fig. 2. The end of the conical point 10 preferably engages a conical socket or recess formed interiorly of the point 3. In this manner the rigidity of the implement is gradually increased when it is in its open cutting position, for the conical point 10 is firmly braced by its engagement with the said recess 14.

The cutters 5 are provided with any suitable means for drawing them inwardly toward each other. A simple expedient for accomplishing this purpose has been illustrated in the drawings, comprising a curved or circular spring 15, located in curved apertures 16, formed in the cutters 5. The action of the spring is to contract the cutters, pulling them inwardly against the spreading-surface of the inner shaft or mandrel 6. The inner shaft or mandrel 6 preferably passes entirely through the outer hollow shaft 1 and is provided with an operating-handle 17. When the bit is mounted in a drilling apparatus, as 2, (shown in Fig. 5,) the inner shaft 6 may be provided with a scale or gage 18, indicating the position of the inner shaft within the outer shaft. By means of such a gage an operator can tell exactly to what extent the cutters 5 have been expanded with respect to the hollow shaft 1.

The outer shaft 1 when the bit is employed upon a drilling-machine, as 2, is provided with a gear 19, which may be made to mesh with an actuating-pinion 20, operated by any suitable motor, as 21.

The operation of the enlarging-bit is as follows: The handle 17 of the inner shaft 16 is operated so as to collapse or draw inwardly the cutters 5 until they assume a position approximately flush with the surface of the outer shaft 1. The diameter of the outer shaft is such that it may be easily inserted in the ordinary hole or aperture produced by a drill. After the shaft 1 has been inserted in the drill-hole to a proper depth the handle 17 is turned, causing the shaft 6 to rotate and gradually expand the cutters 5. The cutters are formed upon their outer surfaces with one or more cutting teeth or edges 22, which engage the walls of the drill-hole and when the shaft 1 is revolved will gradually cut an enlarged place in the material which is being drilled. The shaft 6 is repeatedly rotated until the cutters have been forced outwardly a sufficient distance to produce a recess or enlargement of the drill-hole of the desired size. When the enlarged portion has been cut to the desired extent, the cutters 5 are then collapsed by the rotation of the inner shaft 6, when the bit may be withdrawn from the drill-opening. This device is particularly useful in enlarging drillings at certain points

in rock, ore, or other material which is being excavated or mined, and thus affords an opening or recess of increased capacity at any point where it is desired to place explosive material in a greater quantity than could be accommodated by the bore of the usual drill-opening.

It will be seen that the enlarging-bit can be used to form an enlarged recess at the inner end of a drilled opening or at any point along the length of said opening and that a number of such pockets may be provided at different points in the drilled aperture.

It will be evident that an enlarging implement of this kind may be used in connection with any opening, whether drilled or otherwise, where it is desired to produce a pocket of considerable size within a material which is to be blasted. The device is usually operable in connection with an ordinary drilling apparatus or may be mounted in any other desired manner, it merely being necessary to provide means for rotating the outer shaft 1 and force the cutters about the axis thereof. The pitch of the cones 10 and 12 is made sufficiently steep or abrupt to make them comparatively quick-acting, and the operation of the shaft 6 will thus quickly accomplish the expansion or contraction of the cutters. The pitch of the expanding-cones, however, is not so abrupt or great but that they will afford a firm holding means for supporting the cutters in any of their adjusted positions.

The construction of the enlarging-bit is quite simple and yet effective for the purpose desired. The bit can easily be removed from the drilling-machine and applied to another and can be quickly inserted into a drilled opening for operation. The bit may, if found necessary, be removed from time to time to clear the aperture of the materials drilled.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An expanding-bit for drills comprising a hollow shaft having lateral openings formed therein, laterally-moving elongated cutters mounted in said openings and extending longitudinally of the shaft, and rotating wedges interposed between said cutters for separating them with a parallel movement and supporting them in a cutting position.

2. An enlarging-bit comprising an outer hollow shaft having lateral openings formed therein, expansible cutters mounted in such openings, a rotating shaft mounted within the outer shaft, wedging-surfaces formed upon said rotating shaft and capable of engaging the said cutters at a plurality of points for expanding them in a parallel manner or permitting of their contraction.

3. An expanding-bit comprising a hollow shaft, cutters mounted therein, the said cutters being provided with end guideways,

means carried by the shaft for engaging said guideways, and internally-arranged expansible means extending between the cutters.

4. An enlarging-bit for drills comprising a rotating hollow shaft having lateral openings formed therein, cutters movably mounted in said openings, a longitudinally-moving central shaft extending between the cutters, a conical point formed upon said shaft, and a conical threaded portion also formed on said shaft, the said conical portions operating to expand the cutters when the shaft is moved longitudinally.

5. An enlarging-bit comprising a hollow shaft having lateral apertures formed therein, movably-mounted cutters in said apertures, the said cutters having internally-arranged screw-threads, a longitudinally-movable shaft mounted in the hollow shaft and provided with screw-threads for engaging the threads of the cutters, the rotation of the threaded shaft operating to feed it longitudinally as well as to spread the cutters.

6. An enlarging-bit comprising a hollow shaft, laterally-moving cutters carried thereby, a point carried at the end of the shaft, the said point having a conical aperture formed therein, an inner shaft mounted in the hollow shaft, a conical end piece formed upon said shaft, and means for forcing the shaft longitudinally when it is rotated, the conical end portion operating to separate the cutters and force them outwardly while the recess in the point receives the conical end of the shaft bracing it when the cutters are in their expanded position.

7. An enlarging-bit comprising a hollow shaft having lateral openings formed therein, laterally-moving cutting-blocks mounted

in said openings, guides at the ends of the cutting-blocks engaging guideways in the shaft, annular recesses formed in said cutters, a spring mounted in said recess tending to draw the cutters inwardly, and a longitudinally-moving wedge movably mounted within the shaft and engaging the cutters for spreading them.

8. In a device of the character described, the combination with a support, of a hollow casing pivotally mounted thereon, a hollow shaft having lateral openings mounted within said casing and projecting beyond the ends thereof, longitudinal, expansible cutters positioned within the openings of said shaft, a solid shaft of greater length than and mounted within said hollow shaft, said solid shaft provided with means adapted to engage approximately the opposite end of each cutter when expanded for causing parallel adjustment of the cutters, and means mounted upon said casing and hollow shaft for causing movement of said shaft.

9. A device of the character described, comprising a hollow shaft having a plurality of lateral openings formed therein, longitudinal cutters positioned within said openings, a rotatable shaft mounted within said shaft having openings, said rotatable shaft provided with means adapted to engage approximately the opposite ends of each of said cutters, when the same are adjusted to their greatest extent.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

SAMUEL B. CLARK.

Witnesses:

GEO. S. CLASON,
ANDREW DANIEL, Jr.