

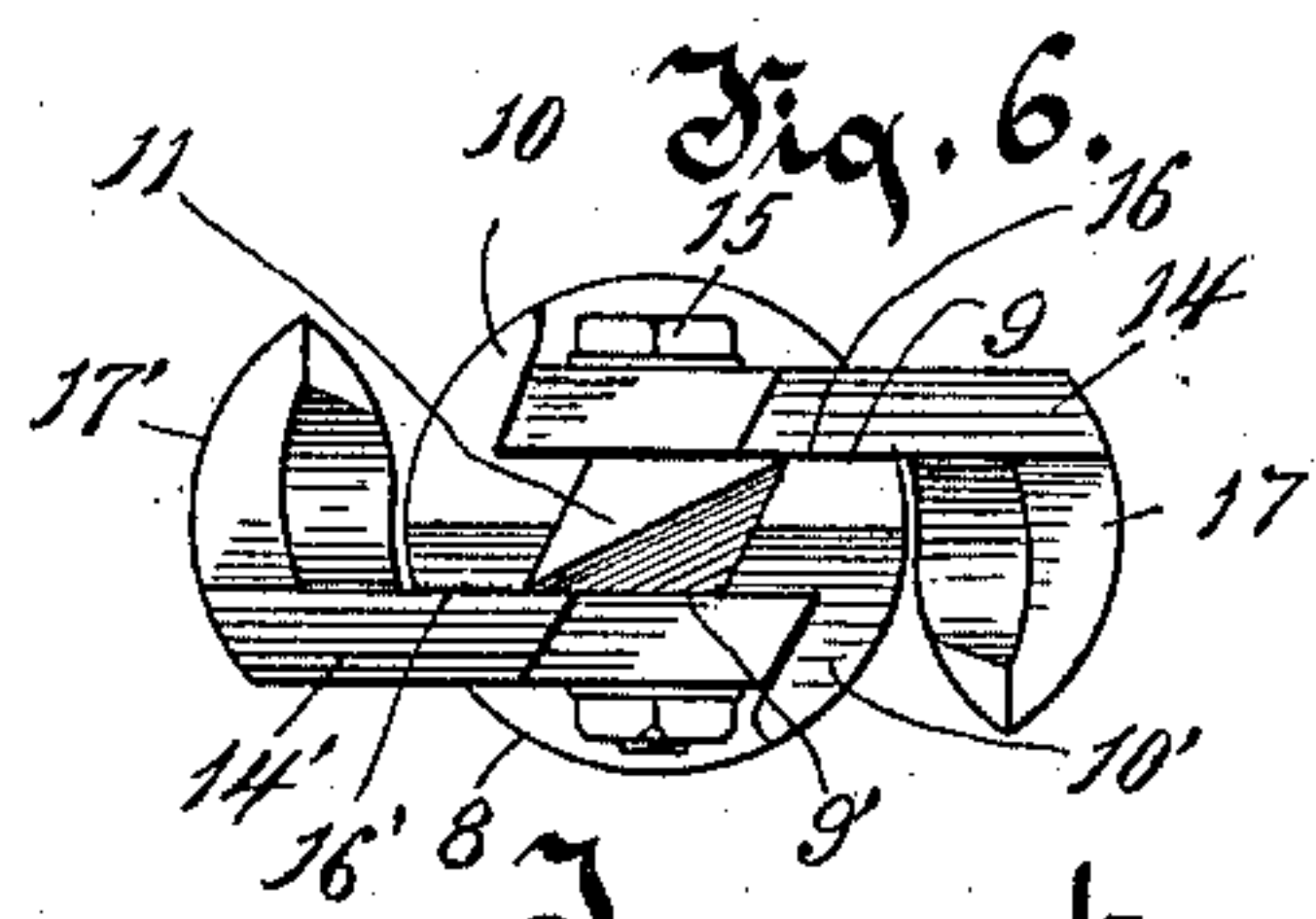
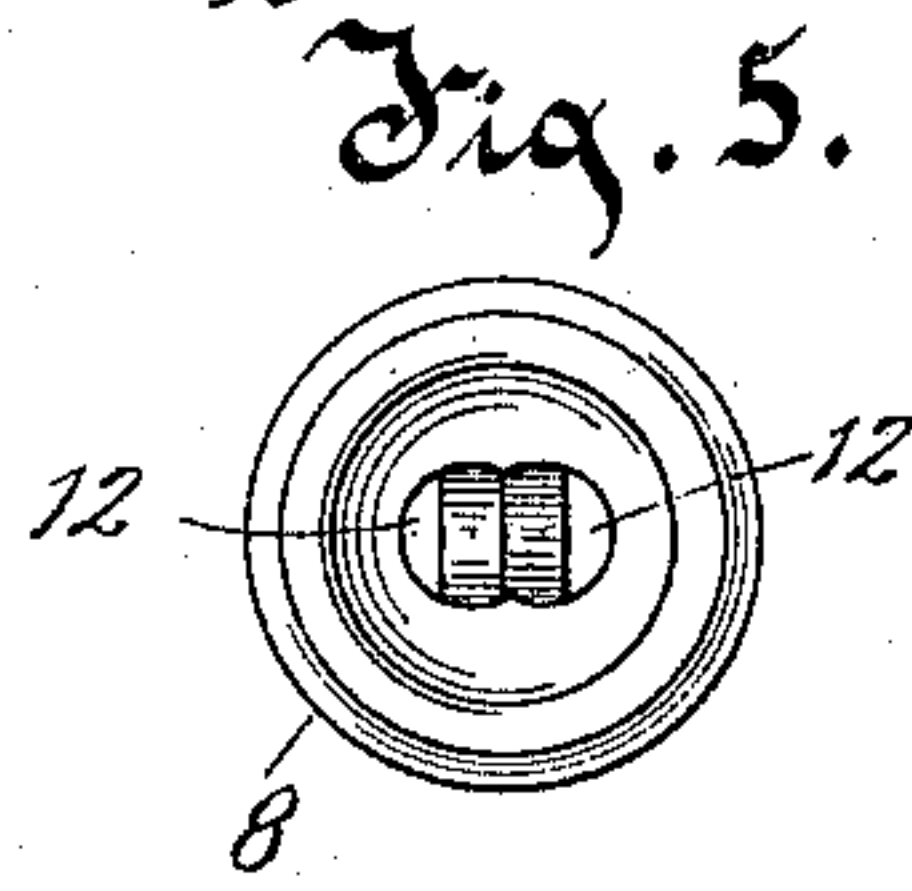
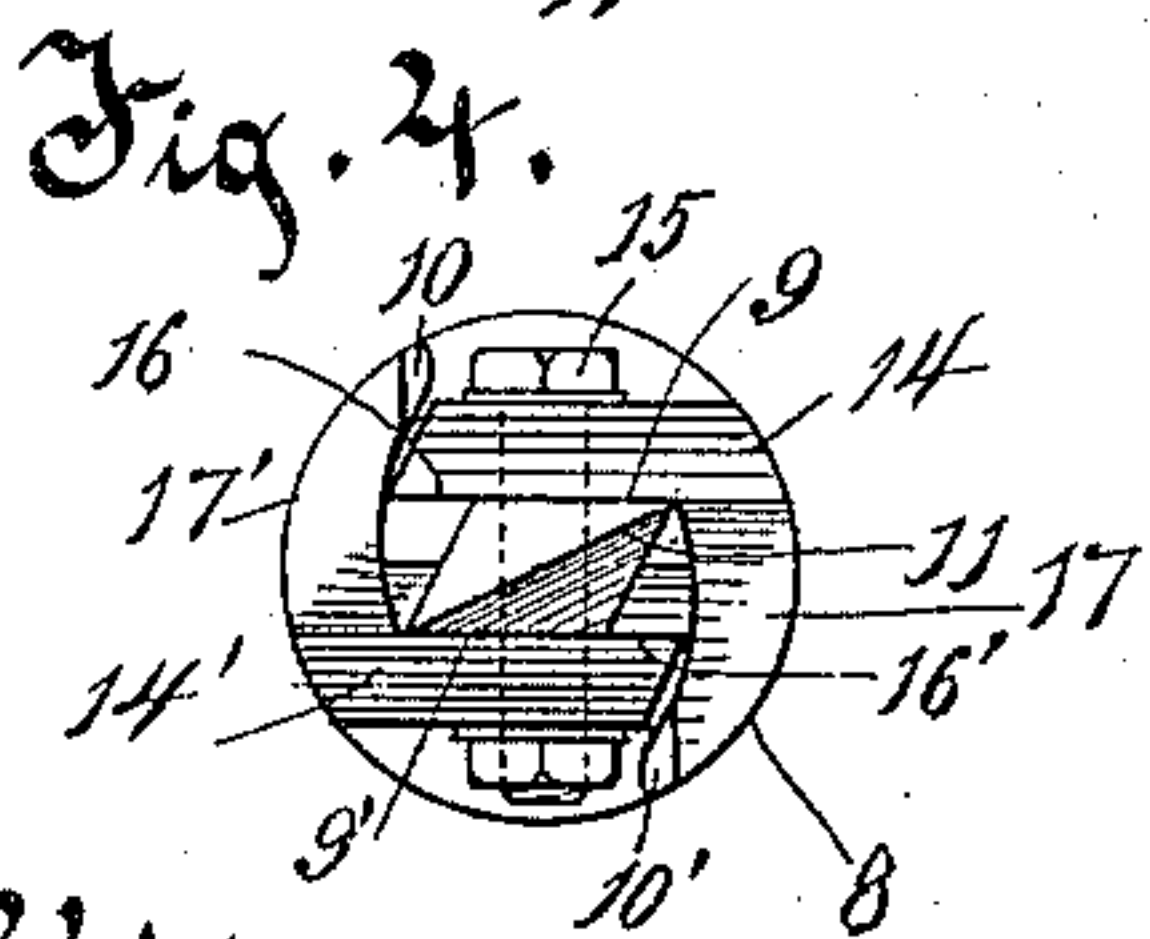
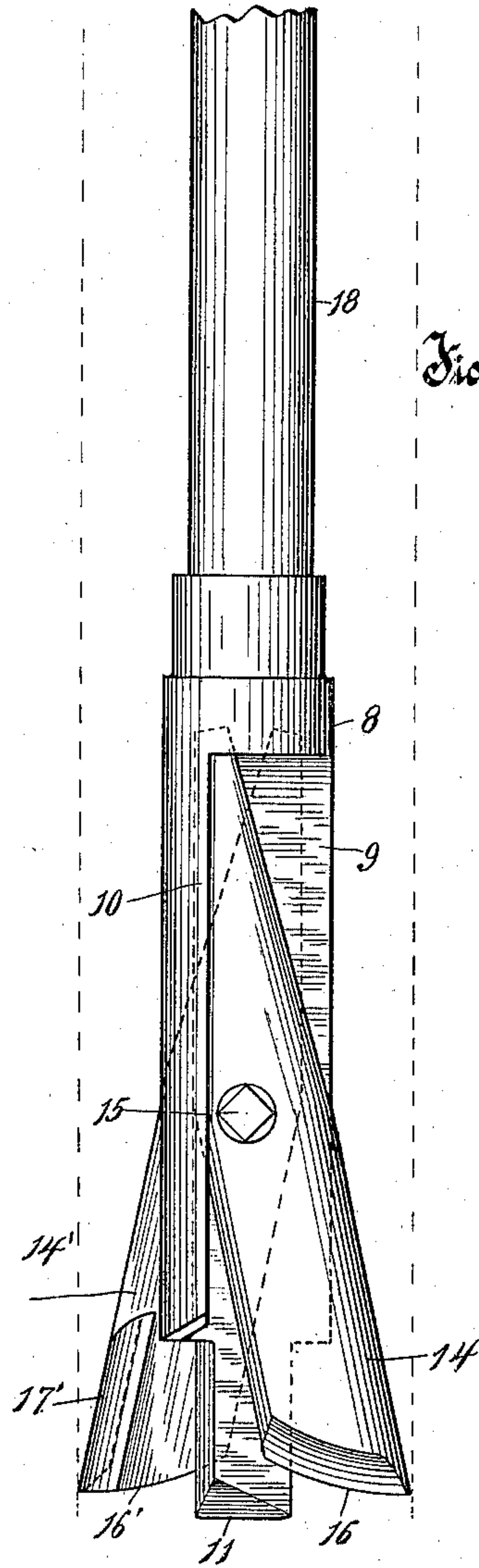
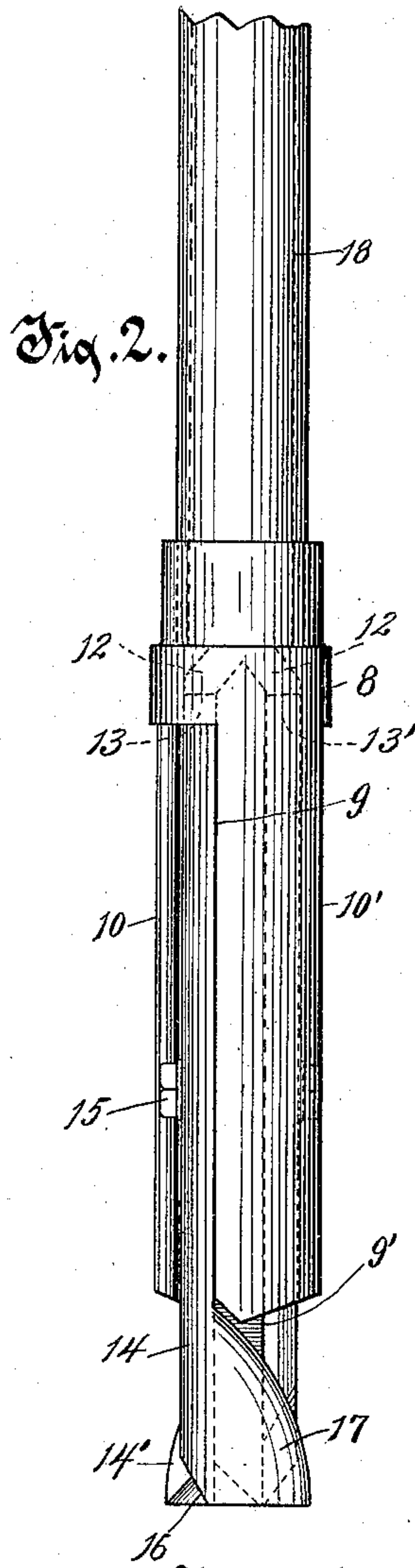
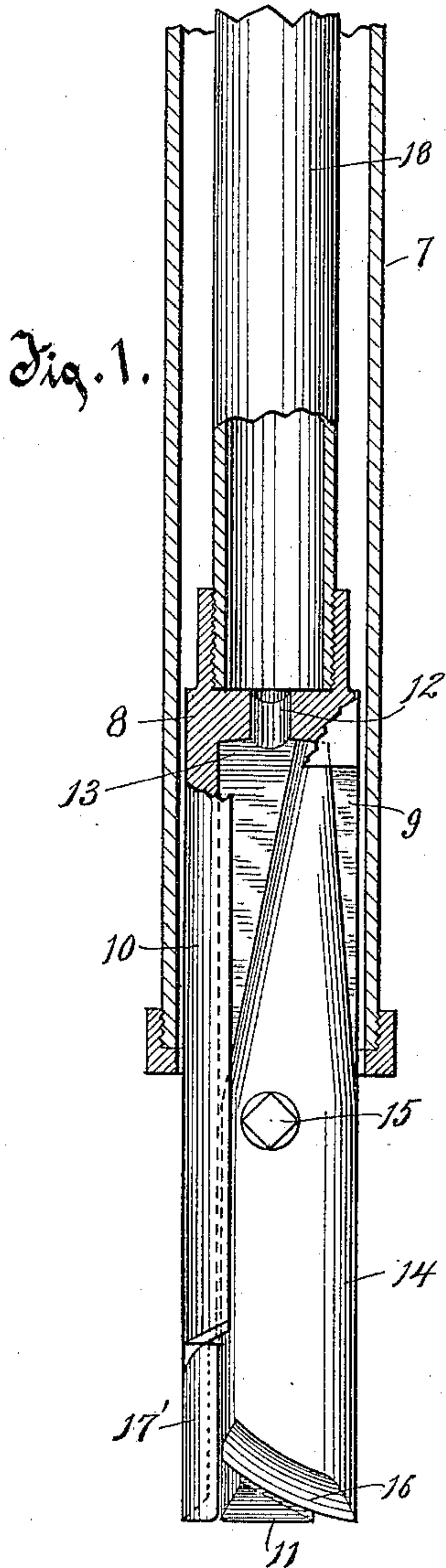
No. 639,036.

Patented Dec. 12, 1899.

A. R. HEALD.
EXPANSION DRILL.

(Application filed Aug. 21, 1899.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

ABNER R. HEALD, OF AURORAVILLE, WISCONSIN.

EXPANSION-DRILL.

SPECIFICATION forming part of Letters Patent No. 639,036, dated December 12, 1899.

Application filed August 21, 1899. Serial No. 727,967. (No model.)

To all whom it may concern:

Be it known that I, ABNER R. HEALD, of Auroraville, in the county of Waushara and State of Wisconsin, have invented a new and
5 useful Improvement in Expansion-Drills, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention is relative to improvements in
10 expansion-drills of that class wherein the drilling is effected by a vertical or up-and-down movement of the drill.

One of the objects contemplated by my invention is to provide a drill of the class referred to wherein pivoted cutting-reamers
15 are so constructed as to provide for cutting the sides of the hole perfectly smooth and true.

A further object resides in the peculiar construction and arrangement of parts whereby
20 the strain on the pivoted reamers is relieved.

With the above and other incidental objects in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully pointed out.

In the accompanying drawings, illustrating my invention, Figure 1 is an elevation of the drill with parts broken away and the pivoted reamers closed, the pipe within which the
30 drill works being in section. Fig. 2 is an elevation of the drill removed from the pipe within which it works and showing the reamers closed, the view being taken at right angles to Fig. 1. Fig. 3 is an elevation of the drill similar to that shown in Fig. 1, but illustrating the cutting-reamers as open to operative position and illustrating in dotted lines the hole which has been drilled. Fig. 4 is a lower end view of Fig. 1, with the incasing-
40 pipe removed. Fig. 5 is a plan view of Fig. 2, with the tube leading to the drill-socket removed. Fig. 6 is a lower end view of Fig. 3.

Referring to the drawings, the numeral 7 indicates the pipe within which the drill
45 works.

The drill-stock is indicated by the numeral 8. The upper extremity of this stock is round or substantially round in contour, and said stock downwardly from its upper rounded
50 end is formed with two opposed flat faces, (indicated by the numerals 9 9', respectively.) Extending at an angle from one longitudinal

edge of each flat face are flanges 10 10', which gradually bend or incline inwardly toward each of said flat faces, whereby the inner flat
55 sides of said flanges are presented at a bevel. It will be noticed that the flange 10 projects from one longitudinal edge of the flat face 9 and the flange 10' projects from the opposite longitudinal edge of the other flat face 9'.
60 The lower end of the drill-stock is provided with a central downwardly-projecting rigid cutter 11, the extremity of which is beveled downwardly to a sharp cutting or chiseled edge, as clearly shown.

The top of the upper rounded extremity of the drill-stock is provided with two vertical openings 12 12, which lead, respectively, to the opposed flat faces 9 9', and beneath this top portion are formed recesses 13 13'.
65 70

The pivoted reamers are indicated, respectively, by the numerals 14 14'. The inner face of the reamer 14 is placed against the flat face 9 of the drill-stock and the inner face of the reamer 14' against the flat face 9' of said
75 drill-stock. They are pivoted intermediate of their ends on a common pivot-bolt 15. The lower ends of these reamers extend downwardly adjacent to and on opposite sides of the central cutter 11. It will be noticed that
80 the extremity of each reamer is beveled from the outside inwardly, the bevel of the reamer 14 being indicated by the numeral 16 and the bevel of the reamer 14' by the numeral 16'. The lower end of each reamer is also provided with a wing projecting at an angle therefrom.
85 The wing of the reamer 14 is indicated by the numeral 17 and the wing of the reamer 14' by the numeral 17'. These wings, as clearly shown in the drawings, are beveled from the inside outwardly. The purpose of providing the reamers with the bevels 16 16' is to hold said reamers during the operation thereof against the drill-stock, and therefore prevent them from being pried off.
95 The beveling of the wings 17 17' facilitates the turning of the reamers on their pivots, so as to throw the lower ends thereof outwardly during the operation of the drill.

The inner edges of the reamers, from the lower beveled ends thereof upwardly to about the pivotal point, extend in a straight line and are beveled to match and fit the corresponding beveled inner sides of the flanges
100

10 and 10' when the reamers are in their closed position, as shown in Figs. 1, 2, and 4 of the drawings. From the pivotal points upwardly to the upper extremity of the reamers the inner edge of each reamer is not only beveled, but is also tapered upwardly to the upper extremity thereof. These beveled tapered edges when the reamers are turned to the closed position are out of contact with the beveled inner sides of the flanges 10 10', or when the reamers are turned on their pivots to the open operative position (shown in Figs. 3 and 6 of the drawings) these tapered beveled inner edges are thrown in contact with said beveled inner sides of the flanges 10 10'. The upper ends of the reamers 14 14' fit, respectively, in the recesses 13 13', and the ends of these recesses act as stops to limit the extent of the turning of the reamers. When said reamers are in their closed position, the upper extremities thereof are on the right-hand side of the openings 12, and when the reamers are in their open position the upper extremities thereof are on the left-hand side of said openings, so that in either position of the reamers said openings 12 are left entirely clear.

Fitted to the upper end of the drill-stock is a tube 18. The connection is preferably made by providing said upper end of the drill-stock with a reduced interiorly-threaded extension which the lower threaded end of the tube 18 engages.

In the operation of my invention the tube 18 and the drill connected to the lower end thereof are inserted through the incasing pipe 7, as shown in Fig. 1 of the drawings, the drill being forced entirely clear of the lower end of the pipe 7, so as to permit the pivoted reamers to be turned outwardly to operative position. A vertically-reciprocating movement is now given to the drill by any approved means, and this will cause the reamers to be turned out to the position shown in Fig. 3. These reamers, in connection with the stationary cutter 11, will thereby cut the hole for the pipe 7, the wings 17 17' cutting the sides of the hole smooth and true. Inasmuch as when the reamers 14 14' are thus turned outwardly to operative position the tapered beveled inner edges of said reamers are bearing against the flanges 10 10', it is obvious that the strain on the pivot-bolt is relieved not only by reason of this bearing contact, but also by reason of the fact that the upper extremities of the reamers are against the inner ends of the recesses 13 13'. Even when the reamers are in their closed position all strain is also taken off of the pivot-bolt in view of the contact of the straight beveled edges of the reamers with the flanges 10 10' and the contact of the upper extremities of said reamers with the outer ends of the recesses 13 13'.

The provision of the openings 12 in connection with the tube 18 provides for clearing the hole of all clippings, &c., as the drilling

progresses. This may be effected merely by forcing water down the tube 18, and inasmuch as the openings 12 are always clear the said water is free to pass downwardly to act on the clippings and to force said clippings upwardly in the space surrounded by the incasing pipe 7, or the water could be forced down into the incasing pipe 7, and thence upwardly through the openings 12.

My improved drill is intended more especially for drilling sandstone, clay, and gravel-cement, although it may be employed as a rock-drill, especially where the proportions are changed so as to make the drill solid enough to meet the requirements for this particular kind of drilling.

Whenever it is desired to withdraw the drill after the drilling is completed, it is pulled upwardly in the incasing pipe 7, and on this upward pull the reamers fall together and become contracted to a compass less than the diameter of the pipe 7.

What I claim is—

1. In an expansion-drill, the combination, with a drill-stock having a depending stationary cutter, of reamers pivoted to said drill-stock, said reamers each having a wing at its end extending from the edge thereof at a right angle or substantially a right angle, the wings of one reamer extending from an edge thereof opposite to the edge from which the wing of the other reamer extends, and the angles of said wings being in a direction to locate the wings on opposite edges or sides of the stationary cutter, when the wings are closed.

2. In an expansion-drill, the combination, with a drill-stock having a depending stationary cutter, of reamers pivoted to said drill-stock, said reamers each having a wing at its lower end extending from the edge thereof at a right angle or substantially a right angle, the wing of one reamer extending from an edge thereof opposite to the edge from which the wing of the other reamer extends, and the angles of the wings being in a direction to locate said wings on opposite edges or sides of the stationary cutter, when the wings are closed, and said wings being beveled from the inside outwardly.

3. In an expansion-drill, the combination, with a drill-stock, having a depending stationary cutter, of reamers pivoted to said drill-stock, the lower ends of said reamers being beveled from the outside inwardly, and said lower ends of the reamers provided with wings projecting at angles therefrom, said wings being beveled from the inside outwardly.

4. In an expansion-drill, the combination, of a drill-stock having a depending stationary cutter, opposite faces of said stock being plane surfaces, and one longitudinal edge of each plane surface provided with a projecting flange having a beveled inner side, of reamers pivoted to the respective plane sur-

faces of the drill-stock, the inner edge of each
reamer from the lower end upwardly for a
desired distance being straight and beveled
to register with and fit the beveled edge of
5 the flange when the reamers are closed, and
the said inner edge of the reamers upwardly
from the upper terminus of the straight and
beveled portion being beveled and tapered,

and adapted to fit the beveled inner side of
the flanges, when the reamers are open. 10

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

ABNER R. HEALD.

Witnesses:

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W. F. HALL.