(No Model.) 2 Sheets—Sheet 1.

S. A. HORTON.

BIT FOR WELL DRILLING APPARATUS.

No. 517,459. Patented Apr. 3, 1894.

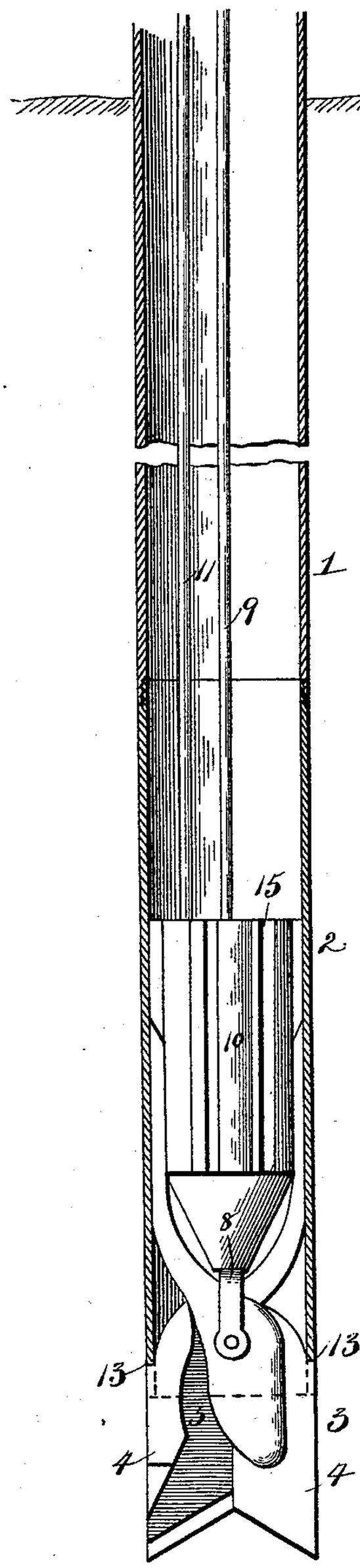


Fig. 7

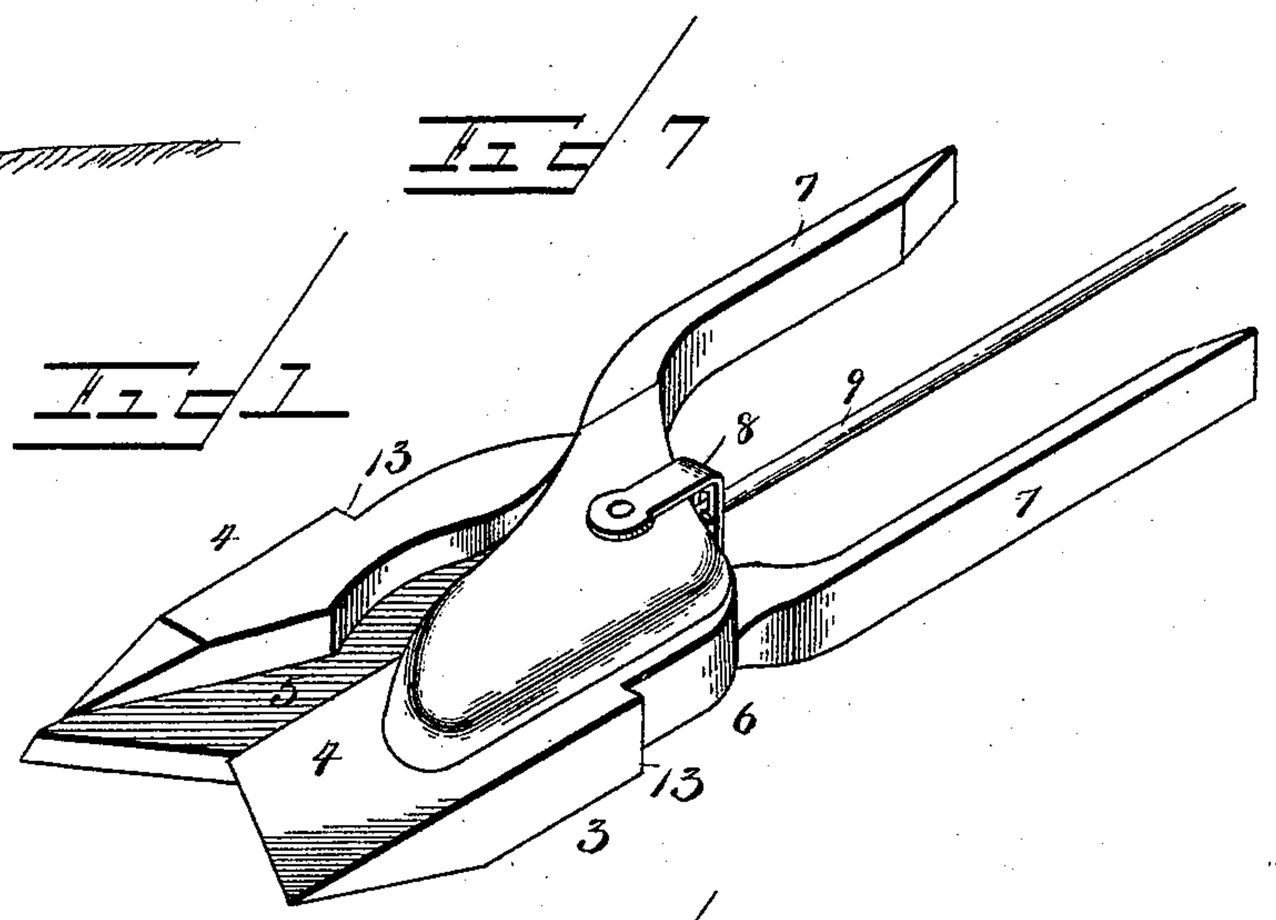


Fig. 1

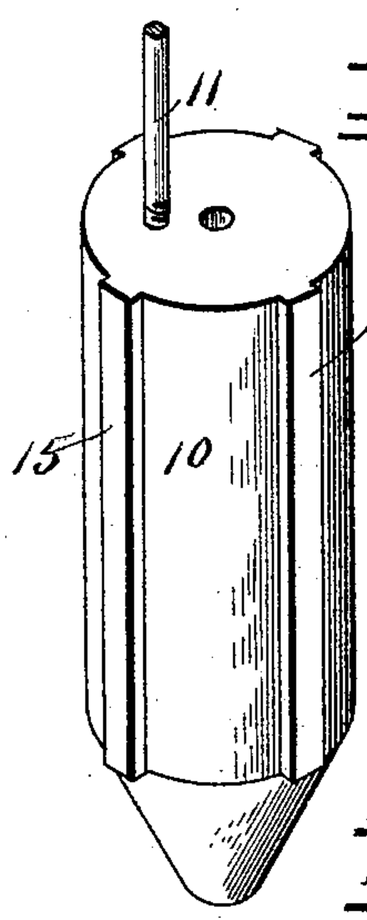


Fig. 8

Fig. 6

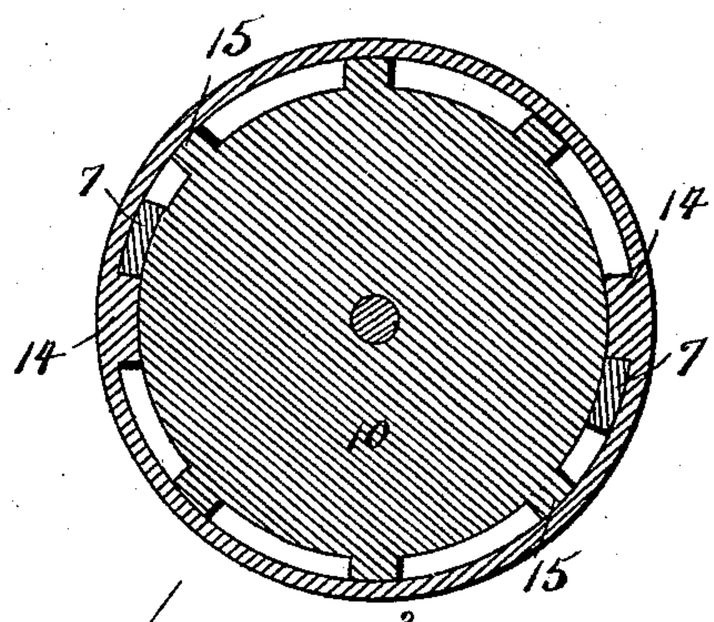
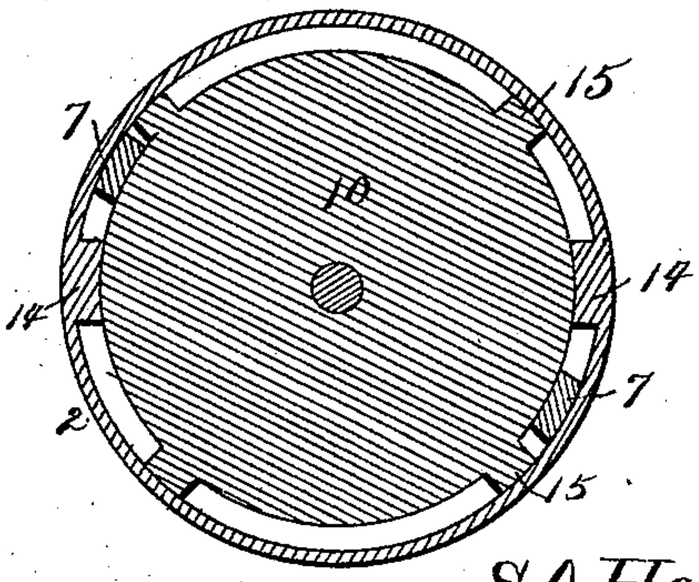


Fig. 5



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(No Model.) 2 Sheets—Sheet 2.

S. A. HORTON.

BIT FOR WELL DRILLING APPARATUS.

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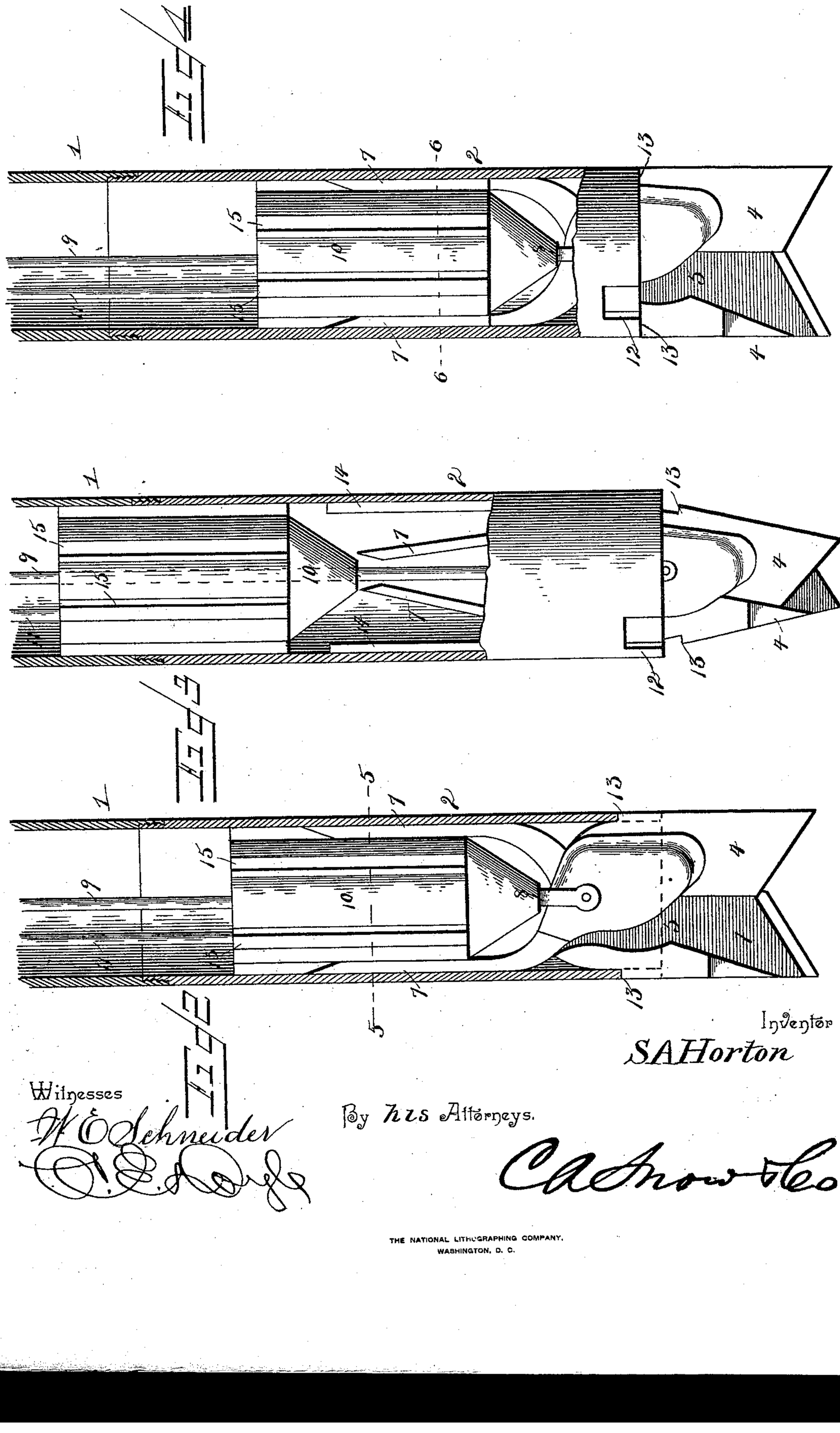

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STEPHEN A. HORTON, OF CLARKSVILLE, TEXAS.

BIT FOR WELL-DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 517,459, dated April 3, 1894.

Application filed May 24, 1893. Serial No. 475,306. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN A. HORTON, a citizen of the United States, residing at Clarksville, in the county of Red River and State of Texas, have invented a new and useful Bit for Well-Drilling Apparatus, of which the following is a specification.

My invention relates to an expansion bit for use in connection with rotary well-drilling apparatus; and it has for its objects to provide a bit capable of being adjusted and removed without withdrawing the well tubing, and to provide means whereby a bit capable of drilling a hole sufficiently larger than the well tubing to accommodate a casing may be introduced through the tubing.

A further object of my invention is to provide a removable bit with securing devices whereby it may be firmly locked in place in the drill stock without interfering with the free passage of the water to or from the bottom of the hole.

Further objects and advantages of the invention will appear in the following description and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings: Figure 1 is a general view showing a well-drilling apparatus embodying my invention, arranged in operative position. Fig. 2 is an enlarged sectional view of the drill stock and a portion of the adjacent well tubing, with the parts of my improved drill bit arranged in the operative position. Fig. 3 is a similar view showing the positions of the parts before the expander has been inserted between the prongs of the bit. Fig. 4 is a side view of the drill stock and bit, showing the positions of the parts after the expander has been introduced between the prongs of the bit and before the tubing has been turned and settled to its operative position with the notches of the stock in engagement with the shoulders of the jaws. Fig. 5 is a transverse sectional view of the stock and contained parts upon the line 5—5 of Fig. 2, in which the prongs are shown in contact with the bracing ribs upon the inner surface of the stock. Fig. 6 is a similar view upon line 6—6 of Fig. 4. Fig. 7 is a detail view in perspective of the drill bit proper. Fig. 8 is a similar view of the expander.

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

In the construction illustrated in the drawings, showing a preferred form of my invention, 1 represents the well tubing, to the lower end of which is fitted a tubular drill stock 2 of equal diameter with the tubing and forming a continuation thereof, such stock being, preferably, constructed of steel.

3 represents the drill bit proper, comprising the pivotally-connected jaws 4, which are cut away at their contacting sides, as shown at 5, to enable them to fold together, as shown in Fig. 3, to occupy a space which in width is less than the diameter of the well tubing. Said jaws are correspondingly thickened or enlarged, as shown at 6, to compensate for the loss of weight and strength caused by the formation of the recesses 5; and it may be noted that the thickness of the bit, through these enlargements of the jaws and perpendicular to the plane of movement of the jaws may, be equal to the diameter of the tubing. The jaws are provided with upwardly-extending prongs 7, having beveled upper ends and adapted when separated, as shown in Figs. 2 and 7, to spread the jaws to their operative positions.

8 represents a hanger or yoke, which is connected at its ends to the jaws, and to which is pivotally attached the lower end of an operating-rod 9, such pivotal connection being such as to enable the bit to be turned by the rotation of such rod.

10 represents an expander, which is slidably fitted upon the operating-rod 9, and is provided with a conical lower end adapted to fit between the upper ends of the prongs of the jaws to separate the latter after said jaws have been extended below the lower end of the drill stock. Connected to this expander is an adjusting-rod 11, by which the expander can be depressed to spread the prongs or elevated to allow the bit to assume its folded position. Reference to Fig. 1 will show that said operating and adjusting rods extend to the top of the well.

It will be seen that the greater portion of the material, and hence weight, of each jaw is arranged outside of a vertical plane em-

bracing the pivot of the jaws, and hence when the bit is suspended by means of the operating-rod, the jaws will fold together by gravity.

The lower end of the drill stock is provided with duplicate diametrically-opposite lock-notches 12, and the jaws of the bit are provided on their outer edges with shoulders 13, which, when the jaws are spread or expanded, lie under and in alignment with opposite points of the well tubing. When said tubing is turned to cause the lock-notches in the lower end of the stock to register with said shoulders 13, and the tubing is dropped or allowed to settle, the lock-notches receive said shoulders and thus clamp the bit firmly in place in the stock.

When the drill bit is expanded, as shown in Figs. 2 and 4, the prongs are parallel and lie in contact with the inner surface of the stock; and in order to form suitable stop-devices to limit the rotation of the tubing when the notches of the stock register with the shoulders of the jaws, I form vertical diametrically-opposite stop-ribs 14, upon the inner surface of the stock, the relative positions of the prongs and stop-ribs before and after the well tubing has been turned to cause registration of the notches 12 and shoulders 13, being shown respectively in Figs. 5 and 6.

In order to hold the expander concentric at all times with the well tubing in order to allow an unobstructed annular passage between its sides and the walls of the tubing, I provide the expander with exterior vertically-disposed guiding-ribs 15, which are equal in projection to the thickness of the prongs and the stop-ribs 14.

Referring to Fig. 3 of the drawings, in which the bit is shown in its folded position, it will be noted that the outer lateral edges of the jaws converge toward their lower ends, and as it is unnecessary that the width of the bit, when folded, shall be less than the diameter of the tubing, approximately, it is evident that the jaws may be increased in width toward their lower ends in order that when expanded the bit may drill a hole which is considerably larger than the tubing and sufficiently large to receive an exterior casing, which is frequently found necessary when a stratum of sand or soft rock is encountered.

This being the construction of my apparatus, the operation thereof is as follows: The bit with the attached operating-rod, is inserted in the upper end of the well tubing and dropped until the jaws extend below the lower end of the stock, when the expander, which is carried by said operating-rod is depressed by means of the adjusting-rod connected thereto to spread the prongs and thus expand the bit to bring the shoulders upon opposite edges of the jaws in alignment with the sides and under the edge of the stock. (The positions of the parts just previous to the depression of the expander are shown in Fig. 3.) The tubing is now dropped until the lower edge of the stock rests upon said shoulders, as shown in Fig. 4, and then the tubing is turned to the right, or in the direction indicated by the arrow in Fig. 5, until the stop-ribs 14 come in contact with the prongs of the jaws and thus dispose the notches 12 in alignment with the shoulders 13, when the tubing will settle and complete the locking of the bit to the stock. To remove the bit. the expander is raised by means of the adjusting-rod sufficiently to disengage the prongs when, by slightly jarring the operating-rod, the jaws will fold together by gravity into a compass which is smaller than the diameter of the tubing to permit of free movement therethrough.

Having described the invention, what I claim is—

1. The combination with a tubular drill-stock, provided at its lower end with notches and having interior vertical stop-ribs, of a bit comprising twin pivotally-connected jaws or members, adapted to fold automatically by gravity when released, and provided with exterior shoulders to engage the notches in the stock and upwardly extending arms to bear against the wall of the stock when separated, an operating-rod connected to the pivotal point of the jaws, and an expander, slidably fitted upon the operating-rod and provided with a conical lower end to pass between and separate the arms of the jaws and hold them in engagement with the said stop-ribs, substantially as specified.

2. The combination with a drill stock provided in its lower end with lock-notches, of a drill bit having pivotally-connected jaws provided with shoulders to engage said lock-notches, and upwardly-extending prongs or extensions arranged within the stock, means to separate the prongs or extensions to bring the same in contact with the inner surface of the stock, and stop-ribs fixed to the inner surface of the stock and adapted to contact with said prongs or extensions, substantially as specified.

3. The combination with a drill stock, of a drill bit having pivotally-connected jaws or members provided with upwardly-extending prongs or extensions, adapted to be held parallel with each other in contact with the walls of the stock when the jaws are extended an expander to separate said prongs or extensions and provided with exterior guiding-ribs to bear against the inner surface of the well tubing, and ribs carried by the drill stock to engage the prongs or extentensions, substantially as specified.

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

STEPHEN A. HORTON.

Witnesses:
C. E. DOYLE,
J. H. SIGGERS.