

No. 735,028.

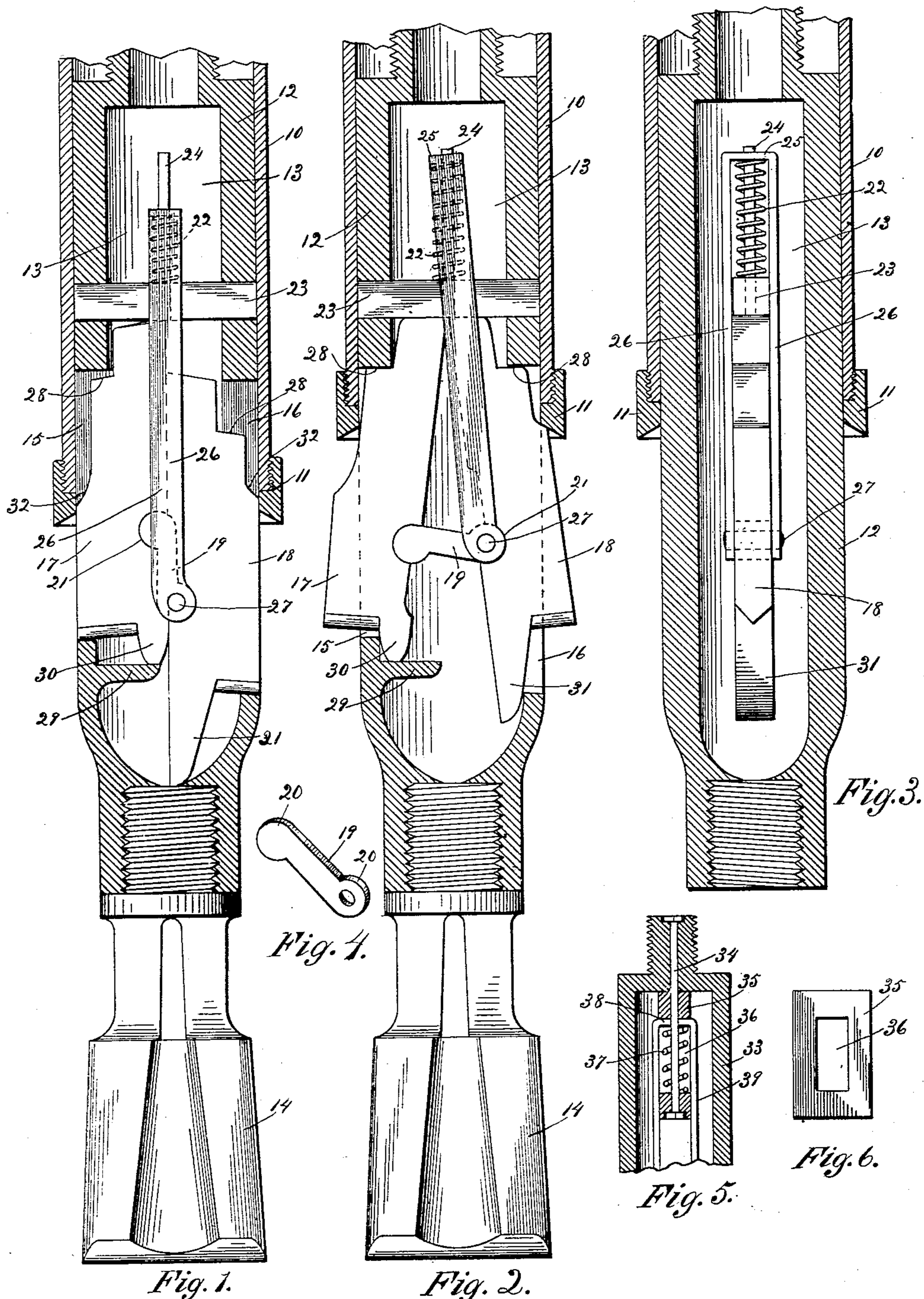
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ROCK DRILL.

APPLICATION FILED OCT. 27, 1902.

NO MODEL.



WITNESSES:
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ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 735,028, dated July 28, 1903.

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To all whom it may concern:

Be it known that I, OTTO G. WORSLEY, a citizen of the United States, and a resident of Newark, county of Kendall and State of Illinois, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

10 This invention relates to improvements in drills especially adapted for boring Artesian and oil wells and in which there is employed a pair of laterally-expandible side cutters or reamers designed to be automatically thrown
15 out when the drill has been dropped through the lower end of the well-casing.

The objects of the invention are to provide a drill of the character referred to in which the side cutters shall be rigidly held, thereby
20 avoiding any play thereof during the drilling operation, and which shall readily and automatically expand when the drill is lowered through the casing and as readily contract when the drill is drawn into the well-casing
25 for removal.

The invention consists of the novel features of construction and combination of parts hereinafter fully described, particularly designated in the claims, and illustrated in the
30 accompanying drawings, in which—

Figure 1 is a longitudinal section of the drill and the lower end of the well-casing, showing the cutters in their contracted position. Fig. 2 is a similar section, but with the cutters
35 projecting below the well-casing and expanded. Fig. 3 is a longitudinal section of the tool on a line at a right angle to the section seen in Figs. 1 and 2. Fig. 4 is a detail of the link connecting the cutters. Fig. 5 is a section
40 corresponding to that shown in Fig. 3 and on a reduced scale of a modification of the invention, and Fig. 6 relates to a detail thereof.

In general terms the drill comprises a hollow stock provided with a pair of slots or apertures in the opposite walls thereof, a side
45 cutter or reamer for each slot and one of which is capable of longitudinal movement, a link engaging the longitudinally-movable cutter and reacting against the other cutter which
50 serves as an abutment therefor, and a spring for sliding the longitudinally-movable cutter, whereby through the medium of the link the

cutters are thrown outwardly through the slots and into working position.

Referring to the drawings, the lower end of the well-casing is shown at 10 and the usual shoe at the bottom thereof at 11. The stock 12 is preferably tubular, providing a chamber 13, in which are located the cutters or reamers and the mechanism for automatically
60 expanding the same, hereinafter described, and is designed to be screwed into the lower end of a drill-rod (not shown) for operation in the usual manner. A cutter 14 may be secured in the threaded lower end of the stock. 65

In the wall of the stock 12 and diametrically opposite each other are longitudinal slots or apertures 15 and 16, through which the side cutters or reamers 17 and 18, located within the chamber of the stock, are adapted
70 to project during the drilling operation. Both of the cutters 17 and 18 may be loose within the stock, as shown, but are connected by a link 19, the ends of which are rounded, as at 20, and fit within corresponding recesses 21 in
75 the adjacent or inner edges of the cutters, the nature of the connection of the link with the cutters shown being that of a knuckle-joint. At least one of the cutters, as 18, is capable of longitudinal movement, and when that cut-
80 ter is moved the effect is, by reason of the link 19, to spread the cutters apart and thrust them through the apertures 15 and 16. This is accomplished automatically through the medium of a spring 22, acting to elevate the
85 cutter 18. The spring 22 (shown as an expansion-spring) may be supported by a cross-bar 23, passing through the stock above the upper ends of the slots 15 and 16 and coiled about a pin 24, projecting upwardly from the
90 bar 23. The spring reacts between the bar 23 and the head 25 of a connecting-rod or yoke 26, said head being provided with an aperture through which the pin 24 projects and resting upon the spring, the legs of the
95 yoke passing at the opposite sides of the cross-bar and the cutters and being pivotally connected to the longitudinally-movable cutter 18. In the present instance the legs 26 are pivoted on a pin 27, passing through that end
100 of the link 19 in engagement with the cutting-blade 18. In the contracted position of the cutters the pivot at the end of the link 19, engaging the longitudinally-movable cutter

18, is below and slightly off center in the direction of movement of the said cutter with regard to the pivot on the cutter 17, thereby permitting the cutter 18 to start easily in moving from a state of rest. The range of movement of the cutter 18 is such that when it has reached the limit of its movement the line of the pivots on the cutters will be at a right angle to the length of the stock, and any tendency of either cutter to be forced back into the stock is resisted by the other cutter, as will be seen by reference to Fig. 2, where the tool is shown with the cutters expanded. Each of the cutters is provided with an upper extension having a square shoulder 28, adapted when the cutters are expanded to bear against the upper wall of the slot in which it moves, and the ends of the said extensions are flattened and engage the flat under face of the bar 23, which serves as an abutment therefor. This arrangement insures distribution of the impact, as longitudinal pressure is resisted by the stock forming the upper walls of the apertures 15 and 16 and the pin 23 and lateral pressure of each cutter is resisted through the medium of the link by the other. The abutment-bar 23 alone may be relied on to receive the impact of the blows struck by the cutters; but preferably I make the tool as shown, the cutters having the shoulder 28, designed to engage the upper walls of the slots 17 18. The vertical movement of the cutter 18 is of course limited by the bar 23 and the upper wall of the slot 16.

If desired, the stock may be provided with a shelf or ledge 29, whereon rests an extension 30 of the cutter 17 for assisting in supporting the latter, and this extension, together with an extension 31 at the bottom of the cutter 18, is designed to close the apertures at the bottom thereof when the tool is operating to reduce to a minimum the ingress of dirt and mud or slush into the chamber of the stock and obviate interference with the free movement of the cutters and also to engage the wall of the stock to limit the outward movement of the cutters.

In operating with a tool having but one cutter the stock opposite the cutter is thrown against the side of the shaft or bore and soon becomes ground away. With a double cutter, as shown, the stock is centered in the shaft and held away from its walls, avoiding this objection and lengthening the life of the tool.

In use when the tool passes out of the lower end of the well-casing the spring 22, which is in a compressed state while the tool is passing through the casing, is permitted to expand and in doing so it elevates the yoke, carrying with it the cutter 18. As the blade 18 moves upwardly it is thrust out by the link 19 and reacting on the cutter 17 forces the latter through the slot 15. When the tool is drawn into the well-casing for removal, the front edges of the cutters, which may be bev-

eled, as at 32, to facilitate their movement, come in contact with the shoe 11 and are forced into the stock, the cutter being moved back into the position seen in Fig. 1 and compressing the spring through the medium of the yoke 26.

The drill heretofore described is of that character in which water is introduced through the chamber of the drill-stock into the bore in order to free it of the boring-meal. With the ordinary tapping-drill the bar 23 may be dispensed with and no passage for the admission of water being used a block employed in lieu thereof to receive the impact of the blows struck by the cutters and also to support the expanding-spring.

The modified construction is illustrated in Fig. 5, where 33 indicates the drill-stock provided with a threaded boss to receive a cap, (not shown,) to which is adapted to be attached the lifting rope or cable. Secured to the top of the stock by a bolt 34 is a block 35 of the same thickness as the cutters, which latter are similar to those seen in Figs. 1 and 2, and the lower face of this block forms an abutment, against which the upper ends of the cutters bear when expanded in like manner as they engage the bar 23 in Fig. 2. The block 35 is provided with a longitudinal aperture 36, wherein is located an expansion-spring 37, coiled about the central securing-bolt 34. The cross-head 38 of the connecting-rod or yoke 39 has an aperture through which the bolt 34 passes, and the spring 37 reacts between the lower end of the block 34 and this cross-head to elevate the yoke. The construction in all other respects is similar to that heretofore described.

I claim as my invention—

1. In a rock-drill, in combination, a chambered stock having apertures in the opposite walls thereof, expansible cutters housed within the chamber and one of which is movable longitudinally, and a link engaging the cutters and adapted when the latter cutter is moved longitudinally to thrust the cutters through the apertures.

2. In a rock-drill, in combination, a chambered stock having a pair of apertures in the opposite walls thereof, cutters housed within the chamber and adapted to be thrust through the apertures, a link engaging the cutters one at least of which is movable longitudinally, and a spring for moving the longitudinally-movable cutter.

3. In a rock-drill, in combination, a chambered stock having lateral apertures in the opposite walls thereof, cutters, one of which is movable longitudinally, housed within the chamber and adapted to be thrust through the apertures when the longitudinally-movable cutter is elevated, a link engaging the cutters and the point of engagement with the longitudinally-movable cutter being below its point of engagement with the other cutter, an abutment against which the cutters bear when expanded, a connecting-rod pivot-

ally engaging the longitudinally-movable cutter, and an expansion-spring reacting against the connecting-rod to elevate the same.

4. In a rock-drill, in combination, a chambered stock having a lateral aperture, a longitudinally and laterally movable cutter housed within the stock, an abutment, and a link pivoted to the abutment and engaging the rear face of the cutter for thrusting the same laterally through the aperture when the said cutter is moved longitudinally.

5. In a rock-drill, in combination, a chambered stock having lateral apertures in the opposite walls thereof, cutters, one of which is movable longitudinally, housed within the chamber and adapted to be thrust through the apertures, a link engaging the cutters, the point of engagement with the longitudinally-movable cutter being below its point of engagement with the other cutter and off center with regard thereto in the direction of movement of the latter cutter, a cross-bar, a

yoke straddling the cross-bar and the legs thereof pivotally engaging the longitudinally-movable cutter, an expansion-spring interposed between the head of the yoke and the bar, extensions on the cutters abutting against the bar, and shoulders on the cutters seating against the top walls of the cutter-apertures.

6. In a rock-drill, in combination, a chambered stock having a lateral aperture, a longitudinally and laterally movable cutter housed within the stock, an abutment, a link pivotally engaging the abutment and the rear face of the cutter, the point of engagement of the link with the cutter being below that of the abutment, a connecting-rod pivotally engaging the cutter, and an expansion-spring reacting against the rod to elevate the same.

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Witnesses:

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