H. J. FREEON.

UNDERREAMING BIT.

APPLICATION FILED MAY 31, 1916.

1,220,739.

Patented Mar. 27, 1917.

Fig. 1.

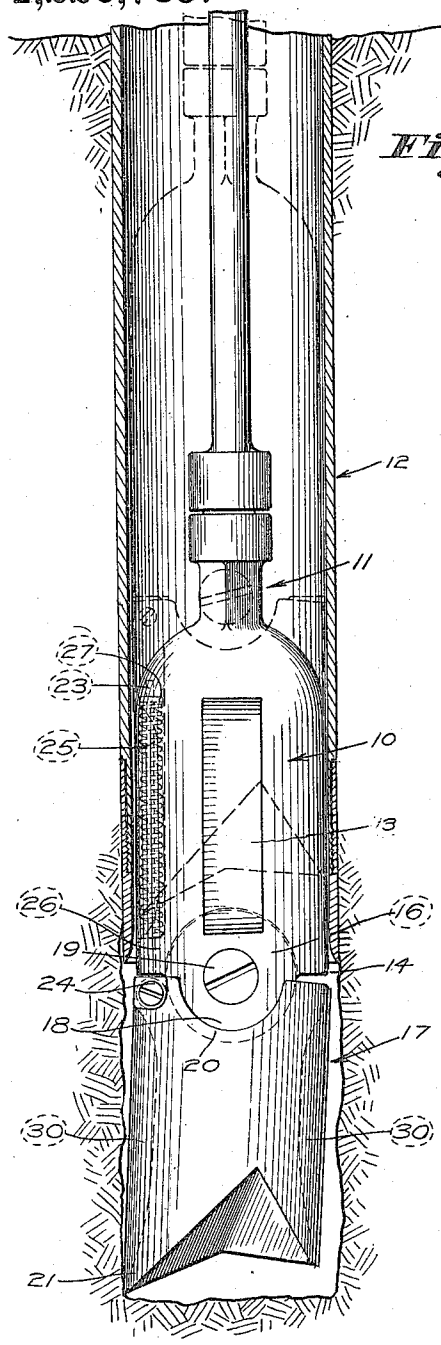


Fig. 2.

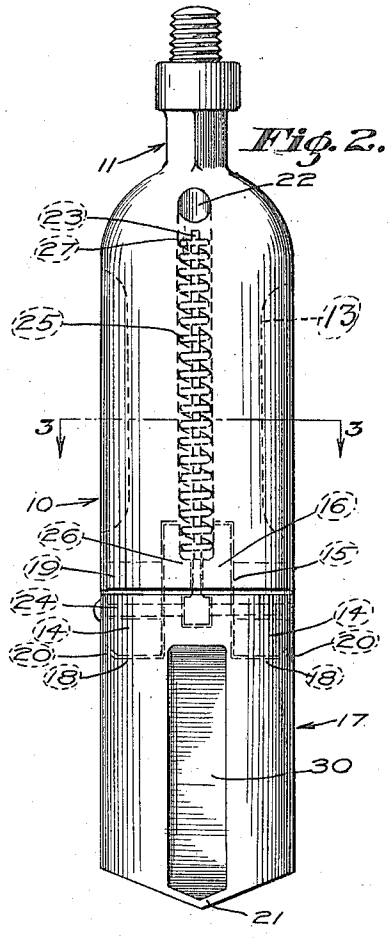
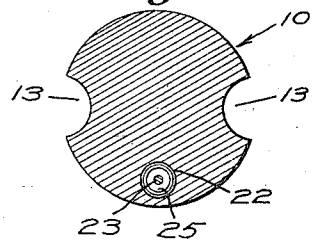


Fig. 3.



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UNDERREAMING-BIT.

1,220,739. Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed May 31, 1916. Serial No. 100,945.

To all whom it may concern:

Be it known that I, HENRY J. FREEON, a citizen of the United States, residing at Santa Maria, in the county of Santa Barbara and State of California, have invented new and useful Improvements in Underreaming-Bits, of which the following is a specification.

My invention relates to a well drilling bit. It is an object of this invention to construct a well drilling bit consisting of a main body portion and a cutting portion pivoted to the main body portion. Means are provided for causing the cutting portion to project outwardly from the vertical cylinder in which the bit is reciprocated in digging the well, whereby the bore of the well immediately below the lowermost casing in the well is cut away underneath said casing thereby permitting the latter to be moved downwardly in the bore which is of sufficient cross sectional area to allow the downward movement of the casing without offering any obstruction.

It is another object of this invention to provide a bit which in its operation forms a snug fit in the casing, thereby providing a large guiding surface but which allows the edge of the cutting portion to cut away or underream the bore immediately beneath the walls of the casing. The width of this extra cut will depend upon the size of the walls of the casing employed and will usually not exceed one-half of an inch, but may be of any size desired.

It is another object of this invention to construct a bit which is simple, durable and not liable to get out of order.

With the above and other objects in view which will appear as the description proceeds, my invention consists in the construction, combination and arrangement of parts hereinafter described and claimed.

In the accompanying drawings which form a part of this specification, I have illustrated a convenient and practical embodiment of my invention in which:

Figure 1 is a side elevation of my improved underreaming bit showing its operation in the bottom of a well.

Fig. 2 is a side elevation of the bit removed from the casing and taken at right angles from the bit shown in Fig. 1.

Fig. 3 is a horizontal section on line 3—3 of Fig. 2.

My improved bit comprises an upper body portion 10 provided with a connecting neck 11 at its upper end, whereby the same is attached to the drilling gear operating the bit. The bit has substantially the shape of a cylinder of a size to fit snugly in the well casing 12. A pair of vertical water channels 13 disposed on opposite sides of the body portion 10 are provided which allow the water or oil in the well to pass freely from below the bit to the space above the same. At the lower end of the main body portion 10, and on opposite sides thereof, a pair of depending semi-circular bearing lugs 14, 14 are provided between which a semi-circular recess 15 is formed. The recess 15 serves for the reception of a bearing lug 16 of corresponding shape which extends centrally upward from the end of the pivoted cutting portion 17. The upper end of the cutting portion 17 is cut away on opposite sides to form a pair of semi-circular bearing recesses 18, 18 for the reception of the depending lugs 14, 14 of the upper body portion. A pin 19 passes horizontally through suitable apertures of the depending lugs 14 and the central lug 16, forming a pivot on which the cutting portion 17 may be oscillated or rocked. In order to lessen the strain on the pivot pin 19, the edge adjacent to the recesses 18 in the cutting portion 17 is upset as at 20 (see Fig. 2) thus forming a strong joint with the depending lugs 14 and central lug 16, capable of resisting wear under the rough usage to which drilling bits are subjected.

As clearly shown in Fig. 1, the top face of the cutting portion 17 on opposite sides of the pivot pin 19 are slightly inclined from the horizontal permitting the cutting portion 17 to be oscillated on its pivot to a slight degree, so that the cutting edge 21 thereof will project outwardly beyond the vertical and enable said edge to underream or undercut the space immediately beneath the walls of the casing 12. 30, 30 designate a pair of vertical water channels oppositely arranged on the cutting portion 17.

In order to cause a positive movement of the cutting edge 21 outwardly away from the interior cylinder of the casing 12, I have provided the following mechanism: The body portion 10 is provided with a vertical bore 22 near the vertical face thereof, and extending throughout the length of said body portion. A rod 23 is disposed therein, whose lower extremity is pivoted to the cut-

ting portion 17 by a pin 24. A helical compression spring 25 surrounds the rod 23. The lower end of the spring rests against a shoulder 26 formed in the lower end of the bore 22 and its movable upper end abuts against a nut 27 on the upper threaded end of the rod 23. The spring 25 tends to move the end of the cutting portion 17 which is attached to the rod 23 in close contact with the adjacent part of the body portion 10 so that as soon as the cutting portion 17 projects below the lower extremity of the casing 12, the cutting edge 21 of the cutting portion 17 will project outwardly as clearly shown in Fig. 1, and thus underream the walls of the casing 12.

From the foregoing description, the operation of my improved underreaming well drilling bit will be easily understood. In the operation, the bit is reciprocated and rotated. The cutting edge, as soon as the bit works below the lower extremity of the well casing, will project outwardly from the walls thereof by the action of the spring 25, the tension of which may be adjusted by adjusting the nut 27, and underream said casing. It should be noted that the relatively large body portion which fits snugly in the well casing will act as a guide, causing the cutting edge to cut and underream the well casing the desired amount. In withdrawing the bit, the cutting edge will, as it passes the lower extremity of the casing, be pressed inwardly against the tension of the spring 25 and will be withdrawn without difficulty.

My improved bit will operate satisfactorily without the provision of the spring 25. The cutting portion 17 will underream without said spring, but better results are obtained where the spring 25 is employed, whereby the cutting portion is positively moved from the vertical.

While I have shown the preferred mode of construction of the well bit as now known to me, it will be understood by those skilled in the art that various changes in the construction, arrangement and combination of parts may be made without departing from my invention and the scope of the appended claims.

I claim:

1. In a well drilling bit, the combination of a cylindrical body portion of a size to fit snugly the well casing in which it operates, a cylindrical cutting portion in axial alinement with said body portion and forming an extension thereof, said cutting portion being pivoted at its upper end to the lower end of said body portion and adapted to rock in a vertical plane, means for limiting the rock movement of said cutting portion and a spring mounted in said body portion and operatively connected with said cutting portion for moving the latter out of alinement with said body portion, whereby said cutting portion will underream the casing.

2. In a well drilling bit, the combination of a body portion of a size to fit snugly the well casing in which it operates, a cutting portion in axial alinement with said body portion and forming an extension thereof, said cutting portion being pivoted at its upper end to the lower end of said body portion and adapted to rock in a vertical plane, a shoulder on said body portion for limiting the outward movement of said cutting portion, a shoulder on said cutting portion adapted to engage said first named shoulder, and a tension spring mounted in said body portion and acting on said cutting portion to cause the shoulder thereof to move toward the shoulder on said body portion.

3. In a well drilling bit, the combination of a body portion of a size to fit snugly the well casing in which it operates, a cutting portion in axial alinement with said body portion and forming an extension thereof, means for pivoting said cutting portion to said body portion to permit the former to swing in a vertical plane, means on said body portion to limit the swinging movement of said cutting portion, and resilient means tending to swing said cutting portion toward said limiting means.

4. In a well drilling bit, the combination of a body portion of a size to fit snugly the well casing in which it operates, a cutting portion in axial alinement with said body portion and forming an extension thereof, means for pivoting the upper end of said cutting portion to the lower end of said body portion to permit the latter to swing in a vertical plane, a pair of shoulders on opposite sides of the lower end of said body portion for limiting the swinging movement of said cutting portion, a pair of shoulders on the upper end of said cutting portion, adapted to coöperate with said shoulders of said body portion, said body portion being provided with a spring chamber, a spring rod located therein and pivotally connected to a shoulder of said cutting portion, and a tension spring acting on said rod and tending to move the shoulder of said cutting portion connected to said rod in engagement with the shoulder of said body portion adjacent thereto.

In testimony whereof I have signed my name to this specification.

HENRY J. FREEON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."