J. C. LEGO.

UNDERREAMER.

APPLICATION FILED MAY 21, 1914.

1,133,481. Patented Mar. 30, 1915.

Fig. 1.

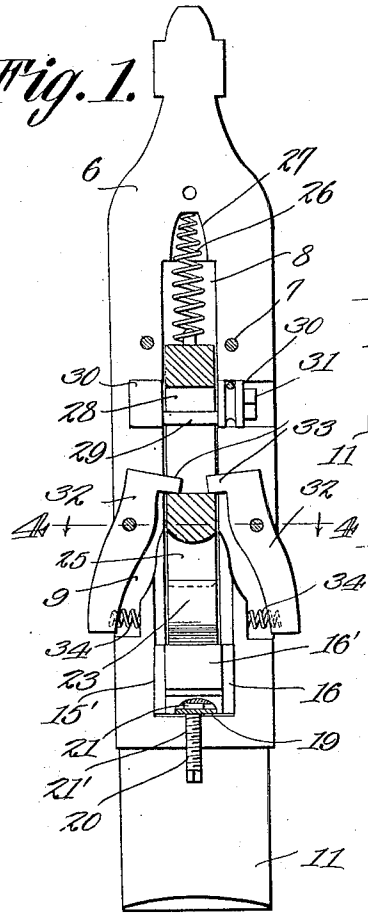


Fig. 5.

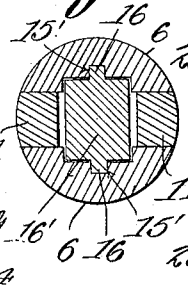
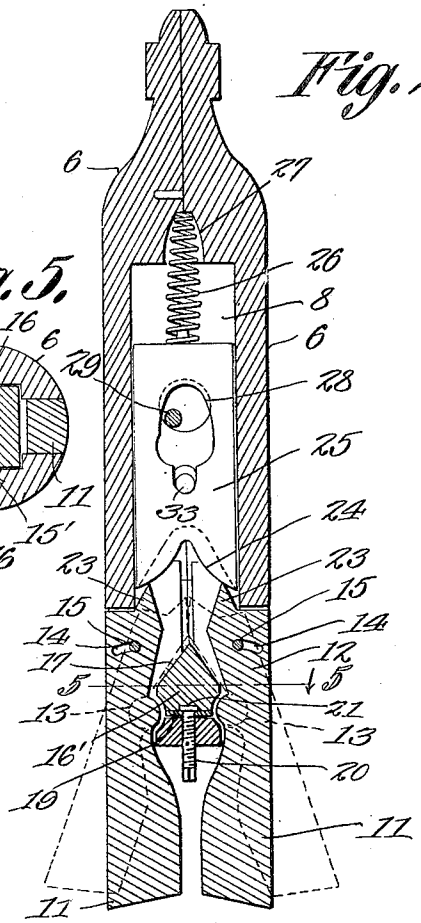


Fig. 2.



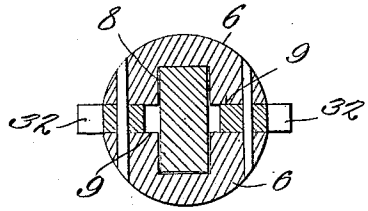


Fig. 4.

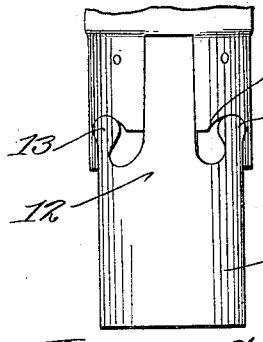


Fig. 3.

Witnesses

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UNDERREAMER.

1,133,481. Specification of Letters Patent. Patented Mar. 30, 1915.

Application filed May 21, 1914. Serial No. 840,086.

To all whom it may concern:

Be it known that I, JAMES C. LEGO, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented a new and useful Underreamer, of which the following is a specification.

This invention relates to improvements in under reamers for deep wells.

The object of the present invention is to provide a novel under reamer having means for automatically locking the bits separated, and for releasing them during the removal or withdrawal of the reamer from the well casing.

A further object of the invention is to provide an under reamer which in addition to being simple in construction and strong and serviceable, includes novel means for automatically spreading or spacing the reamer bits apart, maintaining the bits so positioned, and limiting the expanded position of the bits.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings accompanying this specification and forming a part thereof, the preferred embodiment of my invention is illustrated, in which—

Figure 1 is a view in elevation of the improved under reamer, one half or section of the bit stock removed. Fig. 2 is a central longitudinal section of the reamer taken at right angles to the line of view of Fig. 1. Fig. 3 is a fragmental elevation illustrating the lower extremity of the bit stock and one of the bits. Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 1. Fig. 5 is a cross sectional view taken on the line 5—5 of Fig. 2.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, the numerals 6 designates the two similar sections of the longitudinally divided bit stock through which the securing elements 7 extend to clamp them together.

The bit stock is provided with a longitudinally extending recess 8 which is substantially rectangular in cross section, as illustrated in Fig. 4. The lower extremities of the bit stock sections 6 are provided with longitudinal slots 9 communicating with the recess 8, and with transverse recesses or seats 10. The said recesses 10 extend substantially parallel to the line of division of the bit stock and are adapted to receive the cylindrical fulcrum lugs 13 of the bit tangs 12. The lower or cutting portions of the bits 11 are of the usual configuration as employed in under reamers.

The bit tangs 12 are provided with arcuate slots 14 through which pins 15 carried by the stock project to limit the movement of the bits as will be clearly apparent by reference to Fig. 2.

The bit stock has opposite longitudinal grooves 15′ communicating with the recess 8 and receiving the outstanding flanges 16 of a slidable spacing block 16′. The spacing block is provided with upper inclined faces 17 which are arranged in the path of movement of the tangs 12 to thus limit the outward or separating movement of the bits.

The lower surface of the spacing block is provided with the plate 19 through which an adjusting screw 20 engages, the latter being provided with the enlarged head 21 above the plate 19 to cause the spacing block to move with the adjusting screw. The adjusting screw threadedly engages through the aperture 21′ in the lower end of the bit stock and thus provides for the forcible sliding or shifting of the spacing block and the maintenance of the same in adjusted position.

The upper extremities of the bit tangs are provided with the inwardly offset and wedge shaped projections 23, which when the bits are retracted as illustrated in full lines in Fig. 2, are spaced a distance from the side walls of the recess 8, thus allowing the bifurcated and notched end 24 of the sliding block 25 movable in the recess 8 to straddle the projections 23 and force the said tangs together into the position illustrated in dotted lines. The sliding block 25 is lowered or depressed by the compression spring 26 which has its upper extremity seated within the bore 27 of the stock.

The sliding block 25 has a transverse aperture 28 therein and through which passes an eccentric rod 29 carried by rotatable members 30 journaled in the stock.

One of the rotatable members 30 has the wrench engaging head 31, whereby it may be forcibly rotated by a wrench or key to thus bring the eccentric rod 29 to various positions to limit the downward movement of the sliding block.

Pivoted or fulcrumed between the sections of the bit stock are the two dogs 32 having the inwardly projecting ends 33 adapted to extend over and engage the lower end of the transverse aperture 28. Suitable resilient springs 34 hold the dogs with their lower extremities extended beyond the surface of the bit stock and with their upper ends 33 into engagement with said sliding block.

The many advantages of my improved under reamer, it is thought, will be readily appreciated by those familiar with the use of these devices and particular attention is called to the manner in which the spacing of the bits may be adjusted by the spacing block. The V-shaped notch in the sliding block engaging the wedge shaped ends of the tangs is adapted to force the same apart and conversely the tangs are adapted to force the sliding block upward against the compression spring 26 after the dogs have been moved inwardly. In the actual use of the under reamer, the dogs 32 are first released, and the bits retracted as illustrated in full lines in Fig. 2. The under reamer is then inserted in the well casing and forcibly moved therebelow at which time the bits will spring apart by the action of the sliding block thereon. The dogs will immediately spring into locked engagement with the sliding block and prevent the retraction of the bits until the said dogs have been released. When it is desired to withdraw the under reamer, sufficient upward force is exerted thereon, with the result that the dogs 32 will contact with the lower extremity of the well casing, retracting the dogs and releasing the sliding block. A further upward force will bring the bits into contact with the well casing and retract the same, as will be readily apparent.

Having thus described the invention, what is claimed as new is:

1. An under reamer comprising a bit stock, bits pivoted thereto and having tangs, spring pressed means carried by the stock and engaging the tangs for forcing the same together to extend the bits, and adjustable means carried by the stock between the bit tangs for limiting the inward movement thereof when the bits are separated.

2. An under reamer comprising a bit stock, a spring pressed sliding block disposed therein, bits pivoted to the stock and having tangs, the tangs and sliding block having coöperable portions whereby the block will separate the bits, spring pressed dogs pivoted to the stock and engageable with the sliding block to lock the same in a position with the bits extended, and an adjustable member carried by the stock between the bit tangs for limiting the separation of the bits.

3. An under reamer comprising a bit stock, a spring pressed sliding block disposed therein, bits pivoted to the stock and having tangs, the tangs and sliding block having coöperable portions whereby the sliding block will separate the bits, spring pressed dogs carried by the stock and engageable with the sliding block to lock the same in a position with the bits separated, adjustable means carried by the stock for limiting the movement of the bit tangs when the bits are separated, and adjustable means carried by the stock for limiting the movement of the sliding block.

4. An under reamer comprising a bit stock, a spring pressed sliding block disposed therein, bits pivoted to the stock and having tangs, the tangs and sliding block having coöperable portions whereby the block will separate the bits, a rotary member carried by the stock and having an eccentric element coöperable with the sliding block for limiting the movement thereof, and adjustable means carried by the bit stock for limiting the movement of the bit tangs when the bits are separated.

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

JAMES C. LEGO.

Witnesses:
WALTER E. GRAY,
CLAYO J. BROTHERTON.

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