G. E. SQUIRE.

UNDERREAMER.

APPLICATION FILED MAY 29, 1911.

1,017,333.

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Fig. 1.

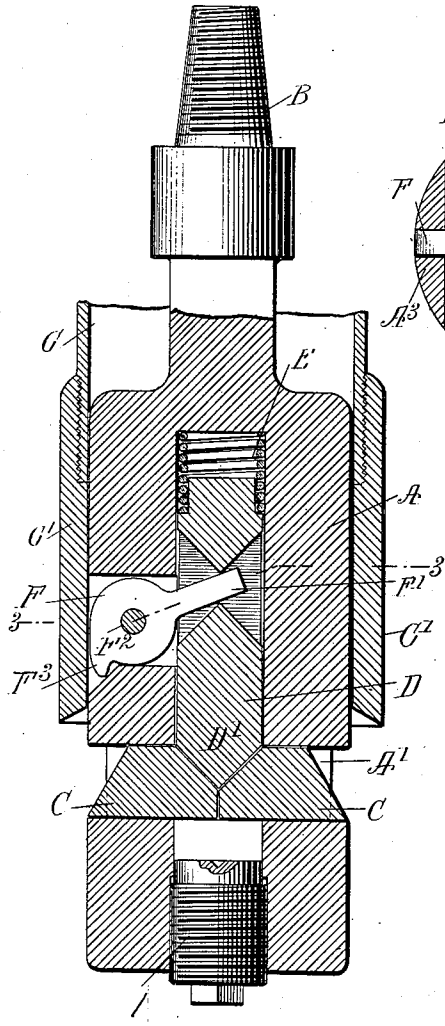


Fig. 3.

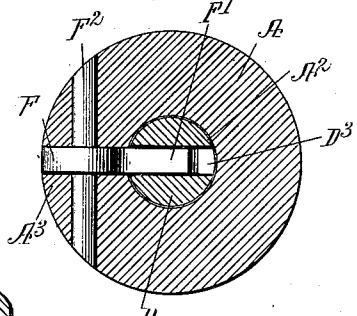


Fig. 4.

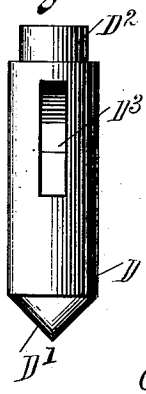


Fig. 2.

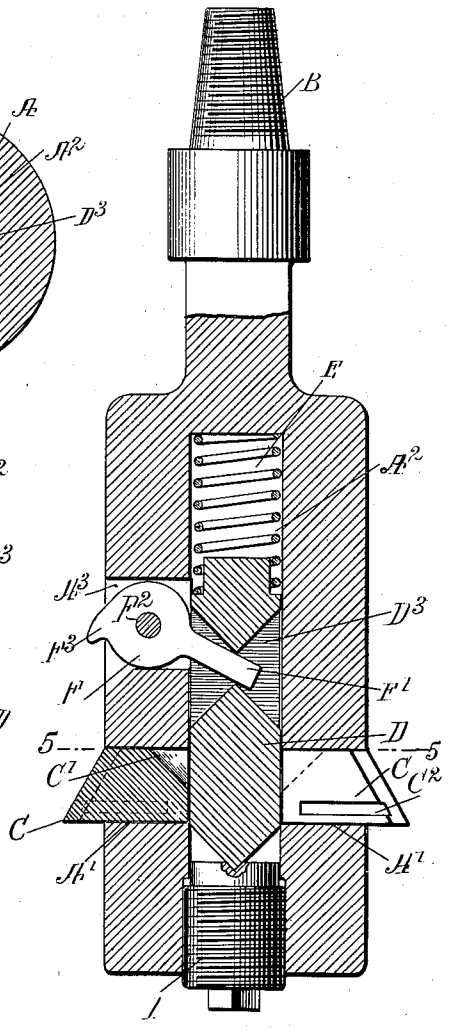
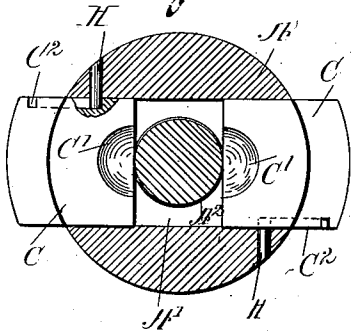


Fig. 5.



WITNESSES

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UNDERREAMER.

1,017,333. Specification of Letters Patent. Patented Feb. 13, 1912.

Application filed May 29, 1911. Serial No. 630,022.

To all whom it may concern:

Be it known that I, GEORGE E. SQUIRE, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Underreamer, of which the following is a full, clear, and exact description.

The invention relates to well boring, and its object is to provide a new and improved under-reamer for enlarging the holes of wells below the stand pipe or casing, for lowering the latter to a desired depth, and arranged to insure quick and accurate reaming without danger of the cutters becoming clogged, at the same time allowing convenient lowering of the under-reamer into position, or withdrawing the same from the well after the reaming is completed.

For the purpose mentioned use is made of reaming cutters mounted to slide diametrically in the stock and projected outwardly by a spring-pressed mandrel slidable lengthwise in the stock and which locks the cutters in the projected active position.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the under-reamer in position in the casing prior to lowering the under-reamer to a lowermost active position; Fig. 2 is a like view of the same and showing the under-reamer in lowermost active position; Fig. 3 is a sectional plan view of the same on the line 3—3 of Fig. 1; Fig. 4 is a side elevation of the mandrel; and Fig. 5 is a sectional plan view of the under-reamer on the line 5—5 of Fig. 2.

The cylindrical stock A is provided at its upper end with the usual nipple B for connection with the stem reaching to the top of the well for manipulating the stock A in the usual manner. The stock A is provided near its lower end with diametrically-extending guideways A′ in which are mounted to slide the reaming cutters C, C adapted to be moved outward into active position and locked therein by a mandrel D mounted to slide lengthwise in a central bore A^2 formed in the stock A, as plainly indicated in the drawings. The lower end D′ of the mandrel D, is in the form of a point adapted to engage correspondingly beveled recesses C′ formed in the inner ends of the cutters C and at the top thereof, the lower ends of the beveled recesses C′ terminating a distance from the bottom of the cutters C. The upper end D^2 of the mandrel D is reduced to form a shoulder for the lower end of the spring E to rest on, the said spring E extending in the upper portion of the bore A^2 and serving to press the mandrel D downward so that the point D′ acts on the beveled recesses C′ and thus pushes the cutters C outward into active position, that is, projecting the outer cutting ends of the cutters C beyond the sides of the stock A. The mandrel D after pressing the cutters C outward engages with its body the inner straight ends of the cutters C so as to lock the cutters C against inward or return movement, as will be readily understood by reference to Fig. 2.

The mandrel D is provided with an opening D^3, engaged by the inner end of a lever F fulcrumed at F^2 in a recess A^3 formed in one side of the stock A, and the said lever F is provided with an outer cam-shaped end F^3 adapted to be engaged by the inner surface of the casing G to hold the mandrel D in uppermost retracted position against the tension of the spring E, and during the time the stock A is lowered in the casing G (see Fig. 1).

It is understood that when the parts are in the position shown in Fig. 1, the mandrel D is in uppermost position and the cutters C are in innermost position to allow convenient lowering of the stock A in the casing G, and when the lever F finally leaves the lower end of the shoe G′ of the casing G when the mandrel D is released by the lever F and the spring E now forces the mandrel D downward so as to cause the cutters C to move outward into active position, as shown in Fig. 2 and above described.

The outer ends of the cutters C are beveled and the sides thereof are provided with grooves C^2 engaged by pins H held in the stock A and serving to limit the outward sliding movement of the cutters C. In the lower end of the central bore A^2 screws a plug I to limit the downward movement of the mandrel D, as will be readily understood by reference to Fig. 2.

From the foregoing it will be seen that the under-reamer can be readily lowered in the casing G and with the cutter C in withdrawn position, and when the stock A has been lowered sufficiently for the lever F to

clear the lower end of the shoe G′ then the spring E causes the mandrel D to move downward whereby the mandrel forces the cutters C into outward active position and locks the same therein as before explained. The stock A is now turned in the usual manner for the cutters to cut the material below the lower end of the casing G for enlarging the well hole with the object to lower the casing G. When it is desired to withdraw the under-reamer then it is only necessary to exert an upward pull on the stock A, so that the outer cam end F^3 of the lever F is acted on by the lower end of the shoe G′ to cause an upward swinging of the lever F and with a view to lift the mandrel D against the tension of the spring E and thus release the cutters C. On further lifting of the stock A the outer beveled ends of the stock A come in contact with the lower end of the shoe G′ so that the cutters C are caused to slide inward to allow of lifting the stock A out of the casing G.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An under-reamer, comprising a stock having transverse ways intermediate its ends, and an axial bore, cutters mounted to slide in said ways, a mandrel mounted to slide in said bore and movable outwardly between the cutters to spread the same, a spring bearing against said mandrel to move the same outwardly, and means within the stock and engaging the mandrel to move the same inwardly.

2. An under-reamer, comprising a stock having transverse ways and an axial bore, transversely movable cutters mounted to slide in said ways, a transversely apertured mandrel mounted to slide in said bore and movable outwardly between the cutters to spread the same, a spring bearing against said mandrel to move the same outwardly, and a member pivoted in the stock and having an outer cam portion and an inner portion extending within the aperture of said mandrel.

3. An under-reamer, comprising a stock, cutters mounted to slide diametrically in the stock and adapted to be withdrawn within the stock or moved outward to project beyond the sides of the stock, the inner ends of the cutters being provided with bevels, a spring-pressed mandrel mounted to slide lengthwise in the stock and having a pointed end adapted to engage the said bevels of the said cutters to move the latter outwardly, the body of the mandrel then passing between the inner ends of the cutters to hold the same locked in an outermost position, and means on the said stock and cutters to limit the outward movement of the cutters.

4. An under-reamer, comprising a stock, under-reaming cutters mounted to slide transversely in the said stock, a spring-pressed mandrel mounted to slide lengthwise in the stock and pressing the said cutters outwardly into active position and locking the same therein, and a locking means for locking the mandrel in position in the stock during the downward movement of the stock in the well casing, said means comprising a member pivoted in the stock and having a portion extending inwardly into engagement with the mandrel.

5. An under-reamer, comprising a stock, cutters mounted to slide diametrically in the stock and adapted to be withdrawn within the stock or moved outward to project beyond the sides of the stock, the inner ends of the cutters being provided with bevels, a spring-pressed mandrel mounted to slide lengthwise in the stock and having a pointed end adapted to engage the said bevels of the said cutters to move the latter outwardly, the body of the mandrel then passing between the inner ends of the cutters to hold the same locked in outermost position, and a lever fulcrumed on the stock and engaging the said mandrel to hold the latter in retracted position, the outer end of the lever extending beyond the side of the stock for engagement with the well casing.

6. An under-reamer, comprising a stock having transverse guideways and a central bore, cutters mounted to slide in the said guideways and having outer beveled ends, the cutters being provided at their inner ends with bevels extending from the top to within a distance from the bottom of the cutters, a mandrel mounted to slide in the said central bore and having a pointed lower end adapted to engage the said cutter bevels, a spring in the said bore and pressing the upper end of the said mandrel, and a lever fulcrumed on the said stock and engaging with its inner end the said mandrel, the outer end of the lever being adapted to project beyond the side of the stock.

7. An under-reamer, comprising a stock having transverse guideways and a central bore, cutters mounted to slide in the said guideways and having outer beveled ends, the cutters being provided at their inner ends with bevels extending from the top to within a distance from the bottom of the cutters, a mandrel mounted to slide in the said central bore and having a pointed lower end adapted to engage the said cutter bevels, a spring in the said bore and pressing the upper end of the said mandrel, a lever fulcrumed on the said stock and engaging with its inner end the said mandrel, the outer end of the lever being adapted to project beyond the side of the stock, and means for limiting the downward sliding movement of the mandrel.

8. An under-reamer, comprising a stock having transverse guideways and a central bore, cutters mounted to slide in the said guideways and having outer beveled ends, the cutters being provided at their inner ends with bevels extending from the top to within a distance from the bottom of the cutters, a mandrel mounted to slide in the said central bore and having a pointed lower end adapted to engage the said cutter bevels, a spring in the said bore and pressing the upper end of the said mandrel, a lever fulcrumed on the said stock and engaging with its inner end the said mandrel, the outer end of the lever being adapted to project beyond the side of the stock, and means for limiting the outward movement of the said cutters.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE E. SQUIRE.

Witnesses:

THEO. G. HOSTER,

PHILIP D. ROLLHAUS.