

J. C. SIEGRIST.
 UNDERREAMER.
 APPLICATION FILED JUNE 8, 1912.

1,044,274.

Patented Nov. 12, 1912.

FIG. 1

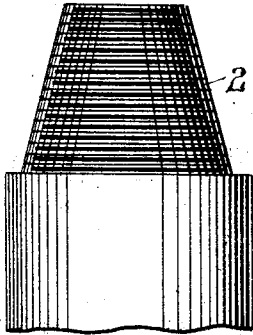


FIG. 2

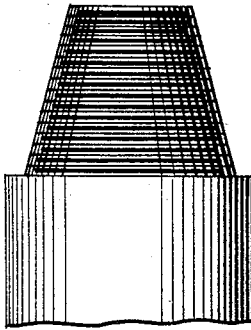
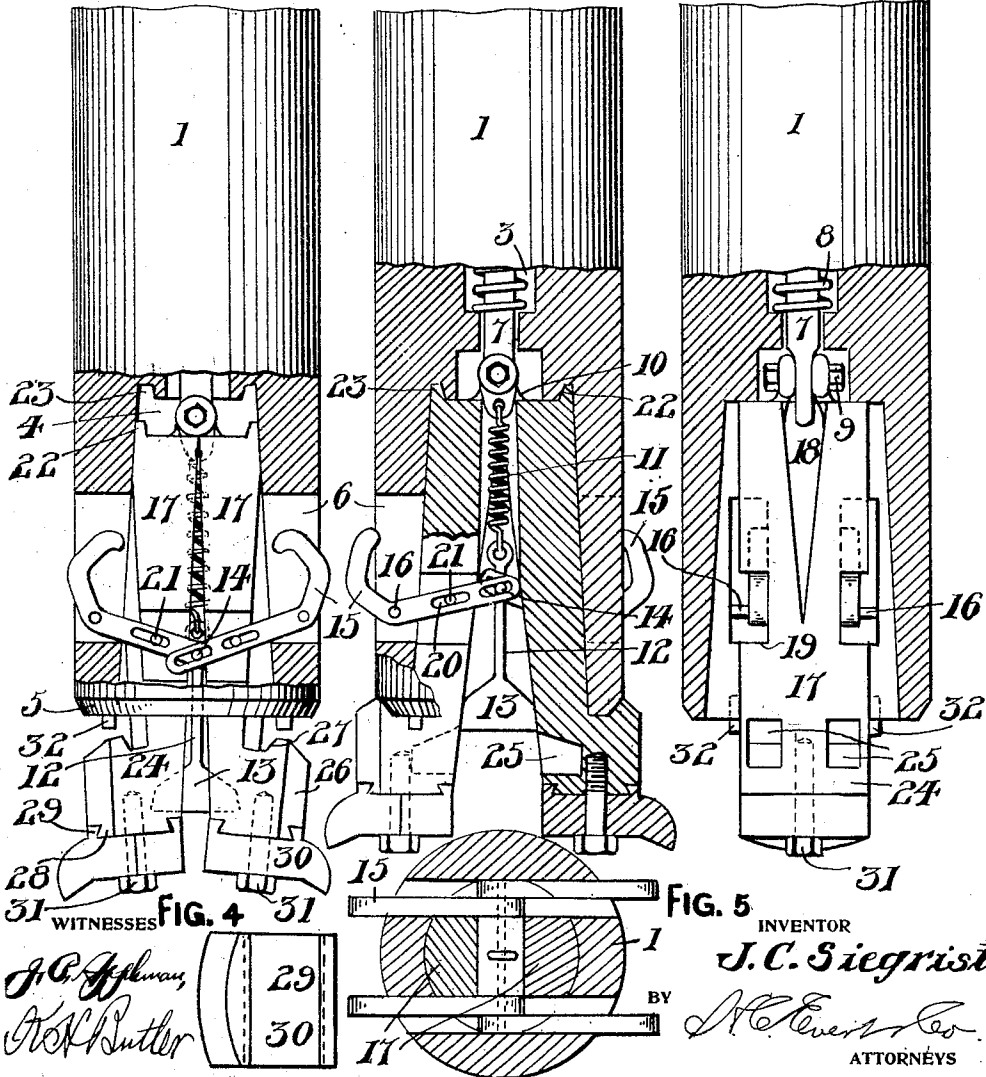
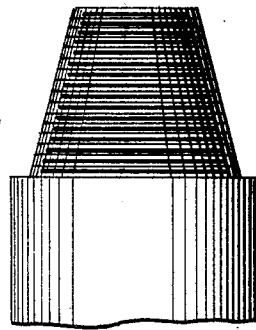


FIG. 3



UNITED STATES PATENT OFFICE.

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UNDERREAMER.

1,044,274.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed June 8, 1912. Serial No. 702,547.

To all whom it may concern:

Be it known that I, JACOB C. SIEGRIST, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Underreamers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to underreamers, and more particularly to that type of tool employed for enlarging the bore of wells to permit of the lowering of casing.

The objects of my invention are to provide an underreamer having a positive expansion and contraction of the jaw, thereby eliminating all possibility of the loss of a movable element to the parts of the underreamer in a well hole, and to provide an underreamer with detachable bits or jaws that are assembled in a manner to have a direct bearing upon the reamer body when a blow is struck.

Other objects of my invention are to provide an underreamer which, when expanded to working position, shall possess the maximum strength, and to furnish the underreamer with pivoted levers by which the jaws or bits of the tool are retracted in order that the tool can be placed in the casing of the well.

Further objects of my invention are to provide an underreamer body possessing the requisite strength to withstand the stresses and strains to which it is subjected when the underreamer is in use, and to furnish the underreamer with a bridge that braces the inner sides of the bits or jaws, preventing contraction when a blow is struck.

Still further objects of my invention are to provide an underreamer that is inexpensive to manufacture, durable and highly efficient for the purposes for which it is intended.

With the above and other objects in view, the invention resides in a novel construction, combination and arrangement of parts to be hereinafter specifically described and then claimed.

Reference will now be had to the drawing, wherein like numerals denote corresponding

parts throughout the several views, in which—

Figure 1 is a side elevation of a portion of the underreamer, partly in section, showing the bits or jaws thereof in a retracted position. Fig. 2 is a similar view showing the bits or jaws in an extended or expanded position. Fig. 3 is a front elevation of the underreamer partly broken away and partly in section. Fig. 4 is a plan of a detached bit or jaw, and Fig. 5 is a horizontal sectional view of the underreamer.

An underreamer in accordance with this invention comprises a cylindrical body 1 having the upper end thereof provided with the usual screw threaded stem 2 to screw into the socket of the "sub." The reamer body 1 has a longitudinal central bore 3 and said bore is in communication with a conically shaped chamber 4 that is formed in the lower end of the reamer body. The lower end of the reamer body 1 is beveled, as at 5 and provided with sets of oppositely disposed longitudinal slots 6 that are in communication with the chamber 4.

Arranged in the bore 3 and extending into the chamber 4 is a rod 7 that is encircled by a coiled spring 8 within the bore 3, said spring holding the rod 7. The rod 7 within the chamber 4 is reduced and pivotally connected to the reduced end of said rod by a bolt 9 or other fastening means is a link 10. Connected to the link 10 is a coiled retractile spring 11 and the lower end of said spring is connected to the eye end of a stem 12, said stem supporting a bridge 13 at the lower end thereof. The stem 12 is provided with a transverse pin 14, and loosely mounted upon the end of said pin are the inner slotted ends of L shaped levers 15 that are fulcrumed upon transverse pins 16 carried by the walls of the slots 6. The L shaped ends of the levers 15 protrude from the slots 5 and when said levers are moved the bridge 13 is adjusted.

Arranged within the chamber 4 are oppositely disposed jaws 17 of a greater length than the chamber 4. The outer sides of the jaws 17 taper and the confronting sides thereof are provided with V shaped grooves 18, said grooves confronting each other, as

best shown in Fig. 2 and providing clearance for the spring 11. The sides of the jaws 17 are cut away, as at 19 to provide clearance for the levers 15, and said levers are slotted, as at 20 to receive pins 21 carried by the sides of the jaws 17, within the cut away portion 19.

The upper ends of the jaws 17 are provided with beveled extensions 22 adapted to engage in beveled sockets 23 provided therefor in the top of the chamber 4. The lower ends of the jaws 17 terminate in bits 24 and the confronting faces of said bits are provided with pockets 25 to receive the end extensions of the bridge 13. The outer faces of the bits 24 are rounded, as at 26 and the upper ends of said bits are beveled, as at 27 to easily ride into engagement with the lower beveled end 5 of the reamer body 1. The lower ends of the bits 24 are provided with dove-tailed tongues 28 and these tongues fit in dove-tailed grooves 29 provided therefor in the upper faces of cutters 30 detachably connected to the lower ends of the bits. The cutters 30 are furthermore connected to the bits 24 by screw bolts 31 or similar fastening means. The cutters 30 have cutting edges protruding outwardly from the bits 26 and these cutters are made of a material whereby they can be used when shale or rocks are encountered. The cutters 30 can be easily removed and sharpened and these detachable cutters form an important adjunct of my invention as they permit of the underreamer being used in the California oil fields, where a hard and indurate shale or strata of rock is encountered when drilling.

To brace the bits 24, the lower end of the reamer body 1 is provided with sets of depending pins 32 and these pins engage the sides of the bits 24, as best shown in Fig. 3 and prevent said bits from shifting relative to the reamer body 1.

In practice, the clamp or suitable device is placed around the underreamer body 1 to engage the outer ends of the levers 15 and force the ends of said levers within the slots 6. With the levers 15 held within the slots 6, the bridge 13 is retained in a lowered position with the spring 11 under tension. With the bridge 13 engaging in the pockets 25 of the bits 24, the bits are in a retracted position beneath the underreamer body, as best shown in Fig. 1. The jaws 17 are therefore lowered and as the link 10 is carried by the upper ends of the jaws 17, the coiled spring 8 surrounding the rod 7 is under tension.

With the bits 24 in a retracted position, the underreamer can be placed in a casing or tubing and after the bits have been placed in the casing of a well hole, the clamp or device employed for holding the outer ends of

the levers 15 is removed, thereby allowing the ends of the levers to engage the inner walls of the well casing. The bits 24 are still retained in a retracted position out of engagement with the walls of the well casing, and the underreamer can be lowered to the lower end of the casing. As the underreamer, particularly the lower end thereof, passes out of the lower end of the casing into the well hole, the spring 11 immediately elevates the bridge 13, thereby removing the bridge from the pockets 25, thereby forcing the bits 24 apart, as best shown in Fig. 2. The spring 8 also coöperates with the spring 11 and the jaws 17 are elevated. As the jaws 17 move upwardly into the chamber 4, the extensions 22 of said jaws engage in the top of the chamber and the upper beveled ends of the bits 24 engage the beveled end of the underreamer body. The jaws 17 are braced against the walls of the chamber 4 and as the upper ends of the jaws and the upper ends of the bits engage the underreamer body, the entire structure is capable of receiving a heavy blow.

When the underreamer body is to be removed from a well hole, the upper beveled ends of the bits 24 are forced inwardly and when the cutters 30 encounter the lower end of the well casing, said cutters are forced inwardly, but such movement of the bits and cutters does not occur except when the bridge is released by the levers 15, as the outer ends of the levers 15 encounter the lower end of the well casing and are shifted inwardly, prior to the lower end of the well casing engaging the bits 24. When the levers 15 are shifted, the bridge 13 is lowered and the bits 24 can assume a retracted position.

It is thought that the utility and operation of the underreamer will be apparent without further description, and while in the drawing there is illustrated a preferred embodiment of the invention, it is to be understood that the structural elements are susceptible to such variations and modifications as fall within the scope of the appended claims.

What I claim is:

1. An underreamer comprising a body, jaws movable in said body and extending from the lower end thereof, levers pivotally mounted in said body and having the inner ends thereof loosely connected to said jaws and the outer ends thereof adapted to protrude from said body, a movable bridge arranged between said jaws and movable in unison with said levers, and bits detachably connected to the outer ends of said jaws, and means connected to said bridge and adapted to shift said jaws and said levers when said levers are released.

2. In an underreamer, a chambered body,

jaws extending into said chambered body,
bits carried by said jaws, levers pivotally
mounted in said body and loosely connected
to said jaws, a bridge arranged between said
5 jaws and means connected to said bridge and
to said levers for expanding said jaws when
said levers are released.

In testimony whereof I affix my signature
in the presence of two witnesses.

JACOB C. SIEGRIST.

Witnesses:

MAX H. SROLOVITZ

K. H. BUTLER.