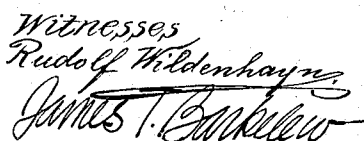


APPLICATION FILED AUG. 10, 1908.

Patented Aug. 31, 1909.



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UNITED STATES PATENT OFFICE.

JOHN W. BRACKNEY, OF FULLERTON, CALIFORNIA.

UNDERREAMER.

Patented Aug. 31, 1909.

Application filed August 10, 1908. Serial No. 447,752.

932,538.

To all whom it may concern:

Be it known that I, JOHN W. BRACKNEY, a citizen of the United States, residing at Fullerton, in the county of Orange and State of California, have invented new and useful Improvements in Underreamers, of which the following is a specification.

The object of this invention is to provide an underreamer of simple, compact and strong design which will withstand the extremely rough usage to which this class of tools is subjected.

In the accompanying drawings, forming a part of this specification:—Figure 1,—is a longitudinal section showing the underreamer in its expanded state. Fig. 2,—is an elevation showing the underreamer in its contracted state. Fig. 3,—is a detail longitudinal section showing the application of the wedge for holding the cutters in their contracted position. Fig. 4,—is a detail perspective view of one of the cutters. Fig. 5,—is a cross-section taken on line 5—5 of Fig. 1. Fig. 6,—is a section taken on line 6—6 of Fig. 1.

In the drawings 10 designates a mandrel provided with the usual screw threaded connecting pin 11 on its upper end and with flattened portions for the engagement of tools therewith in the usual manner. The mandrel is provided with a central longitudinal bore 12 in which the cutter operating spring is mounted. At its lower end the mandrel is provided with two downwardly extending arms 13, one on each side, a space 14 being left between the two arms for the reception of the upper ends of cutters 15. The end of the mandrel is provided with two inwardly and upwardly inclined faces 16, these faces being symmetrically arranged in the mandrel and meeting at the center. Corresponding inclined faces 17 on the upper ends of cutters 15 bear against faces 16 and lie flatly against them when the cutters are in their expanded position as shown in Fig. 1. Each of the cutters is provided with encircling lugs or straps 18 which encircle a pin 19, the cutters being thus pivotally held together at approximately the middle part of their inner edges. Pin 19 is longer than the width of the upper part of the cutters as shown in Fig. 6, the extending ends of the pin projecting into vertical grooves 20 cut on the inner faces of arms 13 and being guided therein. An aperture 21 cut in one of the arms and of slightly larger diameter than

pin 19 allows the removal of the pin by the insertion of a small pin to push against pin 19 through an aperture 22 cut in the other arm 13. Pin 19 passes through an eye 23 in the lower end of cutter operating rod 24, the rod passing upwardly into bore 12 in the mandrel. A flattened portion 25 is provided on rod 24 passing between a pair of pins 26 set in the mandrel and adapted thereby to keep rod 24 from turning out of its correct position when the cutters are removed from its lower end. A collar 27 rests upon pins 25 and a coiled spring 28 surrounding rod 24 rests upon the collar, the upper end of the spring bearing upwardly against an adjustable nut 29 on the upper end of rod 24. A cylindrical lock nut 30 is provided directly above nut 29 and is made of sufficient length to always cover the upper end of rod 24 and protect it from injury. Slots 31 are cut in opposite sides of the mandrel at the upper end of bore 12 so that a wedge 23, shown in dotted lines in Fig. 3, may be inserted to force rod 24 downwardly and allow the cutters to contract.

The configuration of one of the cutters is illustrated in Fig. 4, the other cutter being similar. It will be noted that the upper part of the cutters is narrower than the lower in the direction of pin 19, this narrow upper part working in space 14 between the two downwardly depending arms 13. When the cutters are in their expanded position their inner faces 33 are brought solidly into contact with each other as indicated in Fig. 1, this solid contact and the pivotal connection of both cutters with pin 19 preventing the cutters from being expanded farther at their lower ends by any shock or strain. The slope of faces 16 and the strength of spring 28 are relatively designed so as to prevent the lower ends of the cutters from being contracted by the upward and inward pressure to which they are subjected during the operation of drilling.

The upper parts of the widened lower or cutting ends of the cutters are provided with shoulders 34 arranged angularly with relation to each other and which bear upwardly and inwardly respectively against corresponding shoulders 35 formed on the lower ends of downwardly depending arms 13. The parts are so proportioned that faces 33 are bearing firmly against each other at the same time that faces 17 are bearing against faces 16 and shoulders 34 are pressing up-

wardly and inwardly against shoulders 35. Thus an extremely strong construction is formed which is strengthened against all of the stresses due to the drilling operations.

5 From a comparison of Figs. 1 and 2 it will be seen that the cutters move bodily upwardly while their upper ends move inwardly along surfaces 16. This action takes place whenever the cutters emerge from the
10 lower end of the casing. When the under-reamer is drawn upwardly into the casing the cutters are pressed downwardly and inwardly by the engagement of the lower end of the casing with shoulders 36 on the cutters
15 and they are thereby forced into the position shown in Fig. 2. As soon as the upper end of the mandrel emerges from the top of the casing and while the cutters are still held in their contracted position wedge 32 may be
20 inserted in slots 31 and cutter operating rod 24 held in its lower position or the wedge may be driven into the mandrel to force the operating rod 24 downwardly after the un-

der-reamer has been taken entirely from the casing.

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

In an under-reamer, a hollow mandrel, a spring-elevated rod mounted in the mandrel, a transverse pivot-pin secured to the lower
30 end of the rod, guide-grooves being provided in the opposite sides of said mandrel for said transverse pin, with apertures 21 and 22 opening therefrom respectively, aperture 21
35 being of larger diameter and aperture 22 of smaller diameter than said transverse pin, and a plurality of cutters pivoted on the transverse pin.

In witness that I claim the foregoing I have hereunto subscribed my name this 3rd
40 day of August, 1908.

J. W. BRACKNEY.

Witnesses:

JAMES T. BARKELEW,
OLLIE PALMER.