W. M. KECK.

UNDERREAMER.

APPLICATION FILED SEPT. 13, 1911.

1,040,348.

Patented Oct. 8, 1912.

2 SHEETS—SHEET 1.

Fig. 1

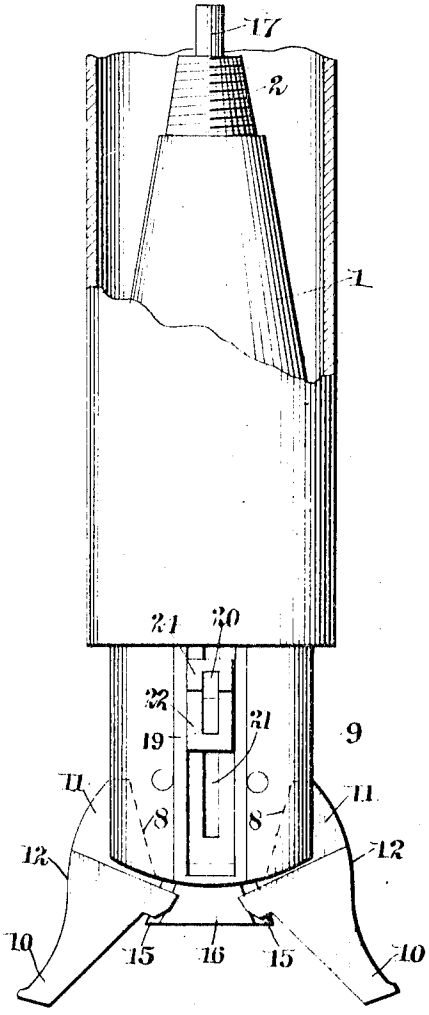
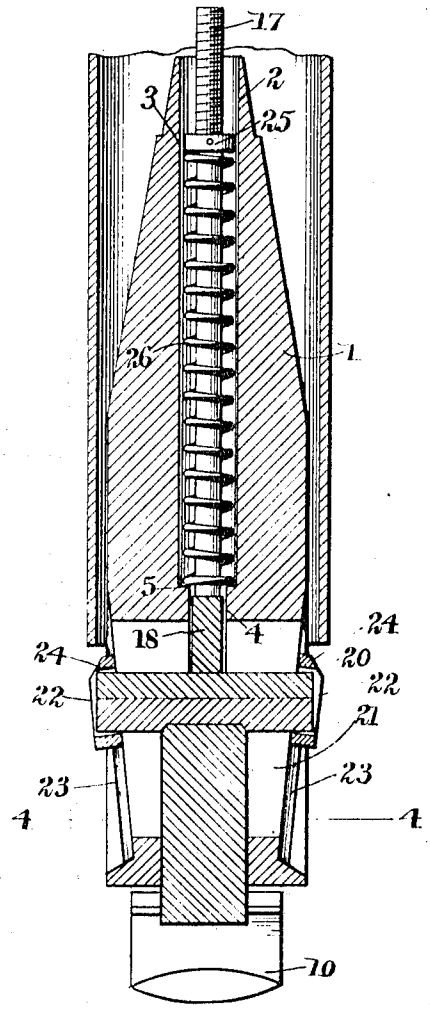


Fig. 2



Witnesses

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2 SHEETS-SHEET 2

Fig. 3

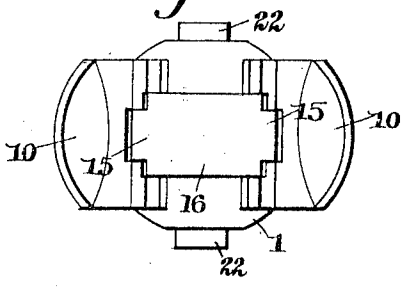


Fig. 4

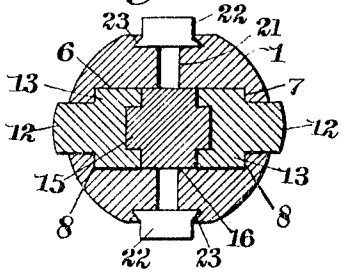


Fig. 5

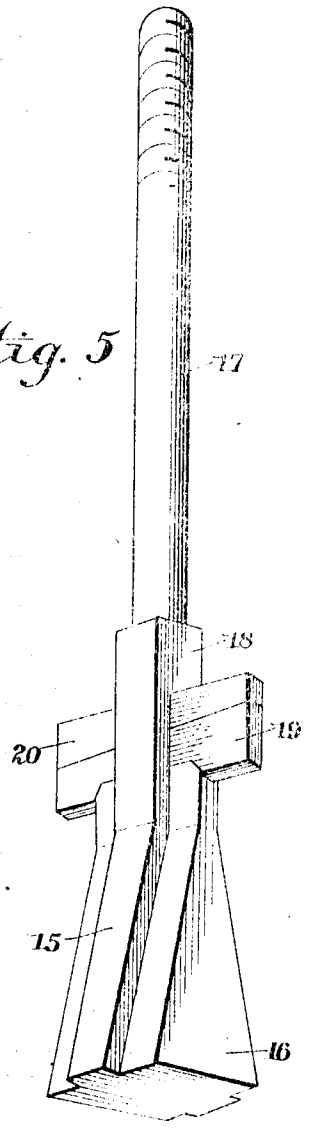
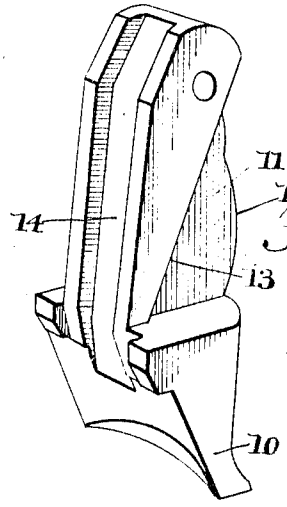


Fig. 6



Witnesses

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UNITED STATES PATENT OFFICE.

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UNDERREAMER.

1,040,348. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed September 13, 1911. Serial No. 649,074.

To all whom it may concern:

Be it known that I, WILLIAM M. KECK, a citizen of the United States, residing at Coalinga, in the county of Fresno and State of California, have invented new and useful Improvements in Underreamers, of which the following is a specification.

This invention relates to reamers and more particularly to underreamers used in connection with the sinking of oil well tubes and the like.

One of the principal objects of the invention is the provision of a device of this character in which the cutters are automatically expanded when the mandrel is projected from the casing and which are automatically collapsed when the mandrel is drawn into the casing.

Further objects of the invention will appear as the following specific description is read in connection with the accompanying drawings, which form a part of this application, and in which:—

Figure 1 is a side elevation of the device shown projected from the well casing. Fig. 2 is a longitudinal sectional view with the casing also in section. Fig. 3 is an end elevation. Fig. 4 is a sectional view taken at right angles to Fig. 2 on the line 4—4 of said figure. Fig. 5 is a perspective view of the expanding rod removed from the casing. Fig. 6 is a similar view of one of the cutter members looking from the inside.

Referring more particularly to the drawings, 1 represents the mandrel which is substantially cylindrical for a portion of its length and then tapers toward the upper end where it is provided with a tapered threaded extension 2 adapted for connection with the auger stem or sinker. The mandrel is provided with a central bore 3 which is reduced at 4 to provide a shoulder 5 and the latter portion communicates with a transverse slot 6, the walls of which are recessed, as shown at 7, the side walls of each recess being inclined inwardly, as shown at 8.

Seated within the recesses and pivotally mounted upon pins 9 are the cutter members 10 which are provided with narrowed webs 11 projecting through the slot 6 on either side thereof and provided with a cam outer surface 12, for a purpose to be hereinafter described. The narrowed webs 12 form shoulders 13 on either side thereof which are adapted to engage the inclined walls 8 so as to limit the outward movement of the cutters. Each one of the cutters is provided with a groove 14 to engage the ribs 15 extending longitudinally of the tapered expanding head 16 which is formed at the end of the expanding rod 17. The rod 17 is squared, as shown at 18, and this squared portion travels in the reduced portion 4 of the channel 3 and is of a width equal to the width of the ribs 15.

Passing through the squared portion 18 are suitable wedging keys 19 and 20 which have their ends projecting through slots 21 in the side of the mandrel and engaged loosely with plates 22 which are double dovetailed in the channels 23. These channels gradually increase in depth from nothing to the forward end of the mandrel and so act upon the plates 22, when they are moved forward, as to cause them to disappear or move out of the path of the casing. The plates are slightly tapered on their upper ends, as shown at 24.

The rod 17 has an adjustable collar 25 mounted thereon and, surrounding the rod between the collar and the shoulder 5, is a spiral spring 26 which normally acts to draw the head 16 between the cutting members 10 so that, immediately upon the projection of the mandrel beyond the end of the casing, the cutters will be expanded into operative working position. When the mandrel is drawn into the casing the plates 22 will be engaged by the casing and forced downwardly until they disappear or are carried out of the path of the casing by the action of the channels 23. At this time the cam surfaces of the cutter members will engage the casing and force the cutter members inwardly. As long as the mandrel is held in the casing the head 16 will be prevented from moving by the action of the spring 26.

Having thus described the invention, what I claim as new is:—

1. A reamer comprising a mandrel, cutters pivoted thereto, a tapered expanding head arranged between the cutters, a spring for normally drawing the head into the mandrel for throwing the cutters to expanded position a member carried by the head and projecting through opposite sides of the mandrel, and plates slidably mounted thereon and adapted to be engaged by a well casing, said mandrel provided with means to throw the plates out of engagement with the casing.

2. In a device of the class described, a man-

drel having grooves on its sides which gradually increase in depth toward the forward end of the mandrel, cutters pivoted to the mandrel, a spring operated expanding head adapted to normally expand the cutters, plates slidably mounted in said channels, and means carried by the head and loosely engaged with the plates and connecting these parts.

3. A reamer comprising a mandrel having channels formed in its sides with undercut walls, said channels gradually increasing in depth from nothing to the outer end of the mandrel, plates slidably mounted in said channels and having a depth less than the greatest depth of the channel, cutters pivoted to the mandrel, an expanding member normally actuated to expand the cutters, and a connection between the expanded member and the plates which is rigid with the expanding member and loose upon the plates.

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

WILLIAM M. KECK.

Witnesses:
STANLEY PEDDER,
A. E. KINNEY.