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Attorney

UNITED STATES PATENT OFFICE.

ACEY L. LAMBETH, OF MINERAL WELLS, TEXAS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO CULLEN B. COOPER AND ONE-HALF TO ALBERT L. HOUSTON, BOTH OF DALLAS, TEXAS.

UNDERREAMER FOR REAMING OUT PRODUCING-SANDS.

1,353,354.

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To all whom it may concern:

Be it known that I, ACEY L. LAMBETH, a citizen of the United States of America, residing at Mineral Wells, in the county of Palo Pinto and State of Texas, have invented certain new and useful Improvements in Underreamers for Reaming Out Producing-Sands, of which the following is a specification.

My invention relates to well drilling tools and more particularly to underreamers for reaming out producing sand from the cap-rock to the bottom of the well; and the object is to provide underreaming tools or bits which can be adjusted from the top of the well and which can be set at the required angle and which will be held rigidly in the required position relative to the work to be done and which is provided with a guiding member for causing uniformity in the underreaming. Other objects and advantages will be fully explained in the following description and the invention will be more particularly pointed out in the claims. Reference is had to the accompanying drawings which form a part of this application.

Figure 1 is an elevation of the underreamer, partly in section with the reamer removed for clearness in illustration. Fig. 2 is an elevation of the tool with the reamer turned out of its place to show certain parts of the guard member. Fig. 3 is an interior elevation of the reamer. Fig. 4 is a broken side elevation of the carrier and guard member. Fig. 5 is a plan view of the locking ratchet.

Similar characters of reference are used to indicate the same parts throughout the several views.

The improved tool has body member 1 which constitutes a carrier for the reamer 2. The carrier is screwed into a hollow drill rod 3 to be operated by the rod 3. The carrier is cut away to form a recess for the reamer, as shown by Fig. 4. The reamer 2 is pivotally mounted on the carrier by a pivot bolt 4. The carrier 1 is extended at the lower end to form a guide 5 which may also be used as a drilling member. A bushing 6 is used to take the weight or wear off the bolt 4. The carrier 1 has a groove 6 in the inner face thereof and the reamer 2 has a projecting lug 7 which moves in the

groove 6 for limiting the movement of the reamer relative to the carrier. The reamer 2 is swung to one side of the carrier 1 and the lug 7 will reach the end 8 and be stopped at that point.

Means are provided for setting and fixing the reamer 2 at any angle required. The reamer has bevel gear teeth 9. The teeth 9 form a rack. A rod 10 extends from the surface of the ground down through the drill rod 3. The rod 10 may be a hollow cylindrical rod provided with a solid cylindrical member 11 which is attached to the rod 3 by a coupling 12. The rod member 11 has a bevel gear wheel 13 formed on the lower end which meshes with the teeth 9 of the segmental gear. The member 11 is inserted in the upper end of the member 1 and is held therein by a collar 14 which is rigidly attached thereto. A turning of the rod 10 will turn the bevel gear wheel 13 and this wheel will move the teeth 9 and so turn the reamer to the desired angle relative to the carrier 1. The rod 10 may be locked stationary by a ratchet wheel 15, pawl 16, and spring 14. The reamer can thus be locked in the required position so that the cutting blade 17 may accomplish its function of reaming out the sands. The reamer can be brought back to vertical position or in line with the member 1 by releasing the pawl 16 from the ratchet wheel 15 and then turning the rod 10.

In operation, the member 1 will guide the reamer down in the opening already made and cause the reamer to cut uniformly as it goes down. Various changes in the sizes, proportions, and construction and arrangement may be made without departing from my invention. The guide member 1 has a bearing shoulder 18 which will relieve strain on the pivot bolt 4 and the upper end 19 of the member 2 is curved to conform to the contour of the bearing 18. The curvature of the parts 18 and 19 is sufficient to relieve the strain on the bolt 4 in whatever position the member 2 may be positioned in operation. The part 1 has provision to furnish water in between the meeting faces of the members 1 and 2 so that mud will not be caked between these members and obstruct their free operation. An opening 20 is made through a portion of the body of the part 1 and then a groove 21 in the inner

face of the member 1 permits the water to flow down between the meeting faces of the members 1 and 2.

What I claim, is—

5 1. An extension drill bit having a guide member rigid with a drill rod and an underreaming member pivotally mounted on said guide member, means for making said underreaming member rigid with said guide
10 member after the underreaming member has been set at the required angle, and means for projecting water between the meeting faces.

2. An extension drill bit having a guide
15 member rigid with a drill rod and provided with a cylindrical head and a semi-cylindrical body having a cavity therein adjacent to said head forming a bearing, an adjusting rod projecting down through said
20 head and a bevel gear rigid therewith and projecting in said cavity, and an underreaming member pivotally mounted on said guide member and supported against said bearing when in operation, and bevel gear
25 teeth on the upper end thereof meshing with said bevel gear.

3. The combination with a hollow drill rod of an extension drill comprising a guide member having a perforated head screwed
30 into said rod and having a flat body and a cavity in said body adjacent to said head forming a curved bearing, an adjusting rod projecting down through said head and a bevel gear wheel integral therewith and
35 projecting in said cavity, an underreaming member having a curved upper end engaging said curved bearing and having a flat body pivotally mounted on said guide member and having gear teeth on the upper end
40 thereof meshing with said bevel gear and means for adjusting said underreaming member relative to said guide member.

4. An extension drill comprising a drill rod, a guide member rigid therewith and
45 having a flat body and a bearing head provided with a curved cavity therein and an underreaming member pivotally mounted on said guide member and adapted to engage

said bearing head in said cavity and provided with means for adjusting the under- 50 reaming member relative to said guide member.

5. An extension drill comprising a drill rod, a guide member rigid therewith and having a cylindrical head and a concave 55 bearing in one side thereof, an underreaming member adapted to bear against said bearing in said cavity and pivotally mounted on said guide member, and means projecting down through said drill rod for adjusting 60 said underreaming member and holding the same rigid.

6. An extension drill comprising a hollow drill rod, a guide member having a head screwed into the lower end of said rod and a 65 flat face below said head and a cavity therein adjacent to said head and a bearing above said cavity, a shaft projected down through said drill rod and through said head and a bevel gear integral with the lower end of 70 said shaft in said cavity, an underreaming member engaging said bearing in said cavity and having a flat face meeting the flat face of said guide member and having teeth meshing with said bevel gear, means pivot- 75 ally mounting said underreaming member on said guide member, and means projecting down through said rod for holding said underreaming member at fixed adjustments relative to said guide member. 80

7. An extension drill comprising a hollow drill rod, a guide member having a perforated head screwed into the lower end of said rod and having a flat face, an underreaming member pivotally mounted on said 85 guide member and having a flat face meeting the flat face of said guide member, said guide member having provision for admission of water between said flat faces, and means projecting down through said rod and 90 said head for adjusting said underreaming member and holding the same at fixed adjustments.

In testimony whereof, I set my hand, this 19th day of November, 1918.

ACEY L. LAMBETH.