April 23, 1929. G. F. LE BUS 1,710,580

ROTARY UNDERREAMER

Filed May 3, 1927

Fig. 1.

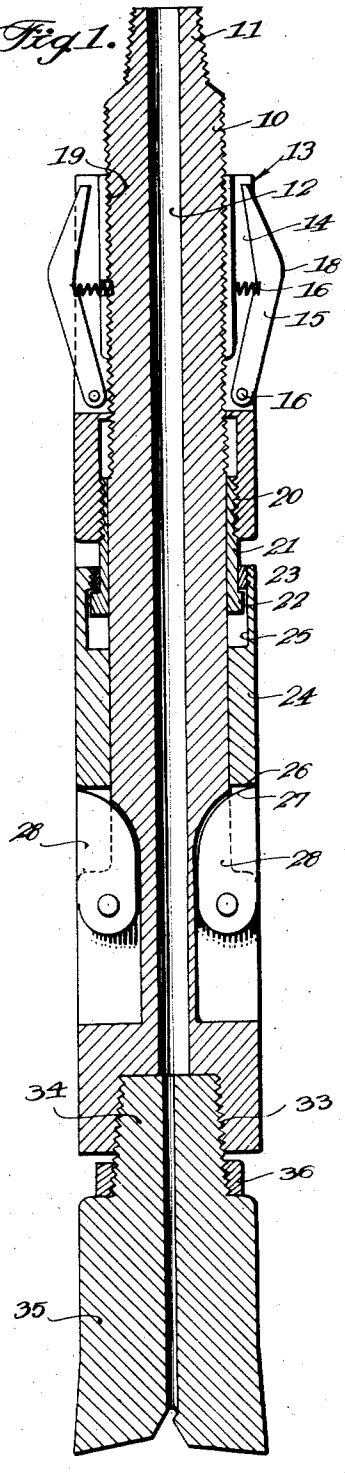


Fig. 2.

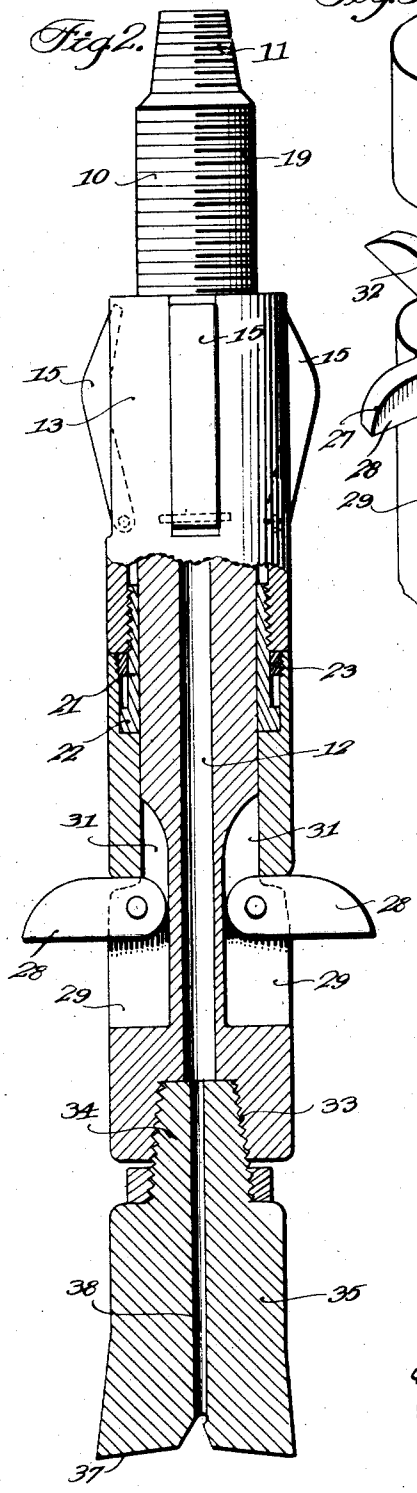
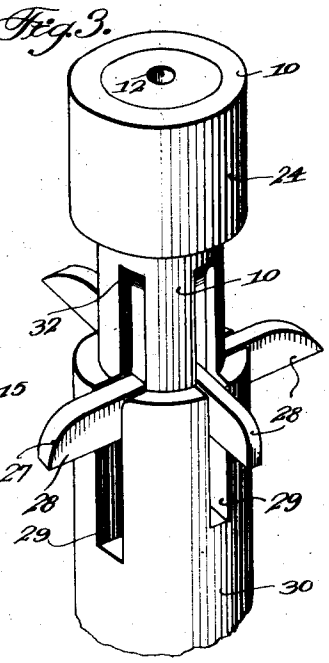


Fig. 3.



INVENTOR

GEORGE FRANKLIN LEBUS

BY Munn & Co.

ATTORNEYS

Patented Apr. 23, 1929. 1,710,580

UNITED STATES PATENT OFFICE.

GEORGE F. LE BUS, OF ELECTRA, TEXAS.

ROTARY UNDERREAMER.

Application filed May 3, 1927. Serial No. 188,489.

This invention relates to rotary underreamers.

An object of the invention is the provision of a reamer which has a positive action for forcing cutting blades into the wall so that when the device is rotated the wall of the hole will be increased in size, the increase depending upon the size of the cutting blades with which the tool is equipped.

A further object of the invention is the provision of a rotary underreamer for increasing the diameter of a well after the usual reamer increases the depth of the wall, the action of cutting the hole to an increased size, being simultaneous with the advance of the reamer which increases the depth.

A still further object of the invention is the provision of a reamer in which no springs are employed and in which the cutting blades are forced into operative position by a force acting longitudinally of the tool so that the action is positive when the blades are predeterminedly forced into position.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawings forming a part of the specification; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

Figure 1 is a vertical section of my improved reaming tool showing the blades in an inoperative position.

Figure 2 is a similar vertical section showing the blades moved to an operative cutting position,

Figure 3 is a fragmentary view in perspective showing the cutting blades in operative relation with the body of the tool.

Referring more particularly to the drawings, 10 designates the main body section which is threaded at 11 for connecting the same to the usual working parts which operates the reamer, the body member has an axial passage 12 running longitudinally of the entire body.

A tubular body member 13 is provided with slots 14 in which are mounted dogs 15, pivoted at 16. These dogs are maintained in extended relation from the body member 13. The dogs are bowed as shown at 17 to provide effective engaging sections 18 which make frictional contact with the wall of the hole or the pipe in order to cause the body member which has a threaded engagement at 19 with the main body 10 to be forced downwardly for a purpose which will be presently described.

The lower end of the member 13 has an internal chamber of greater diameter than the upper portion and is threaded at 20 to receive the threads of the tubular sleeve 21 which slides on the main body 10. A second sleeve 21 at its inner end has an annular rib 22 adapted to engage a nut 23 which is screwed into the upper end of a sleeve 24, this sleeve being spaced as shown at 25 from the main body 10, but in contact with the main body at its lower end. The extreme inner end as shown at 26 is curved to provide an annular cam to engage the curved portions 27 of cutter blades 28.

The cutter blades may be any number and are normally seated within slots 29 in the enlarged portion 30 of the body member 10 when the tool is being withdrawn from the well. However, when the tool is forced into the well preparatory to increasing the diameter of the well these blades are received within slots 31 in that portion of the body member which is directly above the enlarged portion 30 of said body member. The slots 31 curve outwardly at their upper ends as shown at 32 to neatly receive the curved portions 27 adjacent the cutting edges of the blades.

The lower end of the body member is provided with an internal flanged recess 33 into which is secured the shank 34 of a reamer 35 which is adapted to cut the hole in the ground and increase the depth of the well. The nut 36 is secured on to the threaded shank 34 of the reamer 35. The lower end of the reamer is provided with expanded cutting edges 37 and has a slot 38 opening into the passage 12 in the body 10 so that water may be forced downwardly through

the body member to the reamer 35 during cutting action of the tool.

The tool is shown in Figure 1 and has a cutting blade 28 neatly seated within the slots 31 of the body member 10 with the cam edges 26 of the sleeve 24 in engagement with the curved portion 27 of the blades. In this position the tool may be inserted into the hole without any interference from the blades 28 and the tool may be passed freely through the casing to the oil sands.

When the tool is rotated the dogs 15 through their effective portions 18 will engage with the casing or the wall of the hole and maintain the sleeve or body 13 against rotation, whereby the body member 13 is substantially screwed downwardly to carry the sleeve 21 downwardly and permitting the weight or sleeve 26 to move downwardly against the curved portion 27 of the blades 28. When this action occurs said blades will be forced downwardly to their horizontal positions as shown in Figure 2 and the tool is now ready for reaming the walls of the well to an increased size.

After the desired reaming has been done the tool is raised and the cutters collapse or move downwardly because of their frictional contact with the wall of the well and seat within the pockets 29. This action of the blades permits the tool to be readily withdrawn from the well.

It will be seen by such a construction that this tool may be employed in the process of rotary drilling and is so constructed that it may readily be moved downwardly through the casing and enlarge the hole in the sand, thereby increasing the production of the well. This tool also may be employed in producing wells where the sand has become paraffined which closes off the oil. This tool may also be run on the tubing to remove the paraffin from the walls of the sand thus increasing the production of old wells.

The inconvenience of the other methods of rotary drilling is the fact that when the casing has been set on the sand and the sand drilled in the usual way, the passage in the sand is substantially the same size as the casing.

As the body 10 is rotated and screwed into the threads of the sleeve 13, the dogs 15 will engage the walls of the well and prevent rotation of said sleeve. At this time the weight 24 descends forcing the cutters or blades 28 outwardly from the body member. When the member 22 is moved downwardly and engages the shoulder of the pocket 25, at the inner end of the pocket, and further when the lower end of the threads of the sleeve 13 reach the terminus at the lower end of the threads on the body 10, the member 10 and sleeve 13 can not be screwed any further and they will be locked against independent rotation. At this time, the blades 28 have been moved out to the position shown in Fig. 2. The resistance of the dogs 15 against the rotation of the sleeve 13 will be sufficient to maintain the sleeve against rotation during the positioning of the blades 28. However, when the blades are in the position shown in Fig. 2, and the sleeve 13 has been screwed to its longitudinal limit of movement with respect to the body member 10, the continued rotation of the body member 10 will cause rotation of the sleeve 13 and likewise the cutters 28. It will be appreciated that the resistance of the dogs 15 will only be sufficient to maintain the sleeve against movement during the positioning of the blade 28.

I claim:—

1. A reamer comprising a body member, a sleeve having a threaded engagement with the body member, means for maintaining the sleeve in frictional contact with the walls of an oil well, a second sleeve having a threaded engagement with the first mentioned sleeve, a weighted sleeve loosely supported by the second mentioned sleeve and adapted to move downwardly on the body member when the said second mentioned sleeve is moved downwardly on said body member, said body member being provided with pockets, blades adapted to be neatly seated within the pockets and having their free ends engaged by the inner end of the weighted sleeve, and a reamer secured to the inner end of the body member.

2. A reamer comprising a body member having a longitudinal passage therethrough, a sleeve having threaded engagement with the body member, said sleeve being provided with recesses, spring pressed dogs mounted in the recesses, a second sleeve having a threaded engagement with the first mentioned sleeve and provided with an annular rib at its inner end, and a third sleeve movable relative to the second mentioned sleeve, a nut threaded to the third mentioned sleeve and adapted to rest on the rib of the second mentioned sleeve, the third mentioned sleeve being weighted, said body member having a plurality of pockets, a reamer blade pivotally mounted in each pocket and adapted to be engaged by the weighted sleeve so that when the sleeve is moved inwardly the blades would be forced into operative position, and a reamer removably secured to the inner end of the body.

3. A reamer comprising a body member having a longitudinal passage therethrough, a sleeve having threaded engagement with the body member, said sleeve being provided with recesses, spring pressed dogs mounted in the recesses, a second sleeve having a threaded engagement with the first mentioned sleeve and provided with an annular

rib at its inner end, and a third sleeve movable relative to the second mentioned sleeve, a nut threaded on to the third mentioned sleeve and adapted to rest on the rib of the second mentioned sleeve, the third mentioned sleeve being weighted, said body member having a plurality of pockets, a reamer blade pivotally mounted in each pocket and adapted to be engaged by the weighted sleeve so that when the sleeve is moved inwardly the blades would be forced into operative position.

GEORGE F. LE BUS.