

April 7, 1925.

1,532,553

O. DUDA

LUBRICATOR FOR DEEP WELL DRILLS AND THE LIKE

Filed Feb. 2, 1923

2 Sheets-Sheet 1

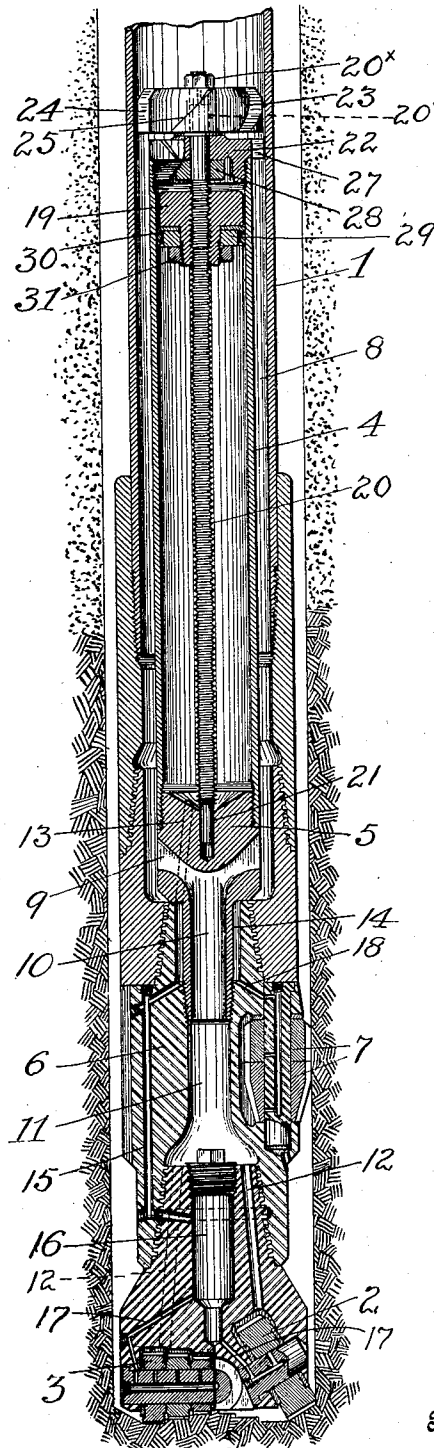


Fig. 1.

Inventor:
Oswald Duda
By
Speer, Middleton, Donaldson & Hall
Attorneys

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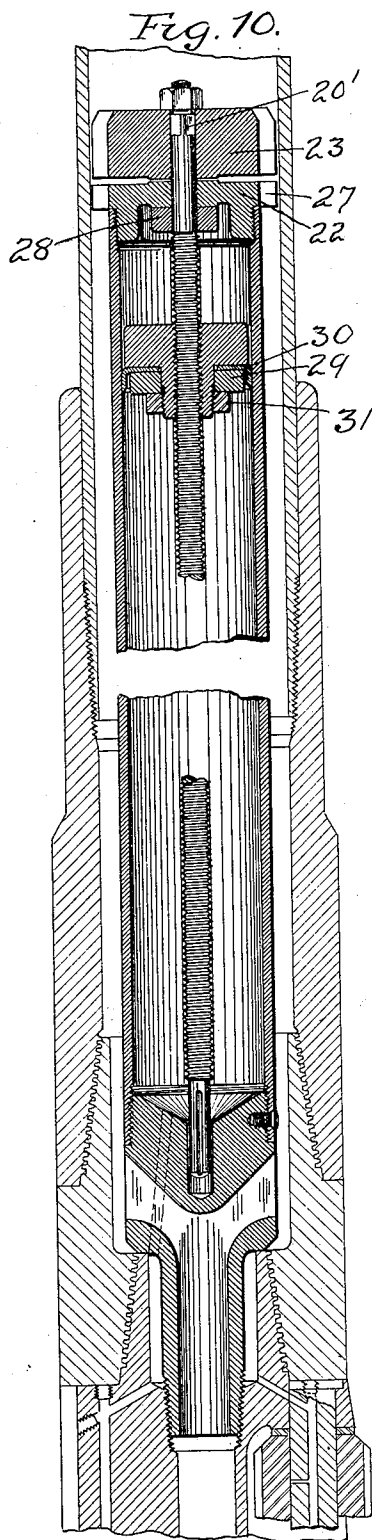
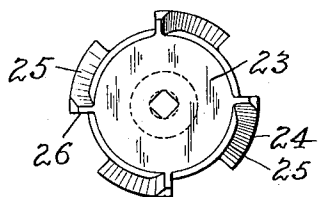
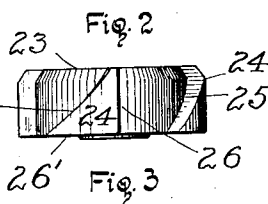
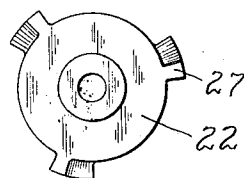
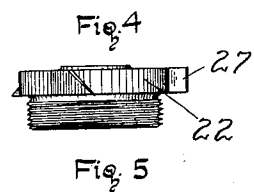
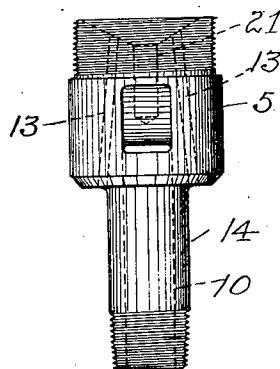


Fig. 6

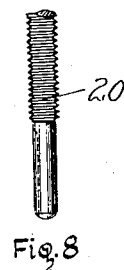


Fig. 8



Fig. 9

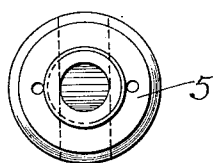


Fig. 7

Inventor:

Oswald Duda

by
Spear, Middleton, Doudles and Hall
Attorneys

UNITED STATES PATENT OFFICE.

OSWALD DUDA, OF HOUSTON, TEXAS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO REED ROLLER BIT COMPANY, A CORPORATION OF TEXAS.

LUBRICATOR FOR DEEP-WELL DRILLS AND THE LIKE.

Application filed February 2, 1923. Serial No. 616,576.

To all whom it may concern:

Be it known that I, OSWALD DUDA, a citizen of the United States, and a resident of Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Lubricators for Deep-Well Drills and the like, of which the following is a specification.

My invention relates to rotary cutter oil well drills having capacity for efficient operation at great depths beneath the surface of the earth as is necessary in drilling so-called deep wells and its object is to provide a device of this sort which is particularly simple in construction and highly efficient in use, and it includes the combination and arrangement of parts to be hereinafter described and particularly pointed out in the claims.

One embodiment of my invention is disclosed in the accompanying drawings, which illustrate a preferred embodiment of my invention.

In the drawings:

Figure 1 is a vertical sectional view of the apparatus, the section at the lower end being taken on radial planes 90° apart.

Figure 2 is a plan view of the bladed member at the upper end of the screw rod.

Fig. 3 is a side view of the same.

Figs. 4 and 5 show the cap piece for the lubricator.

Figs. 6 and 7 show a socket piece.

Figs. 8 and 9 show a part of the screw shaft.

Fig. 10 is a larger sectional view of the lubricator.

In the drawings 1 is a part of the drill stem through which flushing fluid is forced by a pump on the drill rig platform for removing the detritus, which passes up between the drill stem and the wall of the well, after being dislodged by the cutters. These cutters may be of various forms and arrangements. They consist in the form chosen to illustrate my invention of side cutters 2, a cross roller cutter 3 and reaming cutters 7 that are arranged in recesses of the drill head which acts as a carrier therefor. To lubricate the bearings of these cutters with a heavy oil I show, as an example of my invention, a tube 4 arranged coaxially within the drill stem, and within the same, said tube being screw threaded at its lower

end onto a socket or coupling member 5 which in turn is screw threaded into some part of the drill head. In the instance illustrated this socket is screw threaded into the reamer block 6, which carries reaming cutters 7 for reaming out the well hole formed by the cutters at the lower end of the apparatus.

The flushing fluid passes down through the drill stem and through the annular space 8 between the lubricant reservoir 4 and the drill stem, thence through ports 9 and conduit 10 in the socket member, from whence it is delivered through the central bore 11 of the reamer block to conduits 12 of the drill head, which deliver it to the recesses of the head in which the rotary cutters are located so that the cuttings or material cut or dislodged by the cutters will be carried up outside of the drill stem to be discharged from the well.

The lubricant forced from the reservoir 4, as hereinafter described, passes through the conduit 13 of the socket member 5 into the cup shaped space 14 at the upper end of the reamer block, thence through conduits 15 to a central lubricant holding chamber 16 of the drill head, from whence distribution takes place through conduits 17 to the bearings of the cutters at the lower end of the head and distribution also takes place through the conduits 18 to the reamer cutters.

The lubricant is forced through these various conduits from the reservoir 4 by a piston 19. A rotatable screw threaded rod or shaft 20 passes through the piston, which has screw threaded engagement therewith.

This screw threaded rod bears at its lower end in a socket 21 of the socket member 5 and at its upper end it bears in and passes through the cap 22, which is screw threaded into the upper end of the lubricant reservoir.

A block 23 having peripheral blades 24 is fixedly secured to the end of rod 20 projecting through the cap 22. This upper end has a square portion 20' and the member 23 is provided with a square opening to correspond. A nut 20* holds the member 23 in place.

The blades, or laterally projecting portions 24 of block 23, reach out over the annular space 8 between the lubricant reservoir and the drill stem. These lateral pro-

jections or blades preferably have inclined surfaces 25, vertical faces 26, and horizontal lower faces 26'. The upper edge of the member 23 is preferably bevelled.

5 In order to space or brace the upper end of the lubricant reservoir from the wall of the drill stem, I may form the cap member 22 with lugs 27 to bear on the inner side of the drill stem. These lugs are preferably unequal in number in respect to 10 the number of blades or projections on the member 23 and preferably their upper faces are inclined in the opposite direction in respect to the inclined faces 25.

15 I have provided a thrust bearing for the screw shaft to resist the back pressure exerted up through the lubricant ports and the body of the lubricant, consisting of a collar 28 shrunk on the plain part of the 20 screw shaft and bearing on the under side of the cap 22. This plain upper end of the screw shaft is slightly reduced forming a shoulder bearing on the under side of the collar. This construction will resist all ten- 25 dency for the screw shaft to unduly lift under back pressure exerted on the piston.

The piston may be made up of a main block portion with a downward extension carrying a disc 29 between which and the 30 main part a piston packing 30 is held. The disc is held in place by a nut 31. A reasonably close fit is provided between the bearing in cap 22 and the shaft or rod 20 and a machined surface on the cap about 35 the shaft cooperates with a machined surface on the bottom of block 23.

The lower end of the screw rod where it fits into the socket member is plain, and in replenishing the reservoir it will only be 40 necessary to unscrew the cap and lift out the piston together with the screw rod or lift the parts out far enough to expose the bore of the tube for refilling.

The piston packing fits tightly against 45 the wall of the lubricant holder and has no rotary movement relative thereto, but only movement lengthwise of the said holder.

In the operation of the apparatus, flush- 50 ing fluid is forced down through the drill stem, and through the passages described to clear the cutters of the material cut from the sides and bottom of the hole and to carry it up outside the drill stem to be discharged 55 from the well at the surface of the ground. The member 23 will cause a relative movement rotatively between the screw rod and piston and the latter, therefore will be fed down positively and will cause the lubricant 60 to be forced from the holder through the ports described to the parts to be lubricated.

In the described construction there will be no reverse rotation of the member 23 as the tool is lowered into the bore hole, and as 65 the piston cannot be forced upwardly by the

water pressure, the lubricant will not be forced from the bearings back into the holder.

I claim:

1. The combination with a drill stem, a 70 rotary cutter and a carrier in which it is journaled, of a lubricator comprising a barrel, a detachable cap, a piston in the barrel, a screw shaft for operating the piston, an actuator carried by the shaft and a base 75 member for the barrel having water and lubricant passageways therethrough, and a socket closed at its bottom and receiving the plain lower end of the screw shaft removably, and a thrust bearing at the upper 80 end of the screw shaft beneath the cap.

2. The combination with a drill stem, rotary cutter and member in which the cutter is journaled, of a lubricator comprising 85 a barrel, a cap detachably mounted at the upper end of the barrel, a base member carried by the first named member and provided with an axial socket, said base member forming a connection between the barrel and the member first mentioned, a screw 90 rod having a lower end bearing in said socket and its upper end passing out through the cap, a thrust bearing for the screw rod against the under side of said cap, and an actuator secured to the upper end of the 95 screw rod, said actuator being of substantially the diameter of the interior of the drill stem.

3. The combination with a drill stem, rotary cutter and member in which the cutter 100 is journaled, of a lubricator comprising a barrel, a cap detachably mounted at the upper end of the barrel, a base member carried by the first named member and provided with an axial socket, a screw rod hav- 105 ing a lower end bearing in said socket and its upper end passing out through the cap, a thrust bearing for the screw rod against the under side of said cap, and an actuator secured to the upper end of the screw rod, 110 said actuator having a body portion substantially of the diameter of the barrel and wings or blades extending across the space between the barrel and drill stem.

4. The combination with a drill stem, rotary cutter and member in which the cutter 115 is journaled, of a lubricator comprising a barrel, a cap detachably mounted at the upper end of the barrel, a base member carried by the first named member and provided with an axial socket, a screw rod hav- 120 ing a lower end bearing in said socket and its upper end passing out through the cap, a thrust bearing for the screw rod against the under side of said cap, and an actuator 125 secured to the upper end of the screw rod, said actuator having peripheral wings or blades with substantially horizontally disposed under faces and inclined upwardly 130 presented faces.

5. The combination with a drill stem, rotary cutter and member in which the cutter is journaled, of a lubricator comprising a barrel, a cap detachably mounted at the upper end of the barrel, a base member carried by the first named member and provided with an axial socket, a screw rod having a lower end bearing in said socket and its upper end passing out through the cap, a thrust bearing for the screw rod against the under side of said cap, and an actuator secured to the upper end of the screw rod, said actuator having peripheral wings or blades with substantially horizontally disposed under faces and inclined upwardly presented faces, said faces being presented in the direction of rotation of the drill stem.

6. The combination with a drill stem, a rotary cutter and a carrier in which it is journaled, of a lubricator comprising a barrel, a piston in the barrel, a screw shaft for operating the piston, an actuator carried by the shaft and a base member for the barrel having a head and a stem of reduced diameter threaded for engagement with said carrier, said member having a water passageway extending through its stem and

opening out through the side of its head, and having a lubricant passageway through its head opening out through the lower face thereof contiguous the stem, and said head being further provided with a socket closed at its bottom and receiving the end of the screw shaft.

7. In combination in a deep well drilling apparatus, a rotary drill stem, a cutter, a carrier therefor having a central bore for flushing fluid and being connected to the drill stem, a lubricant holder within the drill stem, including a part connecting the holder with said carrier and having a central bore to connect with the central bore of the carrier and with lateral ports connecting with the flushing fluid space between the lubricant holder and the drill stem, a piston within the lubricant holder, a screw rod passing through the piston having a bearing at its lower end in said part, and an actuator secured to said rod and located above the holder in the water space of the drill stem, substantially as described.

In testimony whereof I affix my signature.

OSWALD DUDA.