Dec. 16, 1930. E. E. GREVE 1,785,256

ROTARY DRILLING MACHINE

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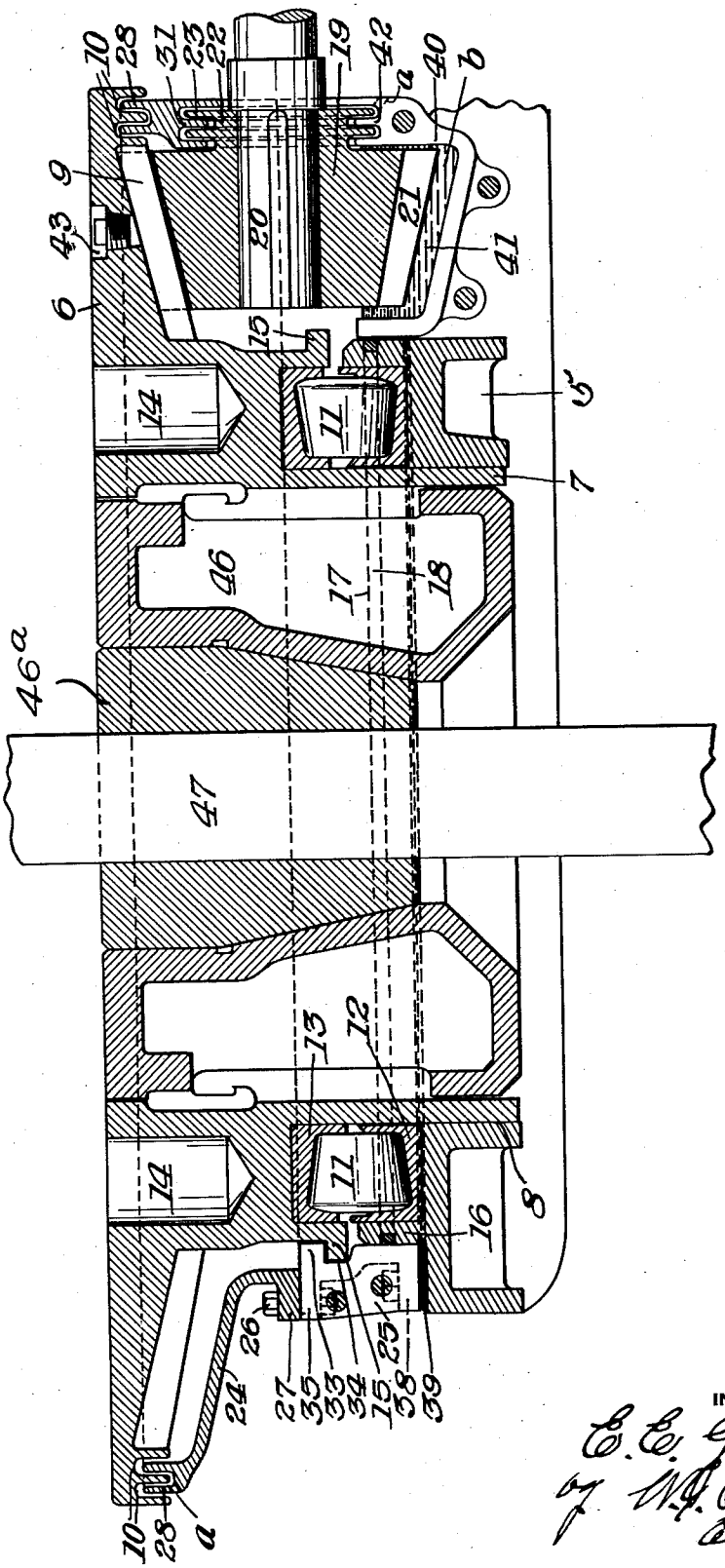

Fig. 1.

INVENTOR

E. E. Greve

by W. J. Doolittle

Attorney

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Fig. 2.

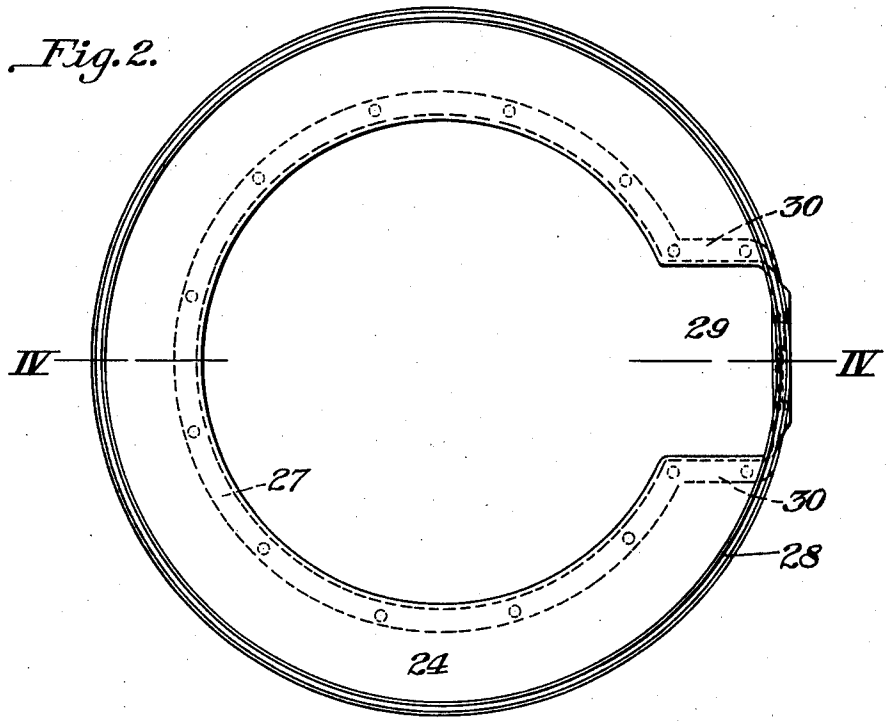


Fig. 3.

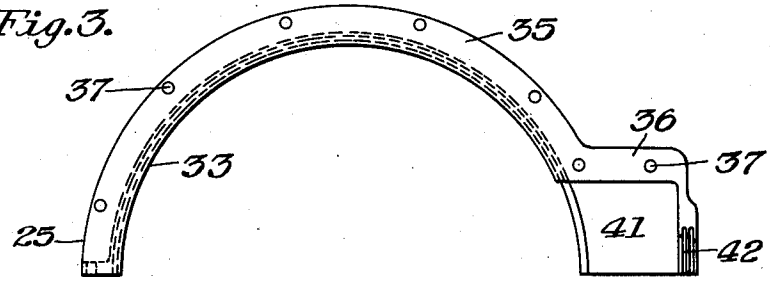


Fig. 4.

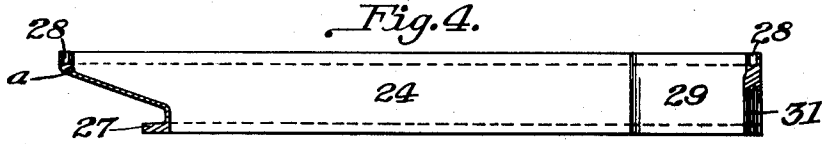
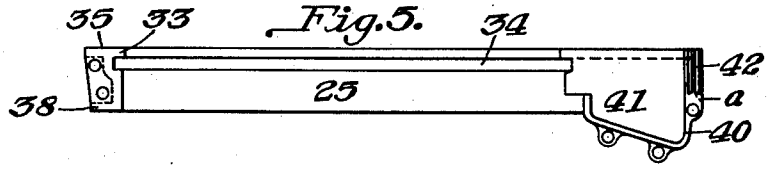


Fig. 5.



INVENTOR

E. E. Greve

by V. K. Woolick

Attorney.

Patented Dec. 16, 1930 1,785,256

UNITED STATES PATENT OFFICE

EDGAR E. GREVE, OF BELLEVUE, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO OIL WELL SUPPLY COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY

ROTARY-DRILLING MACHINE

Application filed February 23, 1928. Serial No. 256,143.

This invention relates to improvements in rotary drilling machines designed to be employed in well known rotary systems of drilling gas, oil and other deep wells.

One of the prime objects of the present invention is to provide, in a drilling machine of the character specified, simple and efficient means for protecting the operating parts of such machines, so that mud and other foreign matter cannot reach such parts and, at the same time, provide for an efficient system of lubrication of said operative parts.

A further object is to provide new and improved thrust or hold-down means incorporated in the protector means above specified for taking care of vertical and lateral thrusts which the rotary table of the drilling machine is subjected to in operation.

Further additional objects and advantages of my invention will be pointed out in or become apparent from a consideration of the following specification read in connection with the accompanying drawings.

In the accompanying drawings, which illustrate an application of my invention:

Fig. 1 is a central vertical sectional view of a rotary drilling machine embodying my invention;

Fig. 2 is a detail top plan view of an upper part or portion of the protector or casing means;

Fig. 3, a view similar to Fig. 2, showing a part of the lower member of the casing or enclosure;

Fig. 4, a cross-sectional view, the section being taken on line IV—IV of Fig. 2; and

Fig. 5, an elevational view of that portion of the lower member shown in Fig. 3.

Referring to the drawings, 5 designates the base of the rotary, 6 the rotary table having a depending cylindrical wall 7 adapted to be closely fitted into a central opening 8 of the base. Rotary table 6, as illustrated and as preferred, is formed with a geared portion or gear ring 9 and, outwardly of the gear ring, the table is provided with channel-like grooves 10 designed to cooperate with an element of a structure or unit functioning as a combined protector, lubricant carrier and hold-down means, hereinafter described.

As shown, the table is designed to be rotatably mounted on the base on anti-friction means or roller bearings 11 disposed between race-plates 12 and 13 respectively positioned on the base and in the table. The table is provided with break-out post-receiving sockets 14 and, in addition to the parts mentioned, with an annular flange or shoulder 15 designed to be engaged by the hold-down or thrust means, as hereinafter described. Base 5 is provided with an annular upwardly extending member 16 having a groove 17 designed to receive a packing element 18. The purpose of member 16 is to properly position and maintain some of the parts relatively to the base and table portions of the drilling machine.

The rotary table is designed to be driven by a drive pinion 19 carried on a drive shaft 20; the teeth 21 of the pinion cooperate with the teeth of the gear ring 9 of the table. The hub portion 22 of the pinion 19 is formed with a tongue and groove construction, as shown at 23.

An important and characteristic feature of the present invention resides in the combined protector, oil carrier, and hold-down structure or unit. As illustrated and as preferred, this unit includes an upper or top member, indicated generally by the numeral 24, and a divided lower member, generally designated 25, said members when assembled being joined together by a series of headed bolts 26.

The upper member 24 is in the form of a dished platelike element having at its lower portion a supporting or base flange 27 and at its upper portion a peripheral grooved part 28 having drain openings *a* formed therein. Said grooved part 28 is adapted to cooperate with the grooves 10 formed on the periphery of the rotary table in order to provide sealing means therebetween. A portion of the member 24, as particularly shown by Fig. 2, is cut away to provide a space 29 adapted to receive the gear pinion 19 therein. As shown, pinion-receiving space 29 is located between radially extending flanges 30

projecting from the base flange 27. In addition to the upper peripheral grooved portion 28, member 24 for a portion of its periphery is provided with a tongue and groove formation 31 for the purpose of cooperating with the tongue and groove construction formed on the hub portion 22 of the pinion 19. The flanges bounding the space 29 are provided with bolt openings adapted to receive some of the headed bolts 26 for securing the said upper and lower elements 24 and 25 together.

The lower member 25 of the unit is divided into two segmental parts, as particularly shown by Figs. 3 and 5 of the drawings. As illustrated, each part is provided with an inwardly projecting flange or shoulder 33 and a groove 34 designed to engage and cooperate with the flange 15 of the table for preventing a vertical movement of the table relatively to the base portion of the drilling machine. In addition to the said shoulder 33, each part of the element 25 is formed with an upper ledge 35 and with a radially extending ledge 36. These ledges are provided with bolt hole openings 37 which register with the openings in the flanges 27 and 30 of the upper member 24, and are adapted to receive the bolts 26 for tying the two elements together.

Each part of member 25 is also formed with a supporting base 38 designated to be positioned on shims 39 interposed between the base of the rotary and the said supporting base 38. The lower member 25 is designed to be positioned and bear upon the upstanding annular member 16 formed on the base.

The respective segmental parts are each formed with a depending portion 40 adapted, when the parts are assembled, to form an oil or lubricant reservoir or container 41. This reservoir 41, in addition to receiving the lubricant, is designed to receive the pinion 19, and enter into the formation of a pinion housing. Each of the said parts is also formed with a tongue and groove construction 42, adapted to cooperate, when the parts are assembled, with the tongue and groove construction of the hub portion 22 of the pinion 19 for effecting a seal or closure for preventing the entrance of foreign matter and the escape of the oil or other lubricant employed. Oil or other lubricant may be furnished to the reservoir through an opening 43 formed in the rotary table.

It will be noted by the construction just described that I have provided an efficient and simple unit device or structure combining a protector or casing for preventing the entrance of foreign matter to the bearings and other movable parts of the rotary table and the escape of lubricant therefrom, an oil bath, and a hold-down means.

By operating the pinion in the oil bath *b*, oil will be passed therefrom to the gear ring of the rotary table, the thrust ring or hold-down means and the anti-friction bearings, and returned to the reservoir 41, thus thoroughly lubricating all the movable parts of the rotary.

The drilling machine, in addition to the parts above described and shown by the drawings, includes a spider which is disposed in the central opening of the rotary table in the usual manner. This spider 46 is designed to receive a plurality of bushings 46*a* by which the grief-stem 47 is engaged, as is usual in rotary drilling machines of the class to which the present invention relates.

I claim:

1. In a rotary drilling machine, the combination with a base, of a rotary table having a peripheral gear, an annular raceway between the table and the base, anti-friction bearings disposed in said raceway and interposed between the base and table, a drive pinion for the table, and a closure structure mounted on the base and cooperating with the table for enclosing the gear, anti-friction bearings and pinion, said closure structure including upper and lower members, said lower member mounted on and secured to the base and having hold-down means cooperating with means on the table, and lubricant-receiving means positioned outside of the base.

2. In a rotary drilling machine, the combination with a base, of a rotary table having a gear-ring and a peripheral groove, anti-friction bearings interposed between the base and table, a drive pinion having a tongue and groove portion, and a closure structure including an upper member having sealing means thereon cooperating with the groove of the table and the tongue and groove portion of the pinion, and a lower member mounted on and secured to the base having hold-down means and a tongue and groove portion cooperating with the tongue and groove portion of the pinion.

3. In a rotary drilling machine, the combination with a base, of a rotary table having a peripheral gear, anti-friction bearings interposed between the base and table, a drive pinion for the table, and a closure structure mounted on the base and cooperating with the table for enclosing the gear, anti-friction bearings and pinion, said closure structure including an upper dish-shaped annular member having a peripheral cut-away portion, and a lower annular member having a recess mounted on and secured to the base, said table having an annular flange entered in the recess formed in the lower annular member, said lower annular member made in sections and formed with a lubricant-receiving reservoir, said upper member mounted and secured to the lower annular member.

In testimony whereof I affix my signature.

EDGAR E. GREVE.