

March 29, 1932.

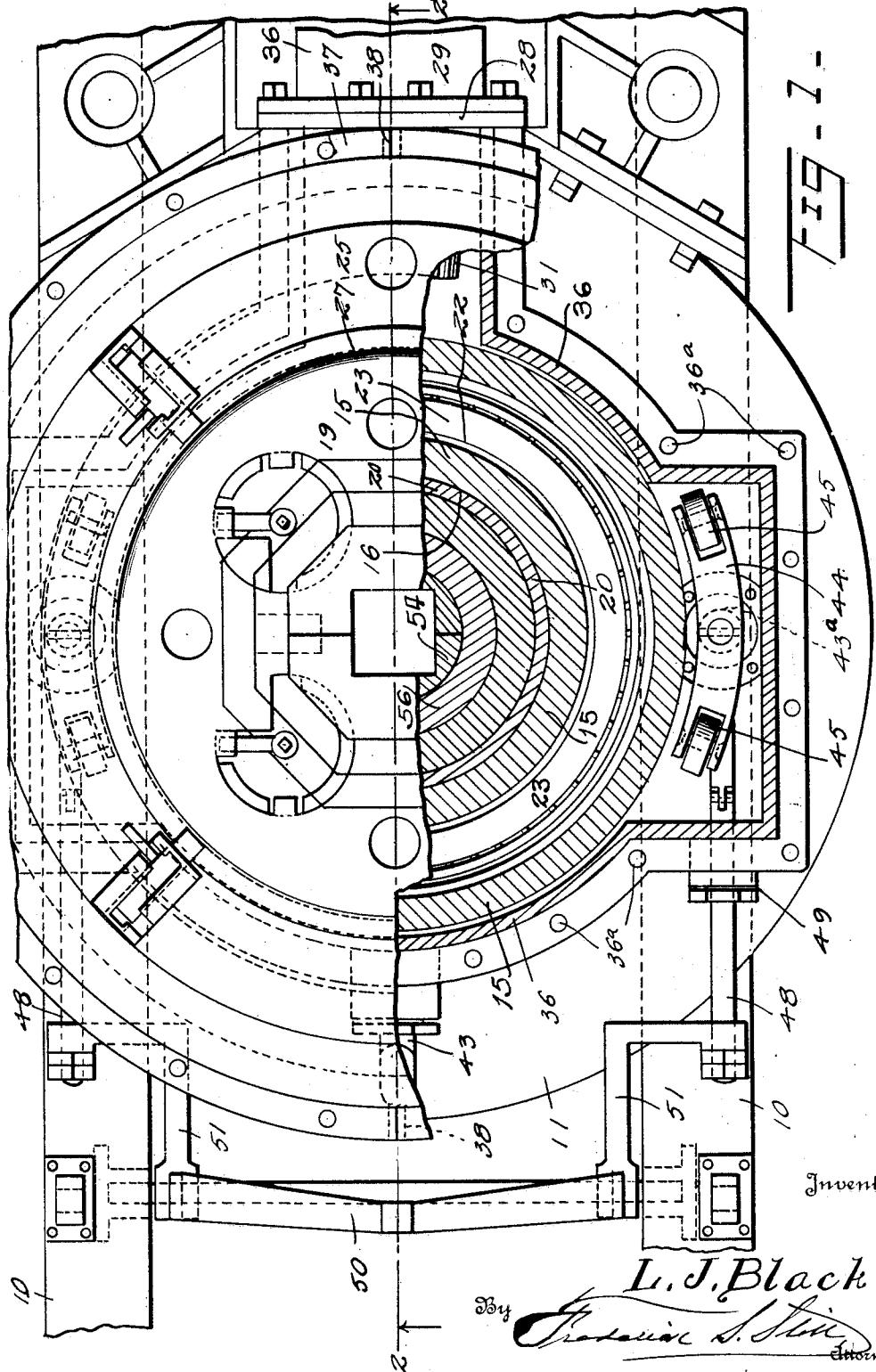
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OIL BATH CONSTRUCTION FOR ROTARIES

Filed April 26, 1929

2 Sheets-Sheet 1



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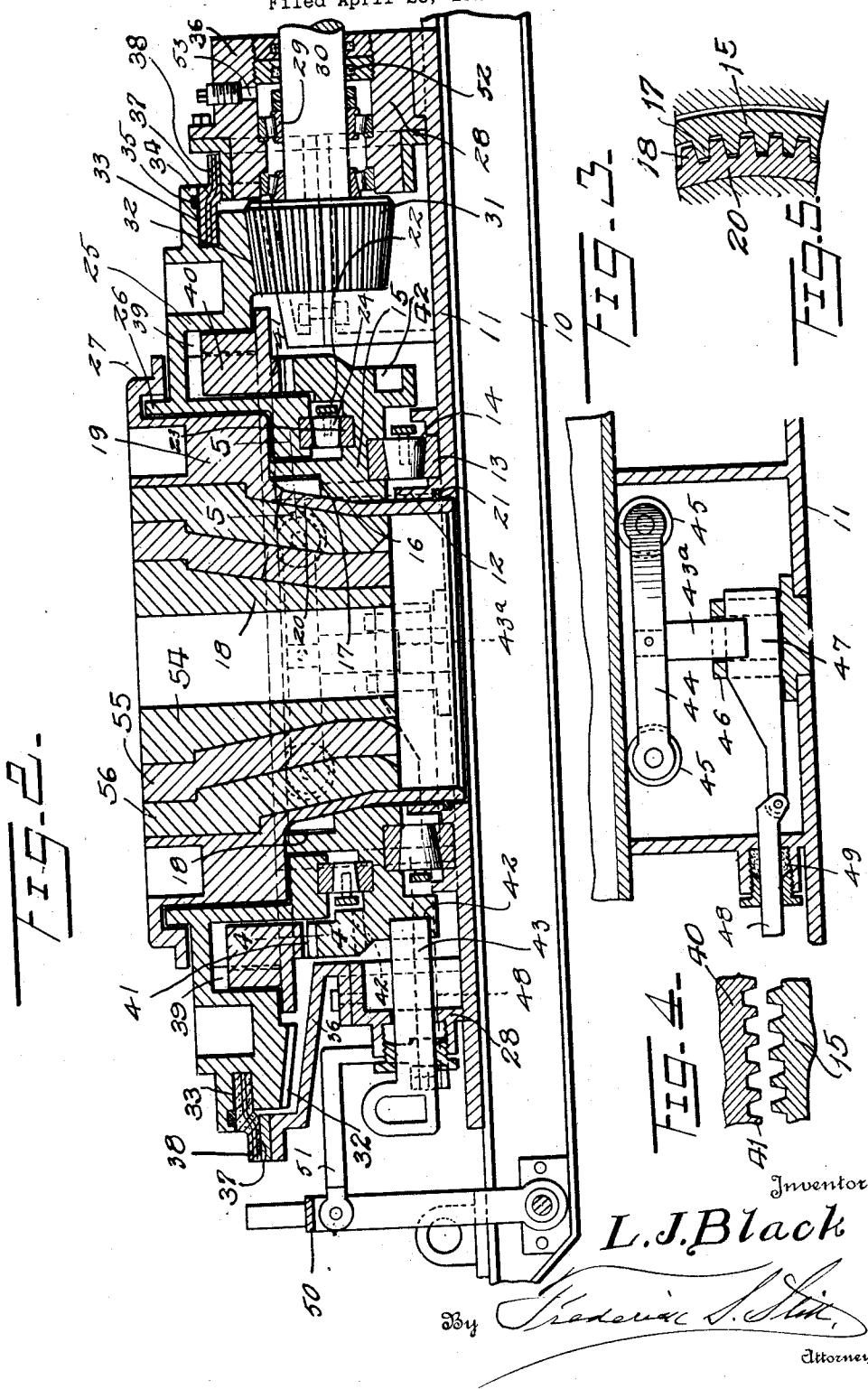
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UNITED STATES PATENT OFFICE

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OIL BATH CONSTRUCTION FOR ROTARIES

Application filed April 26, 1929. Serial No. 358,416.

This invention relates to rotary well drilling apparatus and more particularly to the construction of the drilling table of the rotary.

5 An important object of the invention is to provide in a device of this character a construction such that the operating parts of the rotary table including the bearings and gearing may be so housed that they can 10 be kept in a bath of oil, preventing any contamination thereof.

A further object of the invention is the production in apparatus of this character of an arrangement such that the inner section 15 of the complete drilling table when removed will provide access to the bearings supporting the outer table and thus enable the same to be cleansed by the use of steam, compressed air or the like, of any foreign substance which 20 may have collected therein.

A still further object of the invention is to provide apparatus of this character of such structure that it may be applied to rotary well drilling apparatus constructed in 25 accordance with my prior Patent No. 1,580,002, issued April 6, 1926, for rotary well drilling apparatus.

Another object of the invention is to provide a construction such that all fluids leaking 30 from the drilling swivel or joints of the drilling apparatus lying above the table are withheld from entry to the housing of the bearings and gearing.

These and other objects I attain by the construction shown in the accompanying drawings wherein for the purpose of illustration I have shown a preferred embodiment of my invention and wherein:

Figure 1 is a plan view partially in section 40 of rotary well drilling apparatus constructed in accordance with my invention;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a fragmentary detailed sectional view showing the method of mounting and operating the shifting ring;

Figure 4 is a fragmentary section on the line 4—4 of Figure 2;

Figure 5 is a fragmentary section on the line 5—5 of Figure 2.

Referring now more particularly to the drawings, the numeral 10 generally designates supporting skids, and 11 the base supported thereby. This base has a central opening defined by an upstanding flange 12, and upon the base immediately outward of this flange a roller bearing track 13 is disposed. On this track, by rollers 14, is supported an intermediate bushing 15, having a central bore, the lower portion of which has the same interior diameter as the interior diameter of flange 12, and the lower face of which at the bore closely approaches the upper edge of the flange 12. The upper portion of the bore is conical, as indicated at 16, and is formed in 65 the face thereof with teeth 17 adapted to mesh with teeth 18 formed upon a skirt 20 depending from an inner table element or grief stem drive bushing support 19, which is seated upon the upper surface of the bushing. 70 The upper portion of the skirt 20 fits within the conic portion of the bore and is provided with the teeth 18, and the lower portion fits against the vertical portion of the bore of the intermediate bushing and against the flange 75 12. The lower portion of the outer face of this skirt engages against a packing 21, which effects a seal between the skirt and the flange.

The upper surface of the intermediate bushing is formed with an annular recess 22 and in 80 the base of this groove is provided a roller track 23. This track carries rollers 24, which support an outer table element 25, this outer table element having at the inner margin of the upper surface thereof an upstanding 85 flange 26, over which extends a depending flange 27 carried by the inner table element.

The upper surface of the inner table element is at a slightly higher elevation than the outer table, and flange 27 extends downwardly below the upper end of flange 26, so that any sludge flowing from the surface of the inner table over table 25 will not pass between adjacent faces of the tables 19 and 25 and thus obtain access to the groove 22 and the roller 90 bearings 24, or to the bearings 14.

The outer marginal portion of the base is defined by an upstanding wall 28 in which is mounted a bearing 29 receiving the drive shaft 30, the inner end of which is provided 100

with a pinion 31 having driving engagement with teeth 32 formed upon the under surface at the outer portion of the outer table. The outer face of the outer table is provided with 5 a circumferentially extending groove 33, those portions of the outer face of the table lying above this groove projecting slightly beyond those lying below, as at 34 and having formed in the lower face thereof a packing groove 35. 10 The upstanding wall 28 of the base is preferably formed in two sections, one of which is directly attached to the base and the other of which, as indicated at 36, is bolted or otherwise secured to the first named section. Upon 15 the upper surface of this last named section which is disposed slightly below the level of the groove 33, I place a combined hold down and sealing ring 37, which is formed in two sections securely bolted to the upper surface of the wall section 36, and have their ends connected by a packing indicated at 38. Ring 37 is vertically offset intermediate its inner and outer edges, the inner edge thereof being disposed at a higher level and bearing 20 against the upper wall of the groove, and against the packing 38.

This ring serves to continue the outward movement of any water or slush which may be deposited upon the table and permit the 25 same to pass down the side walls and so to the ground.

The apparatus illustrated is a modification of the arrangement shown in my prior patent, in so far as the use of the intermediate bushing and the inner and outer tables is concerned. As set forth in this prior patent, the outer table is provided with a circular series of clutch teeth 39 with which teeth formed on the side face of a clutch ring 40 are 35 slidably engaged for vertical movement. The under surface of this clutch ring 40 is likewise provided with teeth, indicated at 41, and these teeth overlie teeth formed in the upper surface of the intermediate bushing 45 between the recess 22 and the outer wall of this bushing. These teeth are cut to substantially the same depth as the rollers 24, and place the groove 22 in communication with the outer face of the bushing.

50 It will be obvious that by removing the inner table access may be very readily had to the rollers 14, so that they may be cleaned by an air jet, and it will also be obvious that a jet may be directed into the groove 22 and will act to force any foreign substance upon the rollers 24 through the openings provided between adjacent teeth of the bushing. The outer face of the intermediate bushing 15 is provided with circumferentially spaced sockets 42, which are engageable by a latch element 43 rectilinearly moveable through the wall 28 and having sealing engagement therewith at the point of its passage therethrough.

The ring 40, which as in the case of the 55 corresponding ring of my prior patent above

mentioned, is vertically shiftable so that it may be engaged with the outer table section alone, or with the outer table section and intermediate bushing, is at present shown as supported upon vertically shiftable standards 43a, the upper ends of which have T heads 44 provided with rollers 45 engaging the under surface of the outer portion of the ring. Each standard 43a operates within a guide 46 through which is directed a wedge 75 element 47, having connected thereto a shifting rod 48 passing through the wall 28 and having sealing engagement therewith, as at 49. These wedges, which are two in number are arranged at opposite sides of the table 80 structure and may be operated by a common lever connected thereto by links, as at 51. Shaft 30, at the point of its passage through the bearing is provided with seals 52, preventing loss of oil from the housing provided by 85 the structure just described, and accordingly, oil may be introduced to this housing, as at 53, and will be retained therein just as long as the inner table remains in position to complete the housing structure.

90 By employing in the inner table a sectional grief or drill stem drive bushing structure comprising the bushings 54, 55 and 56 such as illustrated in my Patent No. 1,771,391 granted July 29, 1930 on locking devices for internal bushings, a structure may be provided wherein all likelihood of any contamination of the contained oil by the mud and slush is avoided, and a readily manipulatable structure provided.

95 It will be obvious that this structure is capable of a very considerable range of change and modification without in any manner departing from the spirit of the invention, and I accordingly do not limit myself to 105 such specific structure except as hereinafter claimed.

I claim:

1. In rotary well drilling apparatus, a base 110 having a central opening defined by an up- 115 standing flange, an outer table rotatably supported on said base, an outer wall rising from said base the outer table having an annular recess formed in the peripheral wall thereof, a flexible packing ring secured to the upper end of the base wall and having its inner edge projecting into and having sealing engagement with the walls of said recess, means for driving the table including a shaft extending through and sealed to said wall the 120 table having a central opening, and a drill stem drive bushing support seated in the opening of the outer table and having sealing engagement with said flange to thereby combine with the outer table, the ring, said wall 125 and the base to produce an oil tight housing.

120 2. In rotary well drilling apparatus, a base having a central opening, bearings carried by said base, a table rotatably supported on said bearings, an outer wall rising from the base, 130

the outer table having a groove formed in the peripheral wall thereof, a packing ring secured to the upper end of the base wall and having its inner edge projecting into and having sealing engagement with the walls of said groove, means for driving the table including a shaft extending through said wall and sealed thereto, said table having a central opening, a drill stem drive bushing support seated in said central opening, and a sealing connection between the lower end of the outer wall of said drill stem drive bushing support and said base.

3. In rotary well drilling apparatus, a base having a central opening, bearings carried by said base, a table rotatably supported on said bearings, an outer wall rising from the base, the table having an annular recess formed in the peripheral wall thereof, a packing ring secured to the upper end of the base wall and having its inner edge projecting into and having sealing engagement with the walls of said recess, means for driving the table including a shaft extending through said wall and sealed thereto, said table having a central opening, a drill stem drive bushing support seated in said central opening, and a sealing connection between the lower end of the outer wall of said drill stem drive bushing support and said base, the upper surface of said table at the inner edge thereof having an upstanding rim, the drill stem drive bushing support having a flange overlying said rim and provided with a down-turned terminal, a laterally extending flange, and manually operable locking devices to engage the drill stem drive bushing support against vertical movement.

4. In rotary well drilling apparatus, a base having a central opening, bearings supported by the base and surrounding the opening, a bushing rotatably supported on said bearings, a table rotatably supported on the bushing, means shiftable to connect or disconnect said table and bushing, a wall arising from the base, the table having an annular recess formed in the peripheral wall thereof, a packing ring secured to the upper end of the base wall and having its inner edge projecting into and having sealing engagement with the walls of said recess, means for driving the table including a shaft extending through and sealed to said wall the bushing and table having central openings, a drill stem drive bushing support engaged in the openings of the table, the drill stem drive bushing support and the table having sealing engagement with each other, the bushing having sealing engagement with the base, and the drill stem drive bushing support having engagement with the bushing to prevent relative rotation thereof.

5. In rotary well drilling apparatus, a base having a central opening, bearings supported by the base and surrounding the opening, a

bushing rotatably supported on said bearings, a table rotatably supported on the bushing, means shiftable to connect or disconnect said table and bushing, a wall arising from the base, the outer table having an annular recess formed in the peripheral wall thereof, a packing ring secured to the upper end of the base wall and having its inner edge projecting into and having sealing engagement with the walls of said recess, means for driving the table including a shaft extending through and sealed to said wall, the bushing and table having central openings, a drill stem drive bushing support engaged in the openings of the table, bushing and base having sealing engagement with the base and engagement with the bushing preventing relative rotation thereof, the bearings of the base being accessible to a fluid pressure blast upon removal of said drill stem drive bushing support.

6. In a rotary well drilling apparatus, a base having a central opening, and an outer peripheral wall extending upward from the base, bearings carried by said base, a table rotatably supported on said bearings, the table having an annular recess formed in the peripheral wall thereof, a flexible packing ring secured to the base wall and having its inner end projecting into and having sealing engagement with the walls of said recess, means for driving the table including a shaft extending through said peripheral wall and sealed thereto, the table having a central opening, a drill stem drive bushing support removably seated in the central opening, the lower end of said drive bushing support and the base having sealed engagement with each other, the bearings of said base being thus accessible for cleansing by a fluid pressure jet upon removal of the drill stem drive bushing support.

7. In a rotary well drilling apparatus, a base having a central opening defined by an upstanding wall, an outer upstanding wall formed upon said base, bearings carried by said base, an annular internal bushing supported by said bearings, an annular table supported on said bearings and extending outward beyond the internal bushing, the peripheral face of the table being annularly recessed, a packing ring mounted upon the outer wall of the table and extending into said recess, a shaft extending through the outer wall and sealed therein and having a gear wheel engaging the outer table to rotate it, the upper face of the table being higher than the upper face of the wall on the base, and an inner table or drill stem drive bushing support disposed within the opening of the inner table and having a skirt extending downward through the opening in the internal bushing, and having sealed engagement with the upwardly extending central flange of the base, the upper end of said support being formed with an annular

flange extending outward over the upper face of the table.

8. In a rotary well drilling apparatus, a base having a central opening and an upstanding outer peripheral wall, a table rotatably supported upon the base inward of the outer wall and having a circumferential recess disposed in a horizontal plane and above the upper surface of the outer wall, and a combined hold-down and sealing ring of flexible material extending into and having sealing engagement with the upper and lower walls of the circumferential recess of the table and extending downward to the upper surface of the outer wall.

9. In a rotary well drilling apparatus, a base having a central opening, bearings carried by said base, an outer table rotatably supported upon said bearings, the outer table having an upwardly extending flange on its upper surface, a wall rising from the base and extending around said outer table, the outer table having a circumferential recess disposed above the upper surface of the outer wall, a combined hold down sealing ring extending into and having sealing engagement with the walls of the circumferential recess and extending outwardly over and engaging with the upper surface of the outer wall, means for driving the table including a shaft extending through said outer wall and sealed thereto, said outer table having a central opening, an inner table seated in said central opening and extending above the outer table and having a flange extending outward and downward over the flange on the outer table, there being a sealing connection between the lower end of the inner table and said base.

In testimony whereof I affix my signature.

LEE J. BLACK.

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