T. J. GRIFFIN.

ROTARY DRILLING APPARATUS.

APPLICATION FILED OCT. 5, 1911.

1,067,330. Patented July 15, 1913.

Fig. 1.

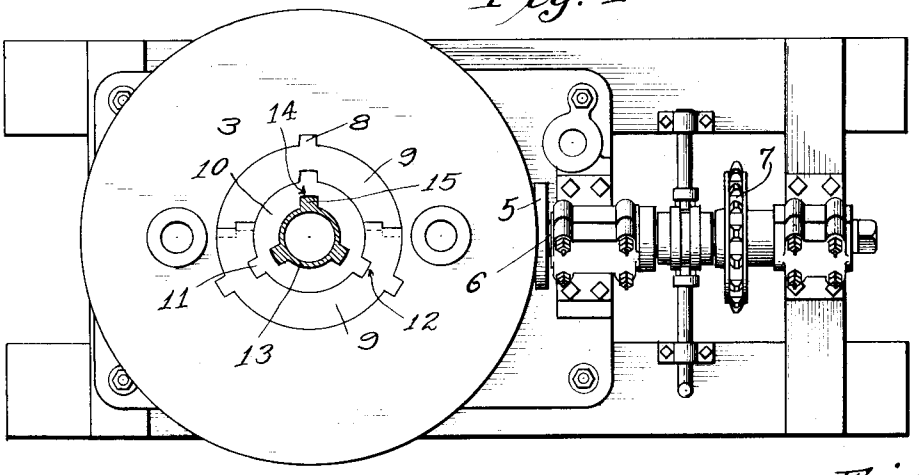


Fig. 2.

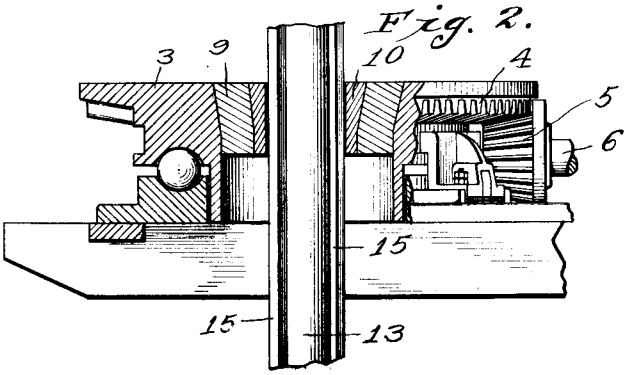


Fig. 5.

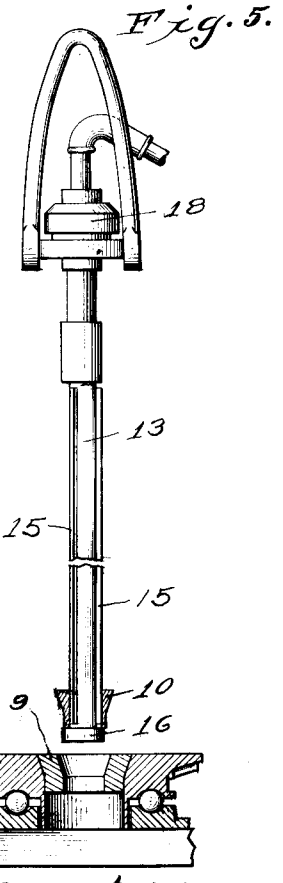


Fig. 4.

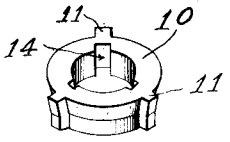
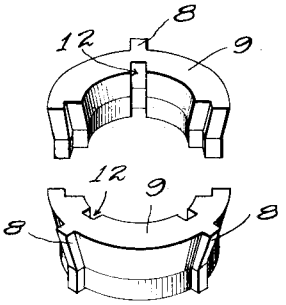


Fig. 3.



Witnesses:

I. D. Thornburgh.

Martha Langer.

Inventor:

Thomas J. Griffin.

By Lyon & Haenley his Attys

UNITED STATES PATENT OFFICE.

THOMAS J. GRIFFIN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-THIRD TO JOHN M. SANDS, RICHARD E. SMALL, AND RICHARD E. KLINE AND ONE-HALF TO EDWARD DOUBLE, ALL OF LOS ANGELES, CALIFORNIA.

ROTARY DRILLING APPARATUS.

1,067,330. Specification of Letters Patent. Patented July 15, 1913.

Application filed October 5, 1911. Serial No. 653,060.

To all whom it may concern:

Be it known that I, THOMAS J. GRIFFIN, a citizen of the United States, and a resident of Los Angeles, Los Angeles county, in the State of California, have invented a certain new and Improved Rotary Drilling Apparatus, of which the following is a specification.

This invention relates to means for drilling oil or water wells by what is commonly known as the hydraulic rotary method of drilling, in which a stream of water is forced down the drilling tube or pipe and washes the detritus up around the outside thereof.

The primary object of the invention is to provide a rotary drilling apparatus of such form, construction and interrelation of parts as to obviate all necessity for the use of the expensive and cumbersome gripping means heretofore commonly used with rotary drilling apparatus and to provide for a positive driving direct connection between the rotary table and the drilling tube or pipe, accomplishing both of these by the use of means adapted to rise freely with the drilling tube as the latter "jumps" in drilling and thereby obviating the binding of the drilling tube or pipe.

A further object of the invention is to provide a rotary table and a drilling stem for connection to the drilling pipe or tube, with means of the most durable and simple form for operatively connecting the drilling stem with the rotary table, so that the rotation of the table positively carries with it the drilling stem and at the same time permits free upward and downward motion of the drilling stem with respect to the table, the said means yielding against any tendency of the stem to bind in the rotary table.

Further objects of the invention will appear from the hereinafter contained detailed description and the accompanying drawings in which,

Figure 1 is a plan view in section of a rotary drilling apparatus embodying my invention. Fig. 2 is a vertical section thereof, portions being broken away to show the driving means by which the rotary table is operated. Fig. 3 is a perspective view of the two-part bushing or slips which I preferably employ as a means for adjusting the rotary table for the use with various diameters of pipe. Fig. 4 is a perspective view of the driving nut. Fig. 5 is a partial longitudinal section of the rotary table showing the drilling stem raised out of and above the table and showing the usual hydraulic swivel connected to the upper end of the drilling stem and showing the drilling nut at the lower end of the drilling stem and resting upon the usual collar 16 by means of which the drilling stem is connected to the drilling pipe or tube in the usual manner of connecting pipe together.

In the embodiment of my invention I have shown in the drawings the ordinary sills upon which the rotary table with its driving mechanism is mounted. The driving mechanism of the table may be of the ordinary or preferred construction and the rotary table 3 itself may be of the ordinary or any preferred construction. In the drawings I have shown the under-surfaces of the table provided with the usual ring gear 4, driven by a bevel drive 5 mounted upon a driving shaft 6, which shaft is driven by means of a sprocket 7, which in turn is connected to any suitable source of power (not shown) by means of a sprocket chain, not shown, or by any other suitable means. I have indicated in the drawings the usual ball race and bearings, but as the particular form of mounting of the rotary table forms no special part of my invention, I may use any of the ordinary or preferred forms. I do not deem it necessary to describe those portions of the mechanism in detail, as any mechanic skilled in the art can readily supply any preferred form thereof.

The center of the rotary table is provided with a perforation of any preferred diameter. The walls of this center perforation or opening of the rotary table are preferably of the tapering form shown in the drawings, the taper extending from the top of the table preferably to at least the center of the rotary table and thence the walls of the opening preferably extending vertically. The object of thus tapering the walls of this opening being to permit the use of tapering slips or split sleeve and tapering nut so that any wear is automatically taken up by downward movement of the slips or sleeve and nut in this central opening of the rotary table. Another advantage of utilizing the tapered form of central opening and the

tapered form of slips or bushing and nut is that the wedging of these parts in the opening of the table is thereby prevented and their more ready removal insured. The walls of this central opening of the rotary table are provided with a suitable number of grooves or channels, these grooves or channels forming key-ways into which the ribs or keys 8 of the bushing or slips 9 fit, thereby in effect making the slips or bushing 9 an integral part of the table and avoiding the necessity of adjusting means for locking the bushing to the table. Preferably the bushing 9 is not cut into two equal parts or slips. By making one of the parts or slips of the bushing 9 smaller than the other, more easy withdrawal of the slips or bushing from the rotary table is insured. The inner surfaces of each of the parts or slips comprising the split bushing 9, are provided with one or more suitable grooves or key-ways, the inner surface of the opening formed through the bushing 9 being also preferably provided with an upper inwardly and downwardly inclined bevel surface and straight vertical surface at the bottom of the bushing, so as to correspond to the inclination of the walls of the opening of the rotary table. The drilling nut 10 is preferably integral, its outer surface being beveled to correspond to the inner surfaces of the split bushing 9 and being provided with a number of keys or ribs 11, corresponding to the number of grooves or key-ways 12 in the split bushing. The center of the drilling nut 10 is perforated vertically to provide an opening corresponding to the diameter of the drilling stem 13 and the internal wall of the drilling nut is also provided with one or more grooves or key-ways 14 into which ribs or keys 15 on the drilling stem are adapted to fit. The drilling stem is preferably of slightly greater length than a length of well casing or pipe. With this construction it is obvious that the drilling stem is free to slide upward and downward through the nut 10 and at the same time the drilling stem is positively driven by the rotation of the rotary table 3.

At the lower end of the drilling stem 13, I provide a suitable collar 16 for connection with the drilling tube or pipe. This collar 16 is threaded on its interior to screw onto the end of the drilling stem and onto the drilling tube or pipe in the usual manner of connecting lengths of pipe, and when the drilling stem 13 is drawn up out of the rotary table, it pulls with it the nut 10, so that suitable elevators or mechanical devices to be used in connection with the drilling tube or pipe, may be engaged therewith as may be required for any operation. At the upper end of the drilling stem 13 is mounted the usual hydraulic swivel 18, the drilling stem 13 being hollow for the purpose of permitting water to pass down through the drilling stem 13 and the drilling tube or pipe to wash out the drillings or detritus at the bottom of the well. It is obvious that in this method of connecting the drilling tube or pipe with the rotary table, the entire top surface of the rotary table is unencumbered and no part of the apparatus utilized for connecting the drilling pipe to the rotary table extends thereabove.

It has been found that in the hydraulic rotary method of drilling where the usual ring-gripping means have been employed, the jumping of the line of drilling pipe in the hole has been such as to require the mounting of such ring-gripping means on posts inserted in the table and free to rise and fall with the rise and fall of the drilling pipe, thus permitting the gripping means to rise and fall freely with the pipe. The rotary movement of the gripping rings in such case has not been found sufficient to permit the free movement of the pipe up and down during such jumping, due to a tendency of the drilling pipe to thrust toward one side of the table. By the use of the inclined wall of the central opening in the table such wall extending upwardly and outwardly from near the lower surface of the table and the use in connection therewith of slips having their outer and inner faces correspondingly formed and the use of a drilling nut the outer surface of which also corresponds to such bevel, the tendency of the drilling pipe to bind as the jump takes place is obviated and the use of such slips and drilling nut permits of such jump without any coincident rise of the rotary table.

It is obvious that many modifications and changes may be made in the details of construction shown and described and I therefore do not confine myself to the construction shown and described.

What I claim is:

1. A rotary drilling apparatus comprising a rotary table, means for rotating the same, said table provided with a central opening the wall of which slopes upwardly and outwardly from near the under surface of said table, a drilling stem, a drilling nut insertible within said opening and having an outer surface corresponding to the wall of said central opening and engaging the walls thereof and through which said drilling stem passes and interlocking means carried by said stem and nut.

2. A rotary drilling apparatus comprising a rotary table, means for rotating the same, said table provided with a central opening the wall of which slopes upwardly and outwardly from near the under surface of said table; a drilling stem, a split bushing and a drilling nut interposed between said stem and table and interlocking the

same, said bushing and drilling nut provided with inner and outer surfaces corresponding to the inclination of the wall of said central opening.

3. A rotary drilling apparatus comprising a rotary table, means for rotating the same, said table provided with a central opening the wall of which is upwardly and outwardly inclined, a bushing having its surfaces inclined to correspond with the inclination of said wall, a drilling nut having its outer surface inclined to correspond with the surface of said bushing, a hollow drilling stem, the wall of said opening, said bushing, said drilling stem and drilling nut provided with interengaging tongue and groove means permitting longitudinal movement of said parts with respect to each other and interlocking the same to provide positively for simultaneous rotary movement.

4. A rotary drilling apparatus comprising a rotary table, means for rotating the same, said table provided with a central opening the wall of which slopes upwardly and outwardly from near the under surface of said table, a hollow drilling tube or stem, a drilling nut insertible within said opening and having an outer surface corresponding to the wall of said central opening for permitting free upward and downward movement of the drilling tube or stem, interlocking means between said stem and nut, a hydraulic swivel connected with the upper end of said drilling stem, and means for connecting the drilling pipe to the lower end of the drilling stem.

5. In a drilling apparatus, a rotary table, means for driving the table, a drilling stem passing through the table and slidable longitudinally, and means for imparting rotation from the table to the stem, said means comprising two parts having interengaging conical faces preventing lateral binding between the parts.

6. A rotary drilling apparatus comprising a rotary table having a central opening, means for rotating said table, a drilling nut, a drilling stem, interlocking means carried by said stem and nut and conically tapered means interlocking said nut and table and compensating for relative movement due to jumping of the stem.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 30th day of September, 1911.

THOMAS J. GRIFFIN.

In presence of—
FREDERICK S. LYON,
GLADYS RUSSELL.