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WELL BORING APPARATUS.

APPLICATION FILED MAR. 11, 1912.

1,064,270.

Patented June 10, 1913.

Fig. 1.

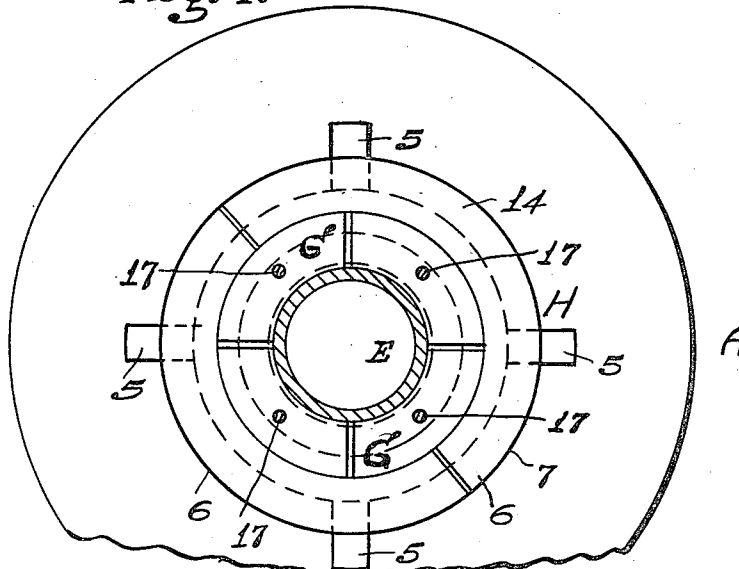


Fig. 2.

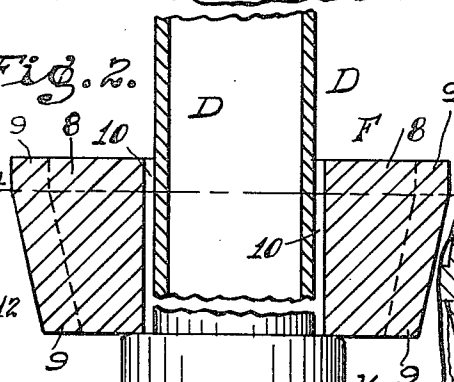


Fig. 3.

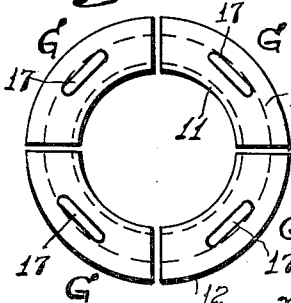
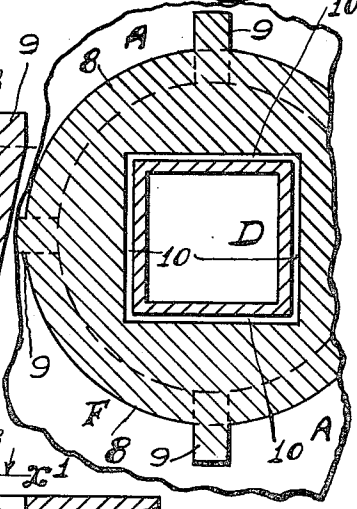


Fig. 4.



Witnesses:
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Arthur G. Willard,
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UNITED STATES PATENT OFFICE.

ARTHUR G. WILLARD, OF LOS ANGELES, AND CHARLES E. WILCOX, OF BAKERSFIELD, CALIFORNIA.

WELL-BORING APPARATUS.

1,064,270.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed March 11, 1912. Serial No. 682,977.

To all whom it may concern:

Be it known that we, ARTHUR G. WILLARD and CHARLES E. WILCOX, citizens of the United States, residing, respectively, at Los Angeles, in the county of Los Angeles and State of California, and at Bakersfield, in the county of Kern and State of California, have jointly invented new and useful Improvements in Well-Boring Apparatus, of which the following is a specification.

This invention relates to the art of well boring or well drilling, and more particularly to well borers such as are provided with rotary tops whereby the rotation of the boring tool and the string of pipe sections extending upwardly from the same to the rig is caused, such rig being employed in raising and lowering the boring tool and string in performing the operations incidental to drilling. In accordance with the practice in such boring operations, means are provided whereby the rotation of the rotary table is imparted to the string of pipe sections, and ultimately to the boring tool, through operative connections between the rotary table and the string. Such operative connections are in various ways coupled up with the rotary table and with the string; and when the string is elevated and broken up by removing successive pipe sections, or groups of sections, the operative connections have to be uncoupled from the rotary table and disposed of as the pipe string is broken up. In elevating the string, devices known as slips are employed for temporarily holding the string at any particular point of elevation. According to the present invention, we provide such means of operative connection between the rotary table and the string, and means of operative connection including slips between the string and the rotary table, that the latter may be substituted for the means of operative connection which rotate the string with the table, after the string has been elevated to the desired extent. We also provide a suitable member upon the string which acts to elevate the means of operative connection whereby power is transmitted to the string from the table, when the string is elevated. The latter means of operative connection and the elevated portions of the string above the table are removed, while the remaining portions of the string and the boring tool are held against descent by the other means

of operative connection. By so organizing our apparatus we are enabled to enhance the convenience and expedition with which elevating and holding the string and the boring tool is accomplished, and the string is disposed of section by section, or by groups of sections, subsequent to each period of elevation of the string and boring tool. All of the parts being properly formed and inter-related, we are enabled to do the work under consideration with the minimum number of necessary parts and members, and without sacrificing any of the necessary factors of positiveness or efficiency.

With the above general objects in view, together with those concerning relative superiority in simplicity, inexpensiveness, durability, facility in handling and general efficiency, the invention consists in the novel and useful provision, formation, construction, organization, combination, interrelation and combination of parts, members and features, all as hereinafter described, shown in the drawing, and finally pointed out in claims.

In the drawing:—Figure 1 is a horizontal sectional view taken through several of the parts and members utilized in carrying the invention into effect, and through a section of a string of pipe from the lower end of which the boring tool is suspended, upon the line X^1-X^1 , Fig. 2, parts being broken away and omitted for convenience of illustration; Fig. 2 is a vertical sectional view through well boring apparatus provided with the features of improvement constituting the invention, parts being in elevation; Fig. 3 is a top plan view of the slips shown in Fig. 2, in detached position; and, Fig. 4 is a transverse sectional view, partly broken away, taken upon the line X^4-X^4 , Fig. 2.

Arrows in connection with each section line designate the direction of vision.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawing, A designates a rotary table organized in accordance with general or preferred practice, and mounted for rotation upon a suitable frame B, C designating suggestively means for imparting rotation to the table.

D and E designate pipe sections of a string at the lower end of which the boring tool is suspended.

F designates means of operative connection for utilization between the table A and the string.

G designates slips which are utilized for holding the string at a given point of elevation.

H designates means of operative connection between the table A and the slips G, the slips being in effect parts of the operative connections H.

K designates a collar or joint between the pipe sections D and beneath the means of operative connection F whereby the latter means of operative connection are elevated when the string is elevated.

Although we do not desire to limit the scope of the invention to the specific provision, formation, construction and combination of parts, members and features shown and described, we will now set forth one preferred form of the same, which is as follows:—The pipe section E is shown of conventional cylindrical form, and the pipe section D is shown in part of conventional square form, merely as illustrations of variations in form of pipes which may be used in practising our invention. The string is raised and lowered and operated through the vertical bore or mouth *b* in the base or frame B above the well hole, by any suitable derrick or rig, not shown. The rotary table A, annular in form, is provided with a plurality of spaced downwardly ranging channels 5 in its inner wall 6, which wall has in the main an inverted truncated conical formation. The upper marginal portions 7 of such wall 6 are vertical. The means of operative connection F comprise a bushing 8 exactly fitting within the table A, and having tongues or flanges 9 fitting within the channels 5 in inter-locking relation. The bushing 8 is annular in form, having a central bore with square walls 10 loosely fitting the pipe section D, there being an appreciable looseness of fit between the same, as clearly shown in the drawing. The slips G, of which four are shown comprising segments of a total annular formation, comprise each a segmental body having a serrated inner surface portion 11 and an inwardly inclined outer surface portion 12, whereby each slip tapers downwardly in formation, all of the slips being in contact with the inner complementary tapering wall 13 of a split bushing 14 which is comprised within the means of operative connection H, the outer wall 15 of said bushing 14 having the form of an inverted truncated cone, to a plane slightly beneath the top of said bushing where it has a vertical edge portion fitting the vertical circular wall 7 of the table A. Each of the slips is provided with an eye or ring 17, sunk into its upper portion, whereby it may be conveniently handled. The collar K, applied for detach-

ably connecting the sections D and E, in the usual manner, is of greater diameter than the square bore of the bushing 8.

In utilizing the improvements constituting the invention, the bushing 8 is fitted into the table A with its flanges in the channels 5, the collar K being then beneath the table, and the slips G and bushing 14 being of course out of the positions shown in the drawing. By means of the bushing 8 and its flanges 9 and the channels 5, rotation may be imparted to the string through the grip of the walls 10 of the square bored bushing 8 upon the square section D, as the table is rotated by the means C. The looseness of fit between the bushing 8 and the section D will permit slight play or yielding relation which is advantageous under various conditions, as in reversing rotation, initiating rotation, and in fitting the bushing 8 to the section and removing it therefrom.

When the string is hoisted to such an extent that the collar K, which may be several sections below the section D, engages with and beneath the bushing 8, it raises the same to the position shown in the drawing, taking it out of the table A. The bushing 14 is then placed into the table A, resting upon the walls 6 thereof, and the slips are passed into the bore of the bushing 14, the downwardly and inwardly inclined conical outer walls of the slips fitting the corresponding inner walls of the bushing 14. Upon slightly lowering the string, the serrations 11 grip the section, as E, and hold the entire string at the point of elevation assumed. When the sections above the section E are removed, further hoisting may be performed, the slips and their bushing 14 again utilized to hold up the string by imparting the load strain thereof upon the table A and its base B, and further sections may be removed, and the operation continued as long as necessary. It is manifest that the bushing 14 is employed simply as an extension of the slips G, filling the space between the same and the table A.

It will be noted we have provided a formation and interrelation of parts and members which enables the boring and elevating operations to be performed with great convenience and by the utilization of a few peculiarly formed and adapted elements; and the facility and speed and positiveness of operation are therefore greatly enhanced, and much economy of time produced.

Having thus described our invention, we claim and desire to secure by Letters Patent:—

1. Improvements of the character disclosed comprising, in combination with a rotary table, a plurality of means of operative connection between the same and a string and each formed for separate appli-

cation to the table in substitution for the other, there being inter-locking means effective between one of said means of operative connection and the table whereby the string may be rotated upon rotation of the table.

2. Improvements of the character disclosed comprising, in combination with a rotary table, a plurality of means of operative connection between the same and a string and each formed for separate application to the table in substitution for the other, there being inter-locking means effective between one of said means of operative connection and the table whereby the string may be rotated upon rotation of the table; the other of said means of operative connection being formed and adapted to co-act through the table and with slips to sustain the weight of the string.

3. Improvements of the character disclosed comprising, in combination with a rotary table and a well boring string, a plurality of means of operative connection between the same and a string and each formed for separate application to the table in substitution for the other, there being inter-locking means effective between one of said means of operative connection and the table whereby the string may be rotated upon rotation of the table; means being provided upon the string for engaging and elevating the rotation imparting means of operative connection upon the elevation of the string.

4. Improvements of the character disclosed, comprising, in combination with a rotary table; a plurality of bushings formed to fit within the table each in substitution for the other, there being inter-locking means effective between one of said bushings and the table for rotating the string, the other of said bushings being formed and adapted to co-act with slips to engage with the string and sustain the weight of the same.

5. Improvements of the character disclosed, comprising, in combination with a rotary table; a plurality of bushings formed to fit within the table each in substitution for the other, there being inter-locking means effective between one of said bushings and the table for rotating the string, the other of said bushings being formed and adapted to co-act with slips to engage with the string and sustain the weight of the same; and said slips detachably fitting said last-named bushing.

6. In improvements of the character disclosed, the combination, with a rotary table and a well boring string; of a bushing fitting within the table and formed to surround and grip the string and impart rotation from the table thereto, and a member upon the string formed and disposed in position to engage with said bushing and withdraw the same from the table upon the elevation of the string.

7. In improvements of the character disclosed, the combination, with a rotary table and a well boring string; of a bushing fitting within the table and formed to surround and grip the string and impart rotation from the table thereto, and a member upon the string formed and disposed in position to engage with said bushing and withdraw the same from the table upon the elevation of the string; said bushing having a yielding fit with a section of the string.

8. In improvements of the character disclosed, the combination, with a rotary table and a well boring string; of a bushing fitting within the table and formed to surround and grip the string and impart rotation from the table thereto, and a member upon the string formed and disposed in position to engage with said bushing and withdraw the same from the table upon the elevation of the string; said bushing having a square bore; and a square section of the string fitting said bore.

9. In improvements of the character disclosed, the combination, with a rotary table and a well boring string; of a bushing fitting within the table and formed to surround and grip the string and impart rotation from the table thereto, and a member upon the string formed and disposed in position to engage with said bushing and withdraw the same from the table upon the elevation of the string; said bushing having a square bore; and a square section of the string loosely fitting said bore.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

ARTHUR G. WILLARD.
CHARLES E. WILCOX.

Witnesses as to Arthur G. Willard:

RAYMOND IVES BLAKESLEE,
CHARLES D. WARDEN.

Witnesses as to Charles E. Wilcox:

W. F. SEEMANN,
CHARLES D. WARDEN.

DISCLAIMER.

1,064,270.—*Arthur G. Willard*, Los Angeles, and *Charles E. Wilcox*, Bakersfield, Cal. WELL-BORING APPARATUS. Patent dated June 10, 1913. Disclaimer filed January 7, 1919, by the patentee, *Arthur G. Willard*, and the assignee of *Charles E. Wilcox*, *William W. Wilson*.

"Your petitioners therefore disclaim from claims one (1), two (2), three (3), four (4), and five (5) of said Letters Patent such manual use of the slips G, or bushing 14, of those combinations, as may be necessary or incident to assembling the combination covered by any of said claims one (1) to five (5) inclusive, particularly the combination disclosed in Figure 2 of the drawing of said Letters Patent."

Official Gazette, December 31, 1918.