W. W. WILSON.

WELL BORING APPARATUS.

APPLICATION FILED AUG. 17, 1914.

1,276,471. Patented Aug. 20, 1918.

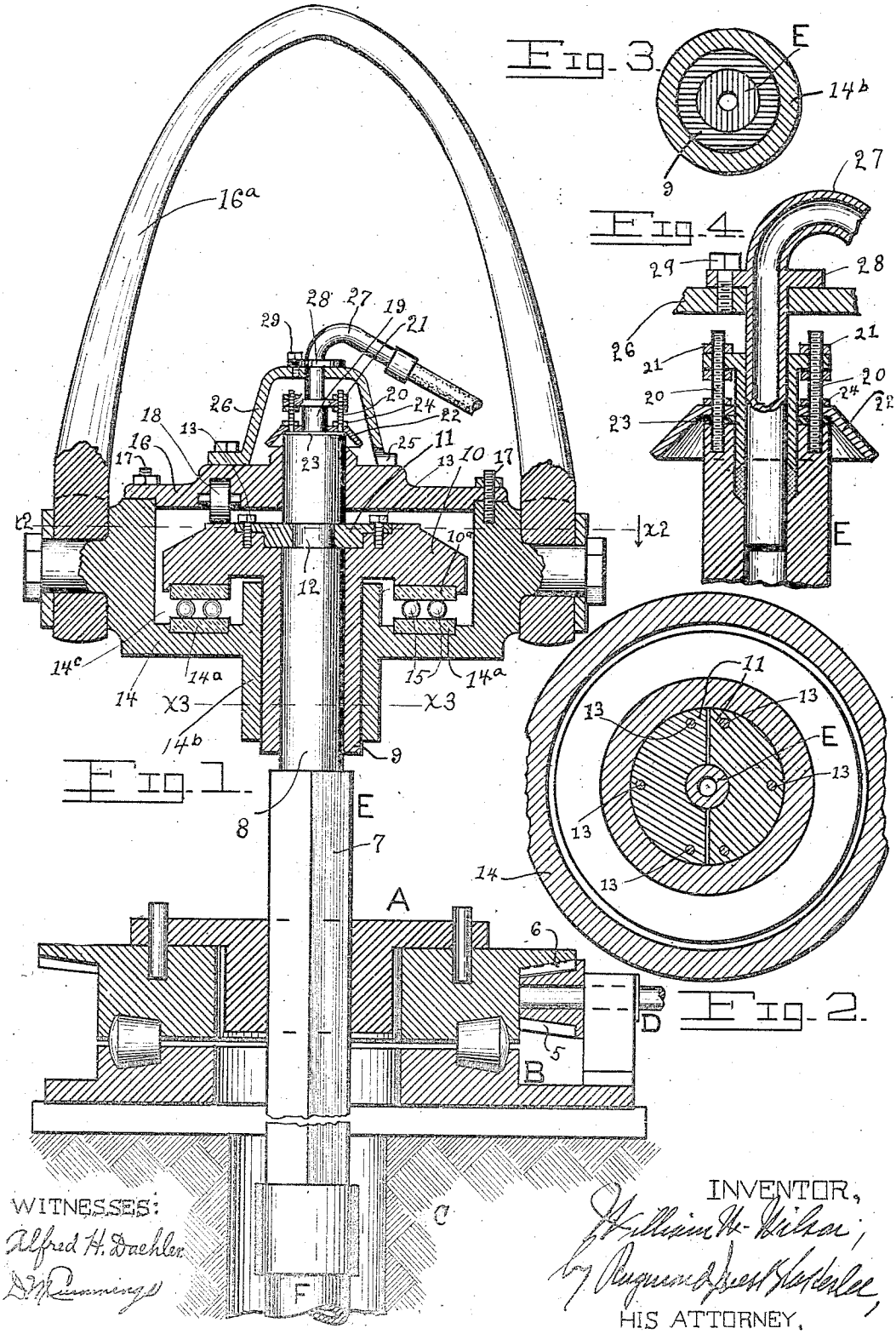


Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

WITNESSES:

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WELL-BORING APPARATUS.

1,276,471. Specification of Letters Patent. Patented Aug. 20, 1918.

Application filed August 17, 1914. Serial No. 857,092.

To all whom it may concern:

Be it known that I, WILLIAM W. WILSON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Well-Boring Apparatus, of which the following is a specification.

This invention relates to well boring apparatus, and more particularly to swivels, or hydraulic swivels, for rotary well drilling or boring apparatus whereby the rotary boring or drilling string is suspended during the rotary operation; and the invention has for its object to provide improvements in such swivels which will be superior in point of relative simplicity and inexpensiveness of construction, facility in assemblage, convenience in adjustment, elimination of added and otherwise unnecessary parts, durability, positiveness in operation, and compactness in form; and which will be generally superior in efficiency and serviceability.

Such swivels as now constructed in ordinary practice include a swivel stem which is jointed on to the boring string whereby the boring bit or tool is rotated in the well hole. Usually a plurality of collars or coupling links are employed to joint the swivel stem with the boring string. The possibility of disconnection at this point is a serious objection to this type of construction. In accordance with the present invention I employ means for applying the boring string or upper section or joint of the boring string directly to the swivel cross-head and attendant features, entirely eliminating the swivel stem as such. Certain other features are provided which, taken together, secure the advantages and features of improvement which are desiderata as above pointed out.

The invention consists in the novel and useful provision, formation, construction, combination, association and relative arrangement 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 vertical central sectional view of features of a rotary well boring apparatus, including the rotary top or table, boring stem and swivel;

Fig. 2 is a detail horizontal transverse sectional view of the same, taken upon the line x^2—x^2, Fig. 1, and looking in the direction of the appended arrows;

Fig. 3 is a similar view taken upon the line x^3—x^3, Fig. 1; and

Fig. 4 is an enlarged detail view, similar to Fig. 1, of features of construction pertinent to the upper end of the boring stem and adjacent parts of the swivel.

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

Referring with particularity to the drawing, A designates a rotary top or table, of conventional form, the same being mounted upon a base frame B which is installed at or surrounding the mouth of the well hole, the earth formation of the well hole being shown at C. D designates means for rotating the top of the table, from any suitable prime mover, the same means including a bevel pinion 5 meshing with a bevel annular rack 6. E designates the boring string stem which is rotated by the top or table A, being shown specifically as consisting of a square hollow body or vertical shaft 7 which fits into a similar squared opening central of the table or top A, the base frame B being provided with similar central opening through which the stem plays and within which it rotates, the joints or lengths of pipe, of which the upper one is shown at F, being connected on to the lower end of the stem E. The upper end of the said stem E is cylindrical in formation, as at 8, and is fitted into a sleeve 9 depending from or formed upon an annular bearing plate 10, such bearing plate being held to the cylindrical top portion 8 of the stem E by a two-piece annular thrust plate 11 which fits within a reduced portion or annular channel 12 in the upper portion of the stem portion 8, slightly below the extreme top thereof. This thrust plate in its two halves is secured to the bearing plate 10 detachably by bolts 13 or other suitable holding devices. The bearing plate is provided with a hardened wearing surface ring 10^a set into its lower face and between which and a similar surface ring 14^a are provided anti-friction devices, such as balls 15; the surface plate 14^a being set into the upper face of an annular swivel cross-head 14 which is provided with a vertical enlarged bearing or opening 14^b, central of which rotatively fits the sleeve 9 upon the bearing plate 10. The swivel cross-head is supported by the usual bail 16^a whereby the entire swivel with the drilling stem and drilling string may be suspended from the hook supplied for that purpose in

the rig. A cap plate 16 is applied to the annular swivel cross-head 14, serving as a closure for a chamber 14^c within the latter, and within which the bearing plate 10 rotates, the anti-friction devices 15 and wearing plates 10^a and 14^a also being accommodated within this chamber which may be filled with lubricant. This cap plate 16 is detachably held to the swivel cross-head by bolts and nuts 17 or the like, and anti-friction devices, such as rollers 18, may be applied between the cap plate and the bearing plate 10. The upper terminal portion of the round stem portion 8 is received rotatively within an opening centrally of the cap plate 16, and is provided at the top with a stuffing box or gland 19 adjustably carried by threaded posts 20 to which lock nuts 21 are applied; an annular upwardly dished shield 22 being carried by the posts 20 and fitted upon a gasket 23 upon the top of the stem, and held in position by lock nuts 24 upon the posts 20. This shield 22 serves to lead downwardly and outwardly any water escaping from the hollow stem E through the gland or stuffing box 19, such water being led outwardly through suitable openings 25 in a crown 26 secured to the closure plate 16 and housing the top end portion of the stem with the mounting of the gland 19, and also the shield 22. The goose neck 27 is passed through this crown 26 whereby the wash pipe may be led downwardly into the hollow stem E through the gland 19, such goose neck being held in place by a flange 28 upon the same which is bolted to the crown 26, as at 29.

The operation, method of use and advantages of the improvements in well boring apparatus constituting the invention will be readily understood from the foregoing description, taken in connection with the accompanying drawing and following statement:

The parts are assembled by placing the bearing plate 10 with its sleeve in position in the swivel cross-head, then inserting the halves of the thrust plate 11 in position entering the channel 12 at the top portion of the stem E, securing the same down by the bolts or the like 13, and then applying the closure plate 16. The anti-friction devices 15 are of course put into place prior to entering the bearing plate in the swivel cross-head. The goose neck 27 is then passed into position so that the wash pipe extends downwardly through the gland 19, and is secured in place by bolting the flange 28 down upon the crown 26.

Upon rotation of the table or top A, to cause the rotation of the frame E and the remaining portions of the boring string with the tool or bit, through the joints such as F, the round portion 8 of the stem E rotates freely with the bearing plate 10, the sleeve 9 having a rotative fit within the annular bushing 14^b upon the swivel cross-head. The upper end portion or terminal end portion of the stem E rotates freely within the opening provided therefor in the closure plate 16, the anti-friction devices 18 properly rotatively spacing the closure plate 16 and the stem E with its bearing plate 10. Also these anti-friction devices 18 serve to hold up the swivel cross-head and connected parts, together with closure plate 16, when the lifting action of the hook upon the bail 16^a is terminated.

The entire weight of the string, including the stem E is imparted to the swivel cross-head 14 directly through the stem and bearing plate 10, without the employment of any separate swivel stem or the means of connection for connecting the same with the string. The elimination of these threaded connections between the swivel and the boring string obviates the possibility of inadvertent disconnection during the rotation of the string or the joints thereof. The bearing plate 10 is applied directly to the string-rotating stem, and particular stress is laid upon this feature in differentiation from former practice in accordance with which a swivel stem and couplings has been uniformly employed. The provision of the bearing plate with the thrust plate constituting projecting shoulders upon the same entering the reduced portion of the stem, such bearing plate being provided intermediate of the ends of the stem also is a marked departure from the prior art.

The operation and use of the gland, and the apron or shield 22 will be manifest without further observation.

It is manifest that many changes and departures may be made from the specific disclosure of the foregoing description and the drawing, in practising the invention, without departing from a fair interpretation of the spirit of the invention.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. In rotary well-boring apparatus, a boring string, a swivel, and means uniting a portion of the string which receives the rotative drive and at a point intermediate of the ends thereof directly with one member of the swivel, whereby the string is rotatably supported by the swivel.

2. In rotary well-boring apparatus, a boring string member which receives the rotative drive, and a swivel; said swivel being provided with an inset thrust plate directly connected with said member of the boring string.

3. In rotary well-boring apparatus, a boring string, and a swivel; said swivel being provided with a bearing plate provided with means whereby the same is directly connected with a member of the boring string

which receives the rotative drive; said bearing plate being applied to said string member intermediate of the ends thereof.

4. In a rotary well boring apparatus, a boring string, and a swivel; said swivel being provided with a bearing plate directly connected with a member of the boring string; said bearing plate being applied to said string member intermediate of the ends thereof, said string member having a diminished portion receiving a detachable member upon the bearing plate and said detachable member whereby the bearing plate is directly connected with said member of the boring string.

5. In rotary well boring apparatus, a swivel comprising two relatively rotative members, a stem rotatively received at its upper end in one of said members, a gland adjustably mounted upon the upper end of the stem, and a wash pipe entering the stem through the gland; and an apron surrounding the gland for directing fluid passing the gland downwardly and outwardly.

6. In rotary well boring apparatus, a swivel comprising relatively rotative members, a stem rotatively received in one of said members, a gasket at the upper end of said stem, a gland within the gasket and mounted upon the stem; and an apron at the upper end of the stem for directing fluid escaping the gland downwardly and outwardly.

7. In rotary well boring apparatus, a swivel comprising relatively rotative members, a stem rotatively received in one of said members, a gasket at the upper end of said stem, a gland within the gasket and mounted upon the stem, and an apron at the upper end of the stem for directing fluid escaping the gland downwardly and outwardly; said member being provided with a crown inclosing the gland and apron and having an opening for escaping fluid.

8. In rotary well boring apparatus, a swivel comprising relatively rotative members, a stem rotatively received in one of said members, a gasket at the upper end of said stem, a gland within the gasket and mounted upon the stem, and an apron at the upper end of the stem for directing fluid escaping the gland downwardly and outwardly; said member being provided with a crown inclosing the gland and apron and having an opening for escaping fluid; in combination with a wash pipe entering the gland and held in position by said crown.

9. In rotary well boring apparatus, a swivel comprising two relatively rotative members, one of said members constituting the swivel cross-head, the other comprising an annular bearing plate rotatively mounted upon said swivel cross-head and provided with a sleeve fitting within an opening in the cross-head, a stem fitting within the sleeve, and detachable means applied to the bearing plate and entering a reduced portion in the stem to hold the stem and bearing plate together in rotative couple.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM W. WILSON.

Witnesses:
TYCIE FULLEN,
ALFRED H. DAEHLER.