

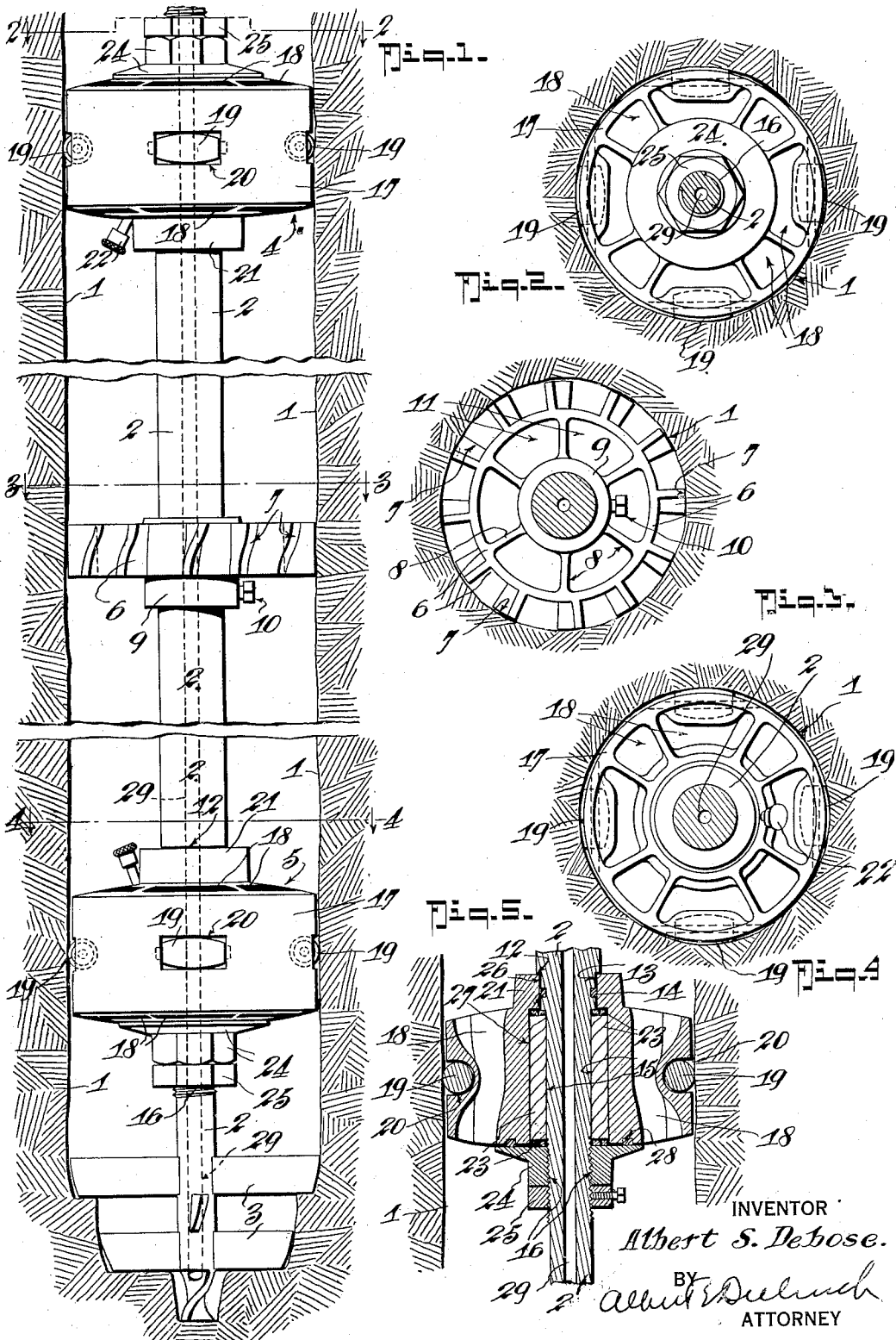
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ROTARY WELL DRILLING APPARATUS

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ROTARY WELL-DRILLING APPARATUS.

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The invention generally relates to rotary well drilling apparatus and primarily has for its object to provide certain new and useful improvements in such apparatus whereby an apparatus of particularly simple and inexpensive construction is provided which is efficient in operation and in which provision is made for assuring against lateral swinging or side deflection of the drill bit causing an oversize bore.

In its more detailed nature the invention resides in the provision of a drill bit proper which is rotatable to provide for the proper drilling of the well bore, and two or more anti-friction and centering bearing mechanisms carried by the bit in spaced relation whereby they will engage the side walls of the bore and prevent side deflection or lateral swinging of the said bit.

The invention further resides in the provision of one or more reamers carried by the drill bit between and held centered by the anti-friction and centering bearing mechanisms and designed to assure the provision of a smooth walled bore truly concentric to the axis of the drill bit.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, my invention consists in the novel details of construction, combination and arrangement of parts, all of which will be first fully described in the following detailed description, then be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic vertical longitudinal section of a well bore, the invention being shown in operation therein.

Figure 2 is a horizontal section taken on the line 2—2 on Figure 1.

Figure 3 is a horizontal section taken on the line 3—3 on Figure 1.

Figure 4 is a horizontal section taken on the line 4—4 on Figure 1.

Figure 5 is a central longitudinal section taken on the line 5—5 on Figure 4.

In the drawing, in which like numerals of reference indicate like parts in all of the figures, 1 generally designates a well bore formed by the longitudinal rotatable drill body 2 and the drill proper 3 carried at the lower end thereof. It should be understood that the drill bit may be of any type

desired which is suitable for the particular work to which it is put.

By reference to Figure 1 of the drawing, it will be observed that the drill body 2 has mounted thereon upper and lower bearing and centering members generally designated 4 and 5 and which serve to provide rotatable bearings for the drill body, and to engage the side walls of the bore being made in such manner as to prevent side swing or lateral deflection of the drill bit such as would cause an "out of round" and over-size well bore.

The reamer 6 may also be mounted on the drill body 2 intermediately of the said upper and lower bearing members 4 and 5, as shown in Figure 1 of the drawings, and by reason of the provision of the said reamer and the mounting of the same between the centering bearings additional means is provided for assuring the forming of a smooth, true well bore.

The reamer 6 may be of any acceptable type, the illustration made in this drawing being merely general in character, and in the illustration shown the same comprises a cutting edge 7 extended by narrow webs 8 from a center hub 9 secured as at 10 upon the body 2, the said webs providing for "cut-outs" or spaces 11 to permit passage of borings and fluid.

The drill body 2 is provided with a stop shoulder 12 associated with each centering and bearing member 4—5 and another bearing shoulder 13 which is grooved to receive a packing ring 14. The body 2 is further reduced at the point of placement of each centering and bearing member to provide a bearing portion 15 and also with threaded portions 16, the purpose for all of which will be explained later.

Each centering and anti-friction bearing member comprises a cylindrical body 17 provided with narrow web divided "cut-outs" 18 to provide for suitable passage of borings and fluid through the said members and roller bearings 19 mounted on the horizontal axes in cut-outs 20 provided in their peripheries, see Figures 1 and 6.

Each body 17 includes a hub extension at one end to fit over the associated bearing shoulder 13 and through which a suitable lubricant may be administered into the bearing interior of the said bearing body through the lubricating equipment 22.

A roller bearing cage 23 is mounted on each bearing portion 15 of the drill member 2 with one end thereof abutting the shoulder end of the bearing shoulder 13, each said cage being clamp-secured to the position stated by a facing nut 24 and a jamb nut 25.

Each bearing body 17 is provided with a bore 26 to fit the bearing shoulder 13 and a counterbore 27 to fit the bearing cage 23, and the face of the said bearing body toward the facing nut 24 is grooved to receive a packing ring 28. The rings 14 and 28 serve as lubricant retainers, see Figure 5.

The drill body 2 is axially bored at 29 to permit the administering into the drilled bore of water under pressure for the usual clean-out purposes.

In operation the drill body 2 is freely rotatable in the bearing and centering members 4 and 5 and by reason of the fact that the said bearing members engage the side walls of the bore, through the medium of their anti-friction rollers 19, at two relatively remote points the drill body is held in true axial alignment with the bore being formed and all tendencies of the drill body to swing laterally or to be deflected from its true course by hard substances are effectively overcome. In raising and lowering the drill bit the anti-friction rollers 19 assure against binding and facilitate such movement of the drill body.

By reason of constructing the bearing and centering members as illustrated in detail in Figure 5 of the drawing the said members are held against longitudinal movement on the drill body but the mounting of the said members on the body is such that the drill body is freely rotatable in the said bearing, as will be clear by reference to the said figure.

From the foregoing description, taken in connection with the accompanying drawing, it is thought that the novel details of construction, the manner of use and the advantages of my invention will be readily apparent to those skilled in the art to which it relates.

What I claim is:

1. In well drilling apparatus, a rotatable drill body having an enlarged collar, a bearing portion and a threaded portion forming an extension of said bearing portion; a roller bearing cage surrounding the bearing portion and abutting the collar at one end; a bearing and centering member comprising a cylindrical body having a bore to fit over the collar, a counterbore to fit the bearing cage and of a length to permit the said cage to project slightly at one end beyond the bearing body, thin web spaced openings to permit passage of borings, and being of a

diameter to closely but loosely fit the bore being made; means on the drill body to prevent longitudinal movement of the bearing body along the drill body in one direction, and a member adjustably mounted on the threaded portion to secure the bearing cage to position and prevent longitudinal movement of said bearing member in the other direction.

2. In well drilling apparatus, a rotatable drill body having an enlarged collar, a bearing portion and a threaded portion forming an extension of said bearing portion; a roller bearing cage surrounding the bearing portion and abutting the collar at one end; a bearing and centering member comprising a cylindrical body having a bore to fit over the collar, a counterbore to fit the bearing cage and of a length to permit the said cage to project slightly at one end beyond the bearing body, thin web spaced openings to permit passage of borings, and being of a diameter to closely but loosely fit the bore being made; means on the drill body to prevent longitudinal movement of the bearing body along the drill body in one direction, a member adjustably mounted on the threaded portion to secure the bearing cage to position and prevent longitudinal movement of said bearing member in the other direction, said collar and the portion of the bearing member opposing the adjustably mounted member being provided with grooves, lubricant retaining rings in the grooves, and means to administer lubricant through a portion of the bearing member into the counterbore thereof.

3. In well drilling apparatus, a rotatable drill body having an enlarged collar, a bearing portion and a threaded portion forming an extension of said bearing portion; a roller bearing cage surrounding the bearing portion and abutting the collar at one end; a bearing and centering member comprising a cylindrical body having a bore to fit over the collar, a counterbore to fit the bearing cage and of a length to permit the said cage to project slightly at one end beyond the bearing body through web spaced openings to permit passage of borings, and being of a diameter to closely but loosely fit the bore being made; means on the drill body to prevent longitudinal movement of the bearing body along the drill body in one direction, a member adjustably mounted on the threaded portion to secure the bearing cage to position and prevent longitudinal movement of said bearing member in the other direction, and anti-friction rollers mounted in the periphery of the bearing member on horizontal axes and adapted to engage the walls of the bore.

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