Feb. 4, 1930. J. C. STOKES 1,746,132

DRILL PIPE

Filed Aug. 1, 1925

Fig. 1.

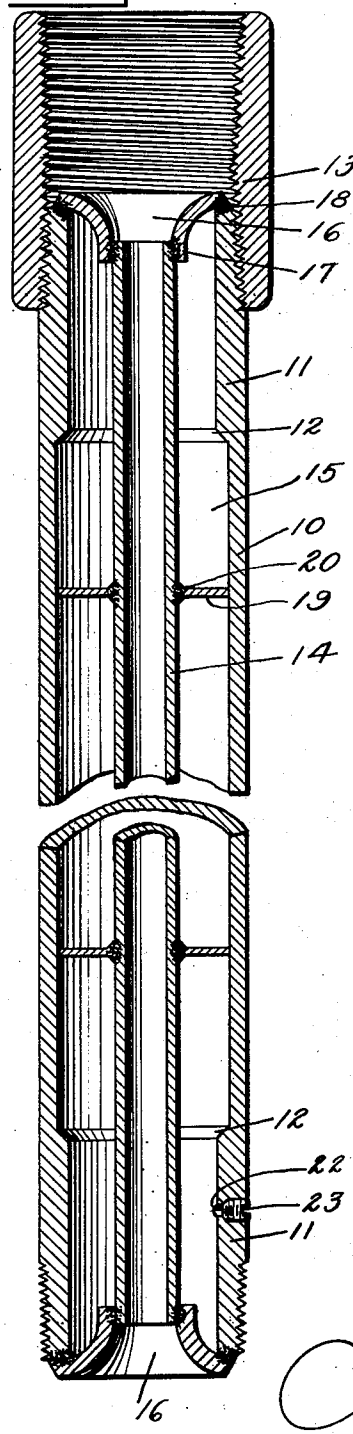


Fig. 2.

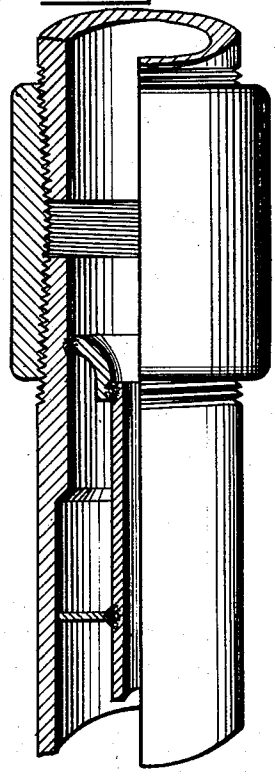
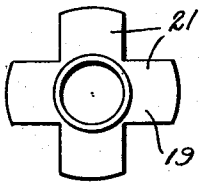


Fig. 3.



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DRILL PIPE

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The present invention relates to well drilling apparatus, and more particularly to the type used in hydraulic rotary systems of well drilling.

A disadvantage which has been encountered in the rotary system of well drilling is the weight of the drill stem which assumes troublesome proportions as the well is deepened, and which limits the operations and the depth of the well.

An object of the invention is to provide a drill stem of novel construction for use in hydraulic well drilling, and which is constructed with a sealed chamber for an air or other gas which by its buoyancy is adapted to at least partially carry the weight of the drill stem and thus materially reduce the effective weight thereof as the stem is built up and fed downwardly during the drilling operation.

Another object of the invention is to provide a drill stem section which is constructed with a sealed annular chamber and a central tube or pipe through which the mud from the usual pumps may be forced downwardly to the bit so that while the section is buoyant to a degree a little more than half of its weight, the usual mud feeding operations may be carried on in the same manner as at present with the conventional type of drill stem.

A further object of the invention is to provide a drill stem possessing the semi-buoyant characteristics of this invention and which may be coupled in the desired number to produce a drill stem of required length, the couplings being of the ordinary union or sleeve type so that the improved drill stem is adaptable for use with present day well drilling equipment.

A still further object of the invention is to provide a drill stem with an outer cylindrical part, or of other desired cross sectional contour, an inner pipe or conductor through which the mud or slush may be fed to the bit, sealing heads arranged between the outer part and the pipe, and improved braces carried about the pipe and constructed for introduction into the ends of the section, even when such ends are upset and reduced internally in diameter.

The above and various other objects and advantages of this invention will in part be described in and in part be understood from the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawing, wherein:

Fig. 1 is a longitudinal section taken through a drill stem section with a coupling sleeve on one end thereof, the drill stem section embodying the novel features of the present invention.

Fig. 2 is a fragmentary side elevation partly in section of the meeting ends of a pair of drill stem sections coupled together by a union or sleeve, and

Fig. 3 is a plan view of one of the braces for the mud pipe as applied to the same.

Referring to the drawing 10 designates the outer pipe or body of a drill stem section which is of any suitable length and configuration and which may have its opposite ends upset and thickened as at 11, the excess thickness being on the interior of the body 10 to reduce the diameter of the ends of the body as shown at 12. The exterior walls of the opposite ends of the section 10 are threaded and tapered in the usual manner to receive one end of a union or internally threaded sleeve 13, such as is commonly used for connecting adjacent drill stem sections together.

Each section 10 is provided with a slush or mud pipe 14 which extends throughout substantially the entire length of the section 10 and which preferably is located coaxially therewith. The mud pipe 14 is of considerably less diameter than that of the inner wall of the section 10 to provide between the two an annular space or chamber 15 which, according to the present invention is adapted to be sealed and to contain air or other fluid to render the section 10 partially buoyant when submerged.

Annular heads or plates 16 are arranged about the opposite end portions of the mud pipe 14 and are adapted to extend thereabout and be sealed against the hollow body portion 10. In the present instance each head

16 is of flaring or funnel shape and is welded at 17 to the adjacent end of the mud pipe 14, and is further welded at 18 to the adjacent end of the section 10. The head 16 is given this formation to augment the flow of the mud into and from the mud pipe 14 and to offer the least possible resistance between the adjacent drill stem sections. Of course the head 16 may be given any other suitable configuration and may be secured to the body 10 and pipe 14 in any other manner than as shown. Further, the head 16 may be arranged at any suitable point at the opposite end portions of the section 10 and mud pipe 14.

It will be noted that the head 16 does not interfere with the coupling sleeve 13 so that the sections 10 may be handled in the usual manner and in connection with the usual apparatus.

In order to brace the mud pipe 14 at suitable intervals throughout the length of the section 10, one or more braces 19 may be secured about the mud pipe 14 by welding at 20, or the like and the braces 19 are provided with a suitable number of bendable arms or projections 21 which extends radially from the brace and are adapted to engage the inner wall of section 10 to hold the pipe 14 from vibration. The arms 21 are bendable so that they may be bent sufficiently to pass the restricted portion 11 at the end of the section 10 when the mud pipe 14 is introduced in assembling the unit. The braces 19 are secured to the pipes 14, and the heads 16 are secured to their pipes 14 at one end before introduction into the outer pipes or body 10. The arms 21 may be easily strengthened by a bar or other suitable tool after the braces are in position.

The chamber or space 15 between the casing 10 and the mud pipe 14 may contain any light substance although air or other gas has been heretofore specifically mentioned. The substance may be of a nature to pack the space 15 and reinforce the mud pipe 14 to resist the internal high pressure therein tending to collapse the pipe 14. Under these conditions the mud pipe may be of light construction without sacrificing strength. The substance may of course be inserted into the space 15 before the heads 16 are welded and during the assembling of the parts.

The air, gas or other suitable fluid may be introduced into the buoyant chamber 15 through an opening 22 formed in one side of the body 10, preferably near one end where the wall is thickened as shown at 11. The opening 22 is normally closed by a screw plug 23 which is suitably sealed in the opening 22. The opening 22 also serves as a means for removing water of condensation or seepage accumulating in the chamber 15.

It is of course understood that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:

1. A drill stem section comprising a hollow body portion having upset ends with reduced interior diameters, a mud pipe arranged in the body portion, heads sealing the adjacent ends of the mud pipe and body portion to inclose a buoyant chamber between the mud pipe and body portion, and a brace carried upon the mud pipe and having radially extending arms adapted to engage the inner wall of the body portion, said arms being bendable for passage through the reduced ends of the body portion.

2. A drill stem section comprising an outer and an inner casing, said outer casing having reduced interior diameters at opposite ends thereof, a plurality of radially arranged braces carried by said inner casing, said braces being adapted to be flexed for passage thereof through the reduced interior diameter of said outer casing, and means for joining the opposite ends of said casings.

3. A drill stem section comprising a cylindrical housing having reduced interior diameters at opposite ends thereof, a mud pipe within said housing and in spaced relation thereto, bracing means mounted on said mud pipe, said bracing means being adapted to be flexed for passage through the reduced diameters of said housing, and a pair of dished collars adapted to be secured to the opposite ends of said housing and said mud pipe.

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