Sept. 22, 1931. W. K. CRILEY 1,824,466

ROTARY WELL DRILL CENTERING AND GUIDING DEVICE

Filed Jan. 23, 1929

Fig. 1.

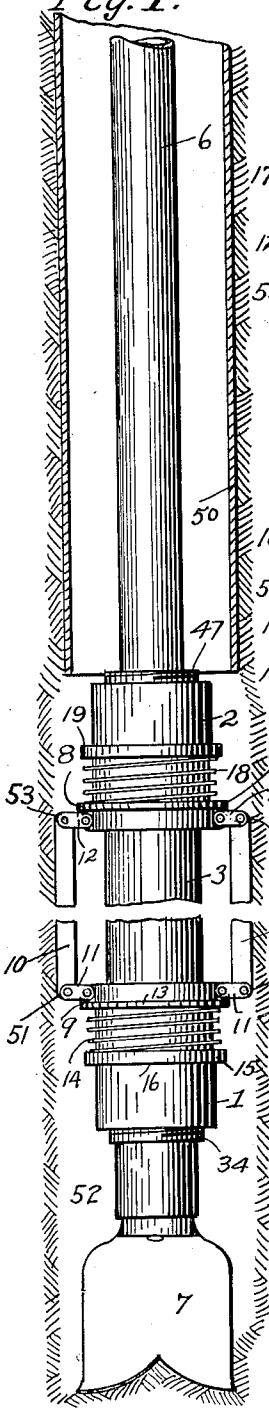


Fig. 2.

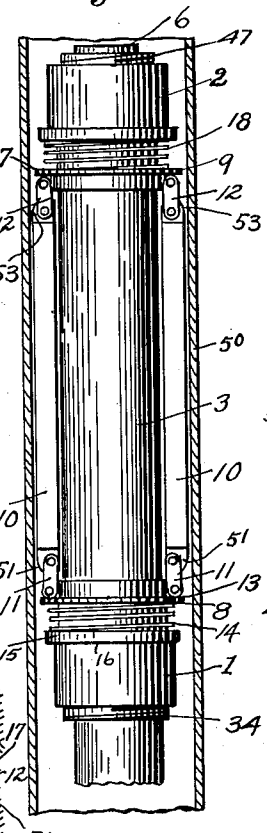


Fig. 3.

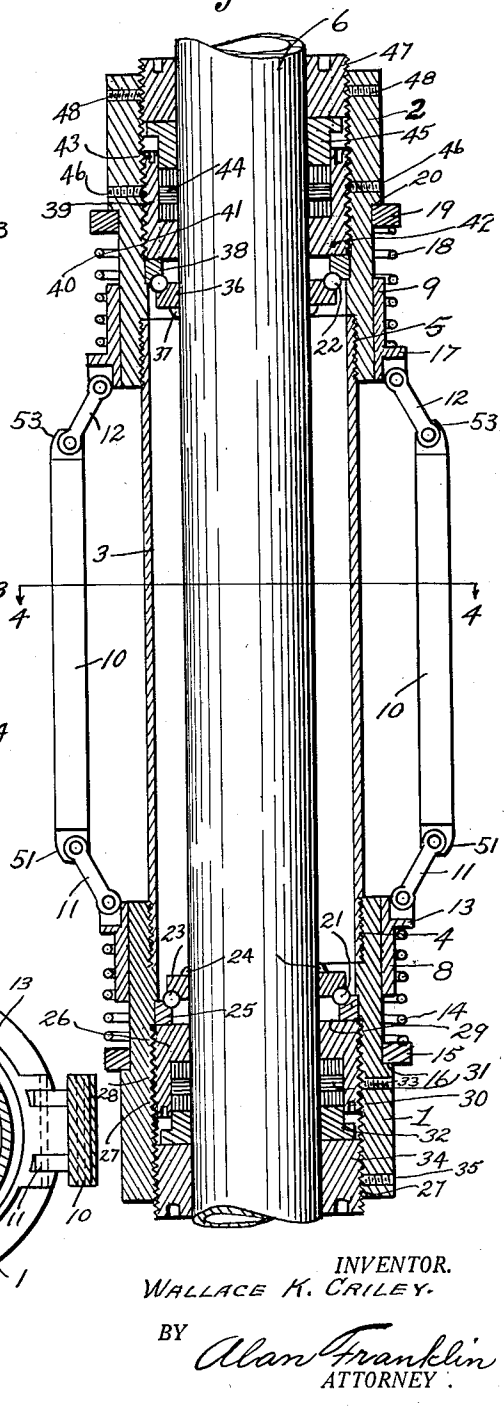
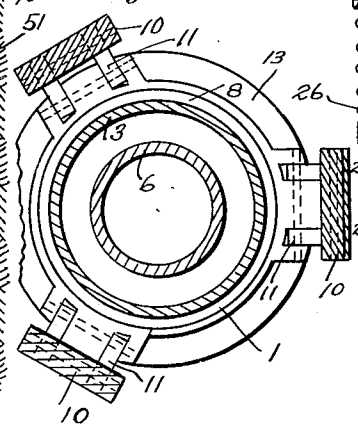


Fig. 4.



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UNITED STATES PATENT OFFICE

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ROTARY WELL DRILL CENTERING AND GUIDING DEVICE

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This invention relates to well drilling apparatus and more particularly to a rotary well drill centering and guiding device.

The general object of the invention is to provide a novel centering and guiding device for rotary well drills, which may be readily introduced through the well casing and expanded below the casing against the wall of the well to center and guide the drill for drilling a straight hole, or contracted and drawn up through the well casing when it is desired to withdraw the drill from the well.

A more particular object is to provide a simple, inexpensive and highly efficient centering and guiding device of the character stated for rotary well drills.

Other objects and advantages will appear hereinafter.

The invention is illustrated in the annexed drawings which form a part of this specification and in which,

Fig. 1 is an elevation of my invention shown applied to a well drill and shown expanded against the wall of a well below the well casing for centering and guiding the drill, the well being shown in longitudinal section.

Fig. 2 is an elevation of my centering and guiding device shown applied to a well drill and shown contracted within the well casing for introducing the device through the casing into the well below the casing or for withdrawing the device from the well through the casing.

Fig. 3 is a longitudinal section of my invention, applied to a well drill and shown expanded against the wall of the well below the well casing for centering and guiding the drill.

Fig. 4 is a horizontal section of my invention taken on line 4—4 of Fig. 3.

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

In the drawings 1 designates a lower housing, 2 an upper housing and 3 a tube which is screw seated at its lower end in the upper end of said lower housing, as at 4 and screw seated at its upper end in the lower end of said upper housing as at 5.

The stem 6 of a rotary well drill is extended through the housings 1 and 2 and the tube 3, with the drill bit 7 on the lower end of the stem located below the lower housing 1.

On the upper end of the lower housing 1 is slidably fitted a spring and toggle sleeve 8 while on the lower end of the housing 2 is slidably fitted a spring and toggle sleeve 9. A plurality of elongated shoes 10 are respectively connected at their lower ends, by toggles 11, to the sleeve 8 and at their upper ends, by toggles 12 to the sleeve 9. The sleeve 8 is formed with an annular external shoulder 13 and a spring 14 surrounds said sleeve with its upper end bearing against said shoulder, the lower end of said spring bearing against a spring seat ring 15 fitted on the housing 1 against an external annular shoulder 16 formed on said housing. The sleeve 9 is formed with an external annular shoulder 17 and a spring 18 surrounds said sleeve with its lower end bearing against said shoulder and its upper end bearing against a spring seat ring 19 fitted on the housing 2 against an annular external shoulder 20 formed on said housing.

My guide and centering device is mounted on the drill stem 6 by means of ball bearings 21 and 22 to permit rotation of the stem therein for drilling.

One cone 23 of the ball bearing 21 is fixed on the stem 6 against a shoulder 24 on the stem, which shoulder prevents upward movement of said cone on said stem, while the other cone 25 of said ball bearing is slidably mounted within the housing 1 to permit adjustment of the latter cone to take up wear in the bearing. A packing box and bearing adjuster 26 is screw seated in the lower portion of the housing 1 by means of interengaging threads 27 and 28, the thread 27 being cut in the inner surface of the housing 1 upwardly from the lower end of the housing and the thread 28 being cut in the outer surface of the packing box and bearing adjuster at the inner end thereof. The inner end 29 of the packing box and bearing adjuster closes the inner

end of the packing box and engages the ball bearing cone 25 for taking up wear in the bearing 21. The packing box and bearing adjuster is provided in its outer end with sockets 30 to receive a wrench for screwing the bearing adjuster in or out for adjusting the ball bearing 21. A packing 31 is held tightly around the drill stem 6 in the packing box against the inner closed end 29 of the box by means of a gland 32 extending into the box through the outer end thereof. The ball bearing cone 25 is locked in adjusted position by means of a set screw 33 seated in the housing 1 in engagement with the packing box and bearing adjuster 26. The gland 32 is adjustably held in position in the packing box by means of a nut 34 which engages the housing thread 27 and said nut may be adjustably locked in position by means of a set screw 35 seated in the lower end of the housing.

One cone 36 of the ball bearing 22 is fixed on the drill stem 6 against a shoulder 37 on the stem, which shoulder prevents downward movement of said cone on said stem, while the other cone 38 of said ball bearing is slidably mounted within the housing 2 to permit adjustment of the latter cone to take up wear in the bearing. A packing box and bearing adjuster 39 is screw seated in the upper portion of the housing 2 by means of interengaging threads 40 and 41, the thread 40 being cut in the inner surface of the housing 2 downwardly from the upper end of the housing, and the thread 41 being cut in the outer surface of the packing box and bearing adjuster at the inner end thereof. The inner end 42 of the packing box and bearing adjuster 39 closes the inner end of the packing box and engages the ball bearing cone 38 for taking up wear in the ball bearing 22. The packing box and bearing adjuster 39 is provided in its outer end with sockets 43 to receive a wrench for screwing the bearing adjuster in or out for adjusting the ball bearing 22. A packing 44 is held tightly around the drill stem 6 in the packing box against the inner closed end 42 of the box by means of a gland, 45 extending into the packing box through the upper end thereof. The ball bearing cone 38 is locked in adjusted position by means of a set screw 46 seated in the housing 2 in engagement with the packing box and bearing adjuster 39. The gland 45 is adjustably held in position in the packing box by means of a nut 47 which engages the housing thread 40 and said nut may be adjustably locked in position by means of a set screw 48 seated in the upper end of the housing 2.

The operation of my invention is as follows: Normally the shoes 10 are expanded outwardly by the springs 14 and 18 acting upon and forcing the toggle sleeves 8 and 9 toward each other. Upon introducing the lower end of the drill into the upper end of the well casing 50 the upper edge of the casing engages the lower cam ends 51 of the shoes 10 and forces the shoes inwardly within the casing against the tension of the springs 14 and 18 which resist the downward and upward movement of the toggle sleeves 8 and 9 respectively. My guide and centering device, when the shoes are thus contracted, will pass downwardly through the well casing into the well 52 below the lower end of the casing where the shoes will be expanded against the wall of the well under the influence of the springs 14 and 18 forcing the sleeves 8 and 9 toward each other. With the shoes 10 thus expanded against the wall of the well and held against rotation in the well my device is firmly mounted in the bottom of the well and the drill is centered and guided in the well by the bearings 21 and 22, so that the drill will drill a straight hole.

When it is desired to withdraw the drill from the well it is only necessary to pull upwardly on the drill, inasmuch as the upper cam ends 53 of the shoes 10 will engage the lower end of the well casing and contract the shoes inwardly within the casing against the tension of springs 14 and 18, whereby my centering and guiding device is allowed to pass upwardly through the casing.

The shoes 10 may be made of wood or other suitable material so that if they should be broken they may be easily cut up by the drill bit and drilled out of the well.

I do not limit my invention to the exact construction and arrangement herein disclosed because variations and modifications may be made therein without departing from the spirit of the invention.

I claim as my invention:

1. A centering and guiding device for well drills comprising a tube, a housing connected to each end of said tube, through which housing and tubes the lower end of the drill stem extends, bearings in said housings in which the drill stem is journaled, a packing box in the lower housing surrounding the drill stem below the bearing in said housing a packing box in the upper housing surrounding the drill stem above the bearing in said housing, and expansible and contractible means mounted on said housings for passing through the well casing when said means is contracted, and for engaging the wall of the well below the casing, when said means is expanded, for centering and guiding the drill stem and bit.

2. A centering and guiding device for well drills comprising a tube, a housing connected to each end of said tube, through which housings and tube the drill stem extends, a ball bearing in each of said housings whereby the drill stem is journaled in said housings, one cone of each ball bearing being fixed on the drill stem while the other cone of each bearing is adjustably mounted in one of said

housings, the lower housing being internally threaded below the ball bearing therein, a packing box and bearing adjuster threaded to engage the internal housing surrounding the drill stem and thread with the upper end of said bearing adjuster in engagement with the adjustable cone of the bearing of said lower housing, the upper housing being internally threaded above the ball bearing therein, a packing box and bearing adjuster surrounding the drill stem and threaded to engage the internal thread in said upper housing with the bearing adjuster in engagement with the adjustable cone of the ball bearing of said upper housing, and expansible and contractible means mounted on said housings for passing, when contracted, through the well casing and for engaging, when expanded, the wall of the well below said casing, for centering and guiding the drill stem and bit.

3. A centering and guiding device for well drills comprising a tube, a housing connected to each end of said tube, through which housing and tube the drill stem extends, a bearing in each housing in which the drill stem is journaled, a toggle sleeve slidably mounted on each of said housings, a plurality of shoes, toggles connecting the ends of said shoes to said toggle sleeves respectively, spring engaging rings fixed on said housings respectively, and springs surrounding and engaging said toggle sleeves respectively and engaging said rings on the housings respectively on which said sleeves are mounted, for expanding said shoes and for yieldingly allowing said shoes to be contracted.

4. A centering and guiding device for well drills comprising housings in which the drill stem is journaled, shoes mounted on said housings, spring means for normally expanding said shoes against the wall of the well for centering the drill stem in the well, and cams on said shoes for engaging the ends of the well casing for contracting said shoes so that said shoes may pass through the casing.

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