Feb. 24, 1953 P. M. HARBOUR 2,629,586

RATHOLE DRILLING APPARATUS

Filed Jan. 28, 1947 2 SHEETS--SHEET 1

Fig. 1

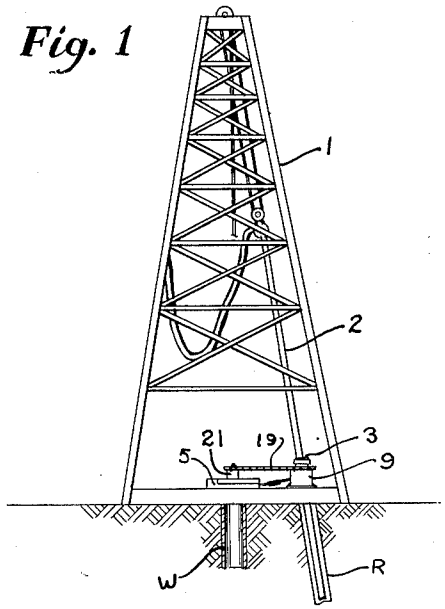
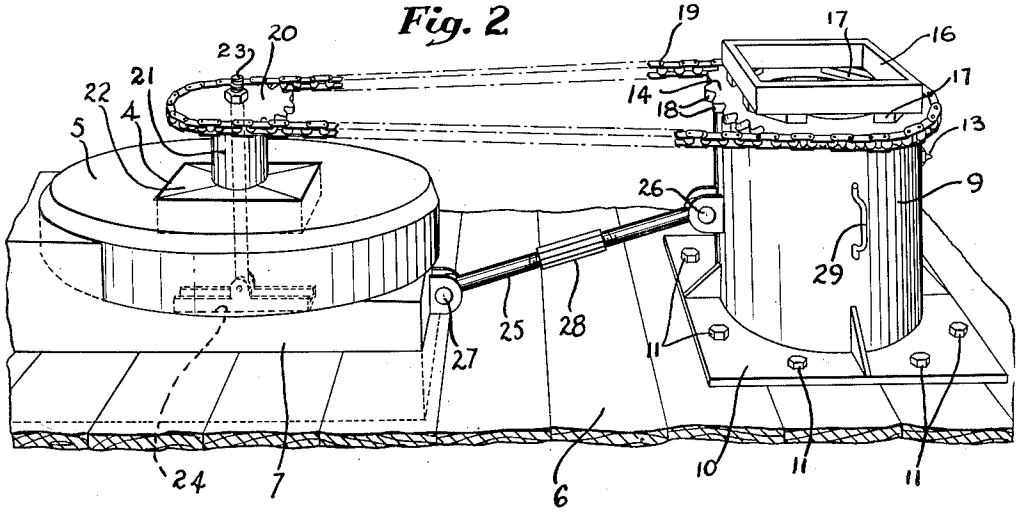


Fig. 2



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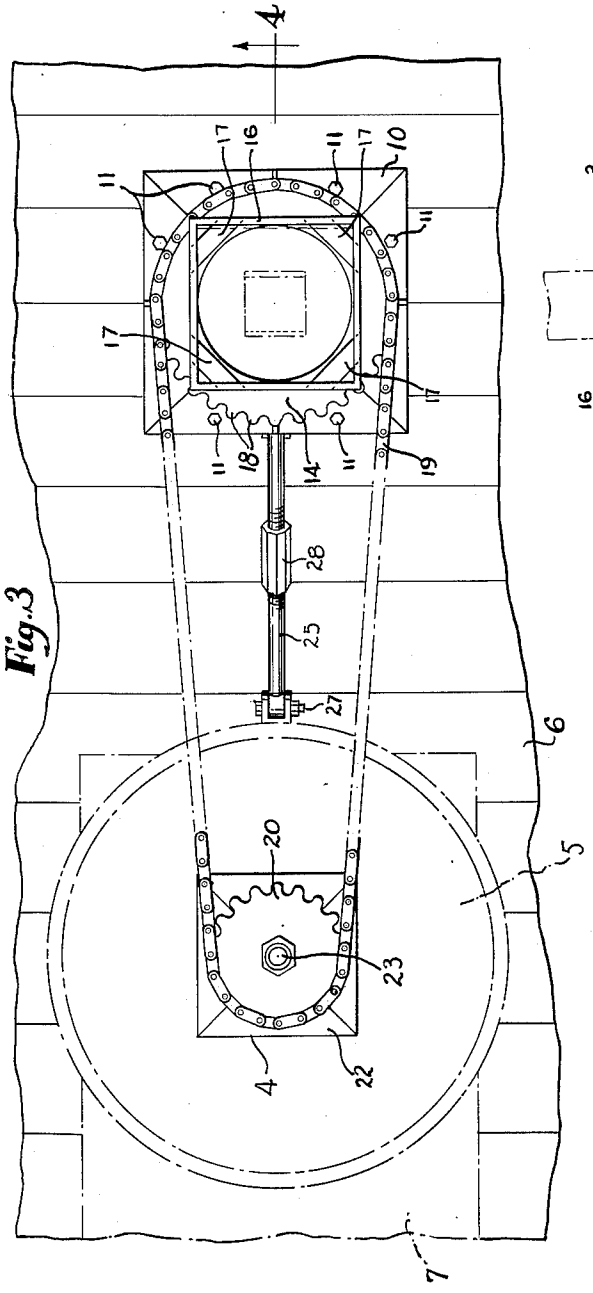

Fig. 3

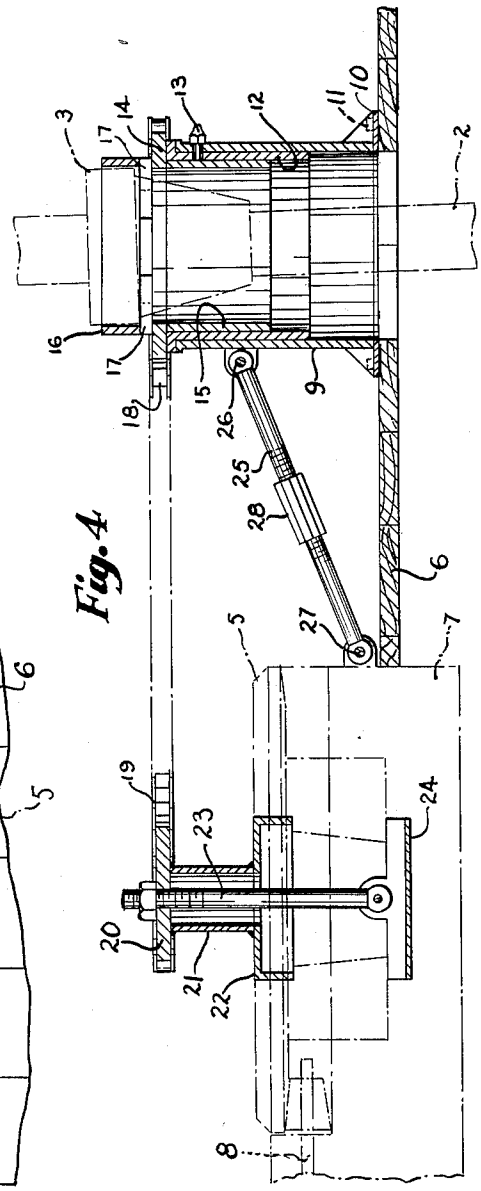

Fig. 4

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RATHOLE DRILLING APPARATUS

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2 Claims. (Cl. 255—19)

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This invention relates to improvements in rat-hole drilling apparatus of the character adapted for the drilling of a rat-hole to receive a kelly.

It is customary practice when preparing to drill a well by the rotary method to bore a slanting rat-hole in offset relation to the well hole, which is adapted to accommodate the kelly while the drill pipe is being withdrawn or run into the well or when additional joints of pipe are to be added thereto.

Such rat-hole drilling attachments for rotary drilling apparatus as have been proposed or used heretofore have involved special apparatus that would not readily accommodate the usual rotary table drive bushing normally attached to the kelly, and therefore, required special fittings to be applied to the kelly to operate the latter in drilling the rat-hole. This has resulted in a loss of time and additional equipment that is not desired.

The object of this invention is to improve the construction of apparatus for this purpose to enable the kelly to be shifted from its connection with the rotary table by the usual drive bushing, and to operate a rat-hole drilling attachment without the necessity for attaching a separate or special coupling thereto, thus eliminating the necessity for extra or special drive bushings and facilitating the drilling operation.

This object may be accomplished, according to one embodiment of the invention, by providing a rotary table unit on a bearing head fixed to the derrick floor and including a sprocket operatively connected with the rotary table of the rotary drilling apparatus to be driven therefrom. The sprocket which forms an auxiliary rotary table for the rat-hole drilling attachment has a socket or seat for interfitting connection with the drive bushing on the kelly, which drive bushing would engage the rotary table of the drilling apparatus during the well drilling operation, whereby the kelly may be shifted directly from the drilling of the well to the drilling of the rat-hole without the necessity for attachment of a special drive bushing thereto. The auxiliary attachment for forming the rat-hole will be operated directly from the rotary table through a driving connection therewith.

This form of the invention is illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation of a rotary drilling apparatus showing the well and rat-hole in section;

Fig. 2 is a perspective view of the rotary table and auxiliary rat-hole drilling attachment operatively connected together;

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Fig. 3 is a top plan view thereof; and

Fig. 4 is a longitudinal sectional view therethrough on the line 4—4 of Fig. 3.

The invention is shown as applied to the drilling of a rat-hole generally designated as R in Fig. 1, associated with a well generally designated as W. In drilling the well by the rotary method, a derrick 1 usually is employed to support a kelly 2, the lower end of which carries a drill bit that is operated to form the hole of the well, as well as to form the rat-hole.

In the operation of the kelly 2, a special drive bushing 3 mounted thereon is shaped to fit and normally engages in a seat 4 formed in a rotary table 5 journaled above the derrick floor 6 within a rotary machine generally indicated at 7. The rotary machine 7 normally projects through the derrick floor 6 and includes a drive shaft 8 connected therewith and with a suitable source of power for operating the rotary table 5.

In the drilling of the well W by the kelly 2, the latter usually projects through the rotary table 5 and is rotated by the engagement of the drive bushing 3 with the rotary table to form a bore in the earth. The kelly is fed downward through the rotary table gradually as the drilling progresses and when the hole has reached substantially the length of the kelly, the latter must be withdrawn and one or more lengths of pipe attached to the lower end thereof successively to form a drill stem. Furthermore, as the hole is started, a lining must be inserted therein at the surface to form the wall of the well. This requires withdrawal of the kelly from the well and it is adapted to be inserted in the rat-hole during these operations.

This rat-hole R may be drilled by the attachment according to this invention which is operated directly from the rotary table 5. This attachment includes a bearing head 9 upstanding from the derrick floor 6 and having a base plate 10 fixed to the head 9 and secured by fastenings 11 to the derrick floor. The bearing head 9 forms a bearing for an auxiliary table, and has a bearing lining 12 fixed therein as shown in Fig. 4. Provision is made for lubricating the inner surface of the lining 12 by a lubricant fitting 13.

Journaled upon the bearing head 9 is an auxiliary table generally indicated at 14. The auxiliary table 14 includes a depending skirt 15 that extends downwardly in the lining 12 and has a bearing fit therewith. A socket or seat 16 is mounted upon the auxiliary head 14 and is spaced therefrom by spacers 17. The socket 16 is substantially the same shape and slightly larger in size than the seat 4 in the rotary table 5, and is

adapted to receive the Kelly drive bushing 3 in a loose fit therewith to allow universal movement of the kelly to a limited extent with respect to the socket or seat 16 while providing a driving connection therewith. The Kelly drive bushing 3 is seated upon the spacers 17 which form supports therefor as will be evident from Figs. 3 and 4, these spacers extending diagonally across the corners of the socket or seat 16 for this purpose.

The auxiliary head 14 is provided with sprocket teeth 18 around the periphery thereof to receive thereon a sprocket chain 19 that extends around a sprocket wheel 20 on a sprocket drive bushing 21 that is disposed over the rotary table 5. The lower end of the sprocket drive bushing 21 is provided with a squared and tapered portion 22 shaped to fit the seat 4 of the Kelly drive bushing in the rotary table 5 to form a driving connection therewith.

A tie bolt 23 extends downward through the sprocket drive bushing 21 and the sprocket wheel 20 through the opening in the rotary table 5, carrying a spanner bar 24 pivoted to the lower end thereof and of sufficient length to extend across opposite sides of the opening in the rotary table to engage the under side of the table and to hold the bolt against upward movement relative thereto. The nut on the bolt is shown as engaging the sprocket wheel 20 so that upon tightening of this bolt the sprocket drive bushing 21 will be secured rigidly in driving relation to the table 5.

A tie bolt 25 is shown as extending between the bearing head 9 and the rotary machine 7. The tie bolt 25 is pivotally connected at 26 to ears on the bearing head 9 and similarly connected at 27 to ears on the rotary machine 7. This tie bolt is capable of lengthwise adjustment at 28 to any desired extent and when secured in place will hold the bearing head 9 in proper aligned relation with the rotary machine to insure of the driving connection with the auxiliary table. Handles are shown at 29 in Fig. 2 on opposite sides of the bearing head 9 to facilitate the movement of the latter and the handling thereof in moving from place to place.

In the operation of the rat-hole drilling attachment, it will be evident that the rat-hole R will be drilled by the operation of the kelly 2 directly from the rotary table 5 operated by the usual mechanism for driving the latter. The kelly is withdrawn from the rotary table with its drive bushing 3 remaining thereon. The bearing head 9 is set up beside the rotary table 5 and secured thereto by the tie bolt 25, and also secured to the floor 6 of the derrick. With the auxiliary table 14 in bearing relation with the head 9, and connected with the rotary table 5 through the sprocket chain 19 and the sprocket 20 on the sprocket bushing 21, the auxiliary attachment is ready for operation.

The kelly 2 is inserted through the bearing head 9 with the Kelly bushing 3 seated in the bushing seat 16 which forms a driving connection between the kelly and the auxiliary head 14. Then upon operation of the main rotary table 5, turning movement will be imparted to the auxiliary head 14 through the sprocket chain 19. This will drive the kelly 2 to bore the rat-hole R in the earth, and the drilling operation can continue to the desired extent, the kelly 2 feeding down gradually through the drive bushing 3 as the boring operation continues.

This enables the kelly 2 to be withdrawn directly from the rotary table 5 without the necessity for removing the Kelly drive bushing 3 therefrom and utilizing the latter as the driving connection with the auxiliary table 14 without requiring the application of a special drive bushing to the kelly. The auxiliary attachment which makes possible the drilling of the rat-hole directly from the operation of the rotary table 5 is very simple and inexpensive to construct and operate and yet facilitates the performance of the desired operation without additional equipment and with a minimum of time and labor.

While the invention has been illustrated and described in one embodiment, it is recognized that variations and changes may be made therein without departing from the invention except as specified in the claims.

I claim:

1. In a rotary drilling apparatus, the combination with a rotary table having a squared bushing seat formed therein, of a squared member adapted to seat within said squared bushing seat for rotation with said rotary table, a neck secured to and extending upward from said squared member, a sprocket secured on the upper end of said neck, an opening formed through said sprocket, said neck and said squared member, a screw threaded bolt extending through said sprocket, said neck and said squared member and adapted to engage said rotary table on the lower side thereof to hold same in binding relation thereto, an auxiliary rotary table spaced from said rotary table and having a base adapted to be secured to the floor of a derrick, an upstanding sleeve mounted on said base and having out-turned flanges, a second sleeve forming a bearing member positioned within said upstanding sleeve, a sprocket member mounted above said second mentioned sleeve and having a downwardly depending sleeve seated within said second sleeve and adapted to fit in bearing relation therewith and said sprocket adapted to fit thereon, upstanding wall members secured on top of said last mentioned sprocket and forming a squared socket in substantially axial alignment with said sleeve members, said squared socket being adapted to receive a squared Kelly bushing when a Kelly joint is positioned therethrough, with sufficient looseness between the outer periphery of said squared Kelly bushing and the inner confines of said squared socket so that said Kelly joint may be positioned therethrough at an angle divergent to the axis of said sleeves, a chain surrounding said sprockets and occupying a substantially horizontal plane so said sprocket of said auxiliary rotary table will be driven by said sprocket of said rotary table upon rotation of said rotary table.

2. In a rotary drilling apparatus the combination with a rotary table having a squared bushing seat formed therein, of an attachable drive member comprising a squared member adapted to seat in said bushing seat, an upstanding tubular neck mounted on and secured to said squared member, a sprocket having a vertical axis mounted on said tubular neck and secured thereto, screw means for attachably securing said sprocket, said neck, and said squared member in fixed relation in said squared seat in said rotary table, an auxiliary table comprising a base, an upstanding sleeve member having a vertical axis, a second sleeve mem-

ber received in said first mentioned sleeve and having a sprocket mounted thereon and coaxial with said first named sleeve, spacer members secured to said last mentioned sprocket on the upper face thereof, wall members mounted on said spacer members and upstanding therefrom to form a rectangular socket above said last mentioned sprocket which sprocket is coaxial with said sleeve, said last mentioned sprocket being horizontally aligned with said first mentioned sprocket, a chain surrounding said sprockets in driving relation, said rectangular socket being adapted to loosely receive a Kelly drive bushing in such manner that the Kelly joint passing therethrough may be driven at an angle so said Kelly drive bushing and said upstanding wall member will form a universal driving connection therebetween so as to permit a hole to be drilled at an angle divergent to the axis of said sleeves, and bracing means between said rotary table and said auxiliary table so as to maintain same a fixed distance apart while said sprocket on said rotary table drives said sprocket on said auxiliary table.

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