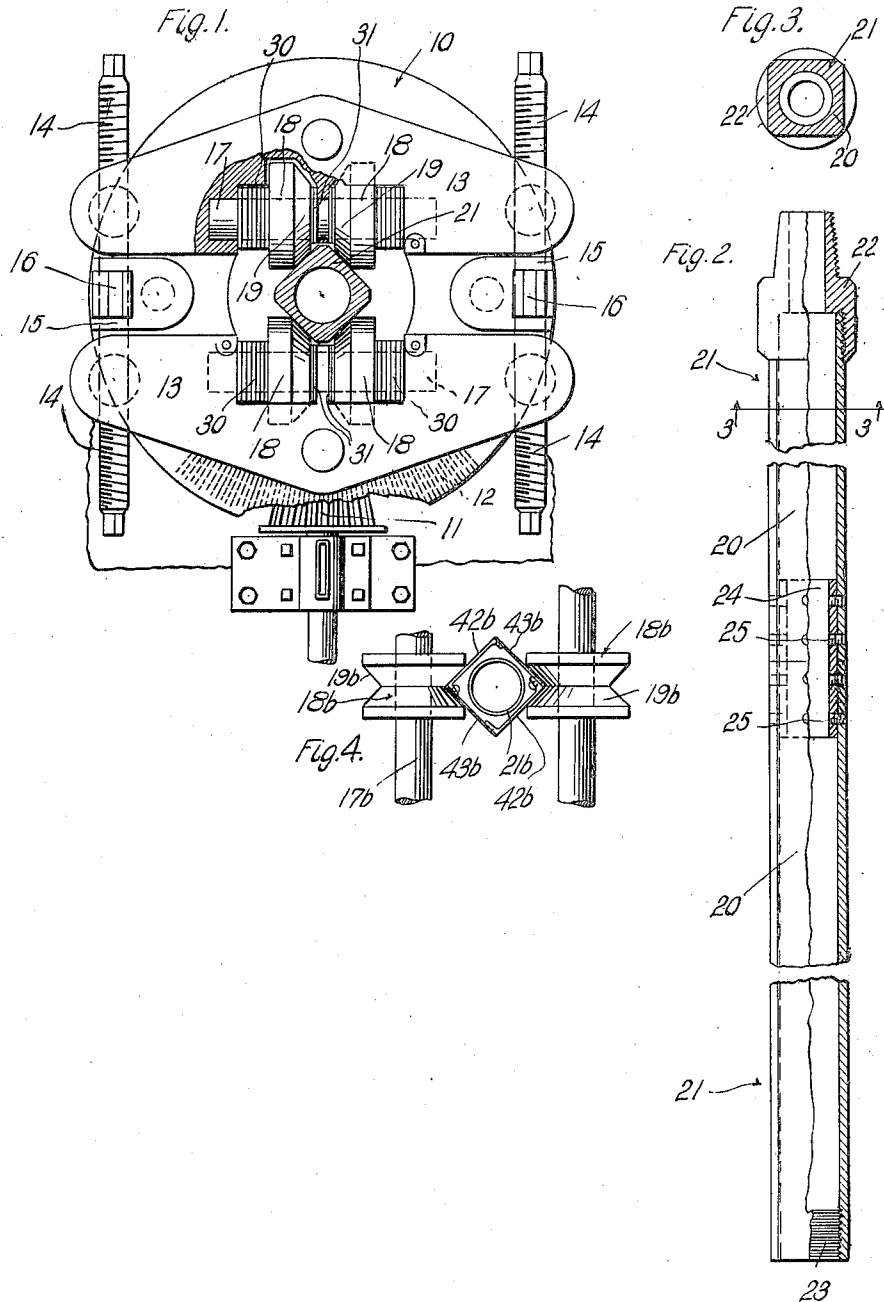


R. E. KLINE.
 ROTARY DRILLING RIG.
 APPLICATION FILED NOV. 26, 1912.

1,103,518.

Patented July 14, 1914.



Witnesses.
 Edward H. Pinkell
 Oscar Alex May.

Inventor,
 Richard E. Kline,
 by James T. Parker
 his Attorney.

UNITED STATES PATENT OFFICE.

RICHARD E. KLINE, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO OIL WELL SUPPLY COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION.

ROTARY DRILLING-RIG.

1,103,518.

Specification of Letters Patent.

Patented July 14, 1914.

Application filed November 26, 1912. Serial No. 733,631.

To all whom it may concern:

Be it known that I, RICHARD E. KLINE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Rotary Drilling-Rigs, of which the following is a specification.

This invention relates to improvements in rotary drilling rigs; and particularly to improvements in the means for causing rotation of the rotary drilling pipe.

In drilling wells by the rotary method a rotary drilling pipe with a drilling shoe is used, water being forced down through the pipe and allowed to flow upwardly and out of the well around the pipe. It is of great importance that the drilling pipe be kept in constant movement and that the flow of water be unimpeded, in order to keep the hole from falling in and setting tightly around the pipe.

My invention relates particularly to a means for causing constant rotation of the drilling pipe, while allowing free vertical motion thereof. Considerable trouble has been experienced in engaging the drilling pipe in such manner as to positively rotate it and also, at the same time, allow its free vertical movement. These operations my device is particularly adapted to perform; and its simplicity and efficiency will be thus understood from the following specification, taken in connection with the accompanying drawings, in which:

Figure 1 is a section plan of my improved combination. Fig. 2 is a longitudinal partial sectional view of my preferred form of drilling pipe. Fig. 3 is a section taken on line 3—3 of Fig. 2. Fig. 4 is a view showing a modified form of my combination.

In the drawings 10 designates a rotary table which may be of any preferred form, being in the typical case, rotated by a gear 11 meshing with gear teeth 12 on its under side. Suitably mounted upon the table 10 there are two jaws 13 which jaws are adjustable to and from each other by a preferred arrangement shown in Fig. 1. I prefer to use a right and left handed thread 14 mounted in a suitable bearing 15 and rotatable through means of a member 16 or any other suitable device. By such a means as

described, the jaws 13 may be made to touch each other or move apart from each other so that any sized pipe may be suitably gripped.

On each jaw 13 there is an axis or shaft 17 placed in a horizontal position, the shafts 17 on the two jaws 13 being parallel to each other. These shafts 17 carry the drill-stem or pipe engaging members or rollers 18 which rollers are adjustable to and from each other and are provided with surface elements which are adapted to coincide with the plane of the exterior surface of a drill-stem or pipe of a polygonal section, and said surface elements are at an oblique angle to the direction of adjustment of the rollers 18 in order to insure a close and effective grip on the pipe or drill stem without regard to the size of the cross section of the drill-stem or pipe. To effect this the adjustable rollers 18 are preferably provided with the beveled faces 19 which engage with the longitudinal flat faces 20 of the pipe 21. In my preferred form the pipe 21 is made with an approximately square exterior, with four flat faces 20 to be engaged by the beveled surfaces 19 of the rollers 18. The pipe 21 may be made in any manner and be of any type; it is provided at its upper end with a water connection 22 and at its lower end with a screw thread or other means 23 for attaching to the regular drill pipe which extends on down into the hole. The pipe 21 may be made up in several sections, the sections being connected together by an internal sleeve 24 over which the ends of the sections are fitted by shrinking and by suitable mechanical connections 25. In practice, I make the pipe 21 in four sections in order to make its total length about thirty six to thirty eight feet. This length amply provides for putting new joints of pipe below the pipe 21, the pipe 21 working downwardly through the rotating device through a distance approximately equal to its complete length. The length of pipe 21 also allows for "reaming" operations; in which operation the drill pipe is moved downwardly to ream out the hole below the outer well pipe or casing.

The rollers 18 are set in their relative positions on the shafts 17 by means of suitable spacers 30 and 31; so that the rollers may be

adjusted or moved together or apart from each other to accommodate pipe of different size. The rollers 18 may be either smaller or larger to obtain a good grip on small or large pipe and cause its positive rotation.

It will be seen that the contact of the beveled faces 19 of rollers 18 with the flat faces of the pipe gives a good solid driving contact through which the rotation of the pipe is assured. At the same time, there is no impedance to free vertical movement of the pipe, so that the pipe may be moved downwardly as the drilling progresses, and so that it may be jumped or jarred up and down to assist in the drilling, if necessary. The rollers 18 being laterally movable to and from each other on the shafts 17, and the jaws 13 which carry the parallel shafts 17 being also movable to and from each other, the interval between rollers 18, which rollers cause the drill stem to rotate with the table 10, can be readily adjusted to permit the free vertical movement of a drill stem of rectangular cross section and of any desired cross sectional area.

In the modification shown in Fig. 4 of the drawing, in which the pipe 21^b has an external squared configuration made up of two channels 42^b and two plates 43^b the squared exterior of the pipe is held between the rollers 18^b which have the beveled faces 19^b constituting gripping surfaces whereof the elements are at an oblique angle to the axis of the rollers.

It will be noted that the construction herein shown and described, while it is simple and consequently durable, does not demand the use of complicated gripping devices, or a drill-stem difficult and expensive to construct. It is nevertheless a construction in which the drill stem, while its feed and jumping is not impeded, is always held securely against lost motion and vibration and has imparted to it from the rotary table a

positive, powerful and effective drive or rotary movement.

Having described my invention, I claim.

1. In a rotary drilling machine, the combination of a plurality of gripping devices each having a drill-stem engaging surface the elements whereof are adapted to coincide with a portion of a polygonal drill-stem, said gripping devices being adjustable singly and in groups, the elements of the gripping surfaces being at an oblique angle to the directions of adjustment.

2. In a rotary drilling machine, the combination of a plurality of revoluble gripping surface the elements whereof are adapted to coincide with a portion of a polygonal drill-stem, said revoluble gripping devices being adjustable singly and in groups, the elements of the gripping surfaces being at an oblique angle to the directions of adjustment.

3. In a rotary drilling machine, the combination of a rotary table, a plurality of revoluble gripping devices each having a drill-stem engaging surface the elements whereof are adapted to coincide with a portion of a polygonal drill stem, said revoluble gripping devices arranged in groups which are adjustable to and from each other, the revoluble gripping devices of each group being adjustable to and from each other, and the elements of the gripping surfaces in each group being at an oblique angle to the direction of adjustment of the revoluble gripping devices which constitute said group.

In witness that I claim the foregoing I have hereunto subscribed my name this 20th day of November 1912.

RICHARD E. KLINE.

Witnesses:

R. A. SMITH,
ELWOOD H. BARKELEW.