Dec. 3, 1935. W. L. PEARCE 2,022,734

DRILL

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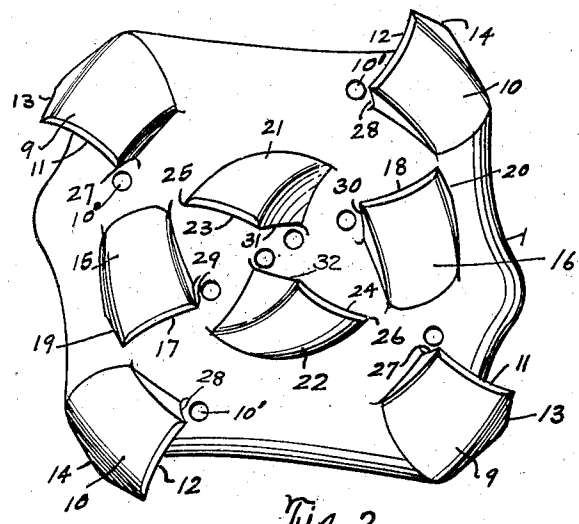


Fig. 2.

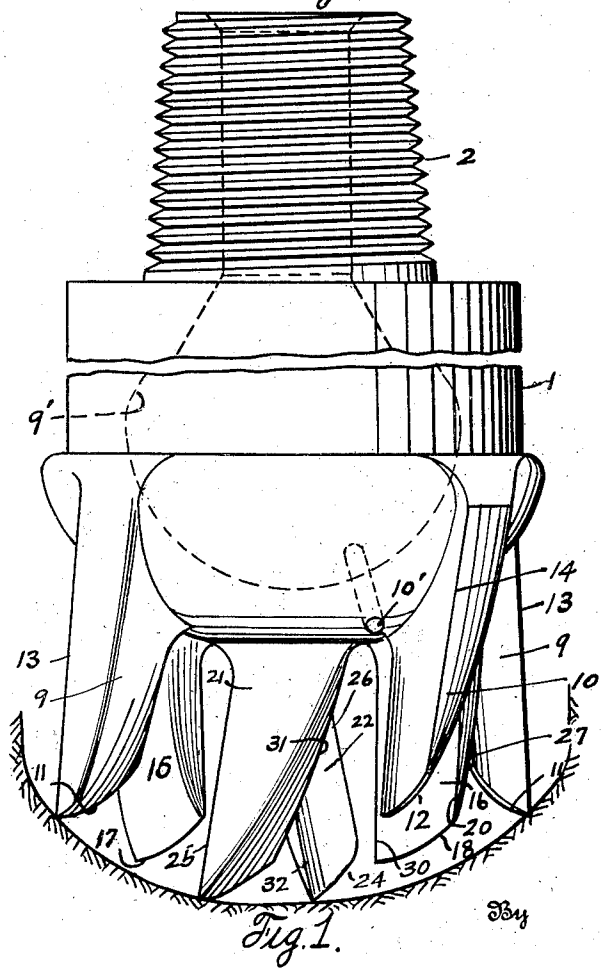


Fig. 1.

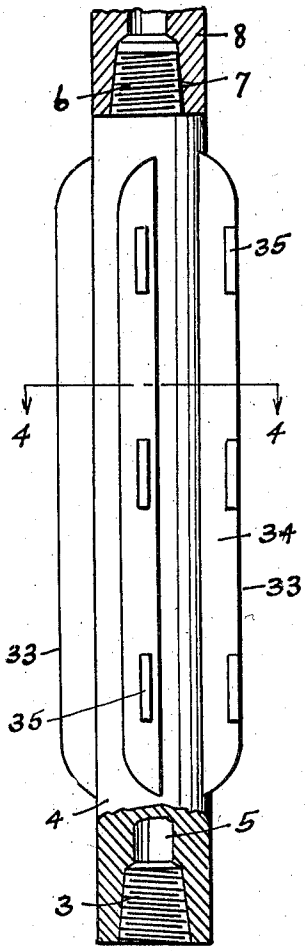


Fig. 3.

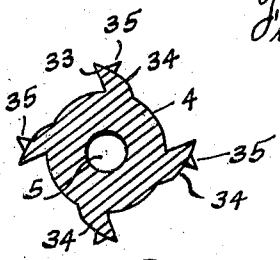


Fig. 4.

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DRILL

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5 Claims. (Cl. 255—73)

This invention relates to a drill.

An object of the invention is to provide a drill specially designed for drilling wells through either hard or soft formation, which will maintain the full diameter, or gauge, of the bore and which will both ream and trowel the walls of the bore to lessen the liability of caving.

Another object of the invention is to provide a drill having a gang of blades extending forwardly from the drill head and having cutting edges which will traverse the entire area of the bottom of the well bore to rapidly disintegrate the formation.

A further object is to provide a drill having a gang of forwardly extending blades whose forward ends are arranged to describe an approximately convex contour and have cutting edges which will gradually penetrate the formation the outer blades having approximately straight vertical edges which cut away the sides of the bore to maintain the gauge of the hole.

Another object is to provide a drill which includes a novel type of reamer arranged to not only ream but to trowel the side walls of the bore.

With the above and other objects in view, this invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawing, wherein:—

Figure 1 shows a side view of the drill.

Figure 2 shows a bottom end view.

Figure 3 shows a side view of the reamer partly in section, and

Figure 4 shows a cross sectional view thereof taken on the line 4—4 of Figure 3.

Referring now more particularly to the drawing wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the drill head which is preferably approximately cylindrical in form and whose lower end is of an oval, or approximately convex shape.

The upper end of the head is reduced forming an outwardly threaded shank 2 adapted to be screwed into the internally threaded box 3 at the lower end of the reamer 4. This reamer is tubular having the channel 5 therethrough for the drilling fluid and its upper end is formed with an outwardly threaded tapering pin 6 adapted to be screwed into the box 7 at the lower end of the conventional tubular drill stem 8. The head is of shell like formation having the enlarged chamber 9' therein and from this chamber the outlet ducts 10' lead and terminate in front of the cutting blades hereinafter referred to. This drilling fluid is forced down through the drill stem and reamer into the chamber 9 of the drill.

The lower end of the drill has a gang of cutting blades extending forwardly from the oval face thereof. There are the similar outer blades 9, 9 and the similarly outer blades 10, 10 arranged around the outer surface of the head. The blades 9 terminate at their lower ends in the sharp cutting edges 11, 11, said edges converging inwardly and upwardly and the lower ends of the blades 10, 10 terminate in sharp cutting edges 12, which diverge outwardly and upwardly. The outer margins of these blades 9, 10 are approximately vertical and are formed with the straight cutting edges 13, 13 and 14, 14 extending from the lower to the upper ends thereof.

There are the intermediate cutting blades 15, 16 arranged transversely opposite each other approximately midway between corresponding blades 9, 10 on each side as shown in Figure 2. The lower ends of these blades 15, 16, terminate in the respective cutting edges 17, 18 which are tapered in the same direction as more clearly shown in Figure 1 and these blades have the outer cutting edges 19, 20 extending from the upper to the lower ends thereof.

There are also the pilot or inner blades 21, 22 which are oppositely arranged and are staggered with respect to the intermediate blades 15, 16. The lower ends of these blades terminate in the cutting edges 23, 24 which are tapered in the same direction as also shown in Figure 1 and the outer margins of these blades 21, 22, have the cutting edges 25, 26 extending from the upper to the lower end thereof.

The inner faces of all the blades are concaved transversely as more clearly shown in Figure 2.

The inner margins of the blades 9, 9, having the lengthwise cutting edges 27, 27 from the upper to the lower ends thereof and the inner margins of the blades 10, 10 have the cutting edges 28 extending from the upper to the lower end thereof; similarly the inner margins of the blades 15, 16 have the cutting edges 29, 30 and the inner margins of the blades 21, 22 have the cutting edges 31, 32 from the upper to the lower ends thereof. These marginal cutting edges of the blades are forwardly pitched and the outer cutting edges of the respective blades are advanced beyond the inner cutting edges so as to give a slight twist to each cutting blade.

As above stated, the cutting edges at the lower ends of the blades 9, 9, 16, and 22, are tapered

the taper being outwardly so as to form cutting points at the outer margins of these blades, at their lower ends and in like manner the cutting edges of the blades 10, 10, 15, and 21 are tapered inwardly so as to form cutting points at the inner margins of these blades at their lower ends. These cutting points will describe different paths around the bottom of the core as the drill rotates to that the cutting points of some of the blades will not track the cutting points of other of said blades, so that the entire area of the bottom of the bore will be effectively disintegrated by the drill. The flushing fluid will be ejected out diagonally across the forward faces of the respective blades so as to keep the blades washed clean and to prevent the clogging of material on said blades.

These cutting points are disposed in such manner as to describe, approximately, a convex contour and they will form the lower end of the bore into a concaved contour and the outer cutting edges 13, 14, will also ream the bore and will keep it of the uniform inside diameter as the bore is deepened and this particular shape and arrangement of the blades will also assist in keeping the bore straight.

The main body of the reamer is approximately cylindrical and it has the external, longitudinal rearwardly curved blades 33 thereon, whose forward faces 34 are rearwardly curved so as to form trowels and these curved forward faces have the longitudinal reaming cutters 35 spaced apart therealong which ream out the bore. Preferably there are four of the blades 33 and as shown, there are three reaming cutters on each blade so that as the reamer descends as the bore is deepened, the reaming cutters 35 will follow a spiralled downward course and will ream the entire area of the bore as drilling progresses.

The drawings and description discloses what is now considered to be a preferred form of the invention by way of illustration only, while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. In a boring tool, a reamer comprising a body having a longitudinal passageway therethrough, external longitudinal rearwardly curved blades on the body and reaming cutters spaced apart along the forward faces of the blades.

2. A reamer comprising an approximately cylindrical body having a longitudinal passageway therethrough, external longitudinal blades thereon, whose forward faces are rearwardly curved to form trowels, and reaming blades spaced apart along the forwardly curved faces.

3. In a boring tool, a reamer comprising an approximately cylindrical body having a longitudinal passageway therethrough, external longitudinal blades thereon, whose forward faces are rearwardly curved to form trowels, and reaming blades spaced apart along the rearwardly curved faces, said reaming blades having forwardly directed cutting edges.

4. A reamer comprising a body having a longitudinal passageway therethrough, longitudinal blades on the body spaced apart therearound, reaming cutters on the forward faces of the blades spaced apart longitudinally along said blades and having forwardly directed cutting edges.

5. A reamer comprising a body, means at the upper end of the body for connecting the same to an operating string of pipe, longitudinal blades on the body spaced apart therearound, reaming cutters on the forward faces of the blades spaced apart longitudinally along said blades and having forwardly directed cutting edges.

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