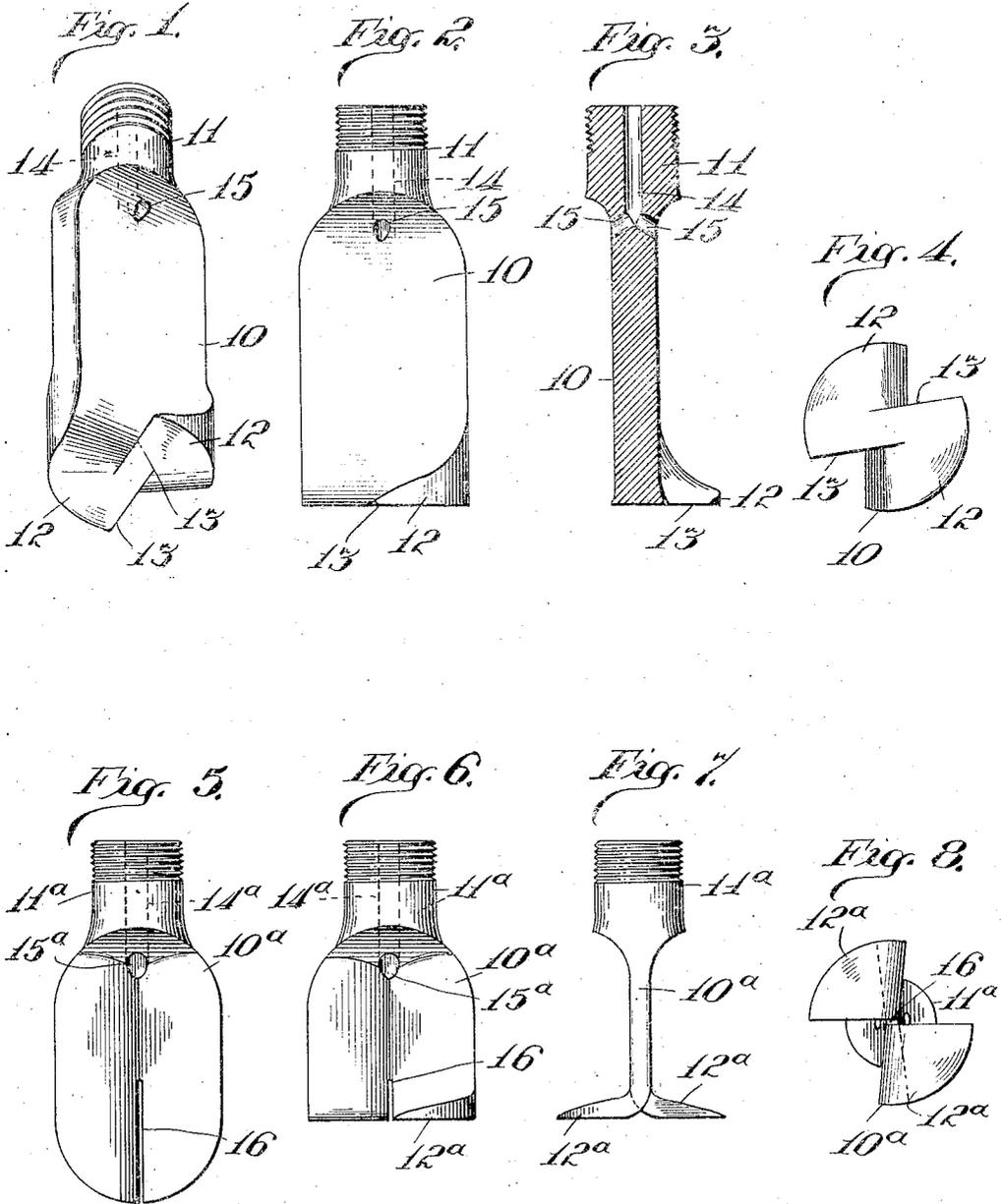


I. FEITEL.
 ROTARY BORING DRILL,
 APPLICATION FILED OCT. 23, 1918.

1,362,247.

Patented Dec. 14, 1920.



Witness
 Milton Lenoir

Inventor
 Isaac Feitel.
 by Adams Jackson
 Attorneys

UNITED STATES PATENT OFFICE.

ISAAC FEITEL, OF NEW ORLEANS, LOUISIANA, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS, AND, BY JUDICIAL ORDER, ONE-FOURTH TO HELEN GRADWOHL FEITEL, WIDOW, AND ONE-FOURTH TO JESSIE FEITEL JAUBERT, IRVIN FEITEL, ETHEL FEITEL HEILPERN, CHESTER FEITEL, AND GLADYS FEITEL, HEIRS OF SAID ISAAC FEITEL, DECEASED.

ROTARY BORING-DRILL.

1,362,247.

Specification of Letters Patent. Patented Dec. 14, 1920.

Application filed October 23, 1918. Serial No. 259,427.

To all whom it may concern:

Be it known that I, ISAAC FEITEL, a citizen of the United States, and a resident of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Rotary Boring-Drills, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in drilling tools for boring holes in the earth for obtaining supplies of water or oil. It is common to employ for such purposes a type of boring tool known as a "fish tail" drill, which drill comprises a comparatively thin body, whose lower edge is sharpened and centrally indented so as to provide at such edge two distinct curves. The body of such fish tail type of drill is also much thicker along its side edges than at its central portion. By reason of the shape of such drill, its acting lower edge, formed as stated, wears away rapidly, and requires constant resharpening. Furthermore, by reason of such shape, it frequently will enter crevices in the bottom of the hole being formed, or will enter between the stones at such bottom, and thus become more or less tightly wedged and, for the time being, non-rotatable. A drill of this type is connected to the lower end of a string of pipes, the several sections of which are screwed one to the other, such string being suspended by flexible hoisting means, and by the weight of the string of pipes the drill is brought into proper engagement with the bottom of the bore. When the drill drops into a crevice or between stones, as stated, and the rotation thereby stopped, the effect will be to shorten up the suspension means due to the continued operation of the machinery which rotates the string of pipes. Such shortening up of the suspension means will, of course, draw the drill up out of the crevice in which it has lodged, but immediately upon being so drawn out, the drill will be jerked forward with great force, thus causing an irregular and undesirable operation of the drill in addition to tending to impair its acting edge.

My invention has for its object to produce a drill which may retain the flattened body

form of the fish tail type of drill, but which will have its lower or effective end so shaped as to obviate any liability of the drill catching in a crevice or between stones, and thus insure a regular, steady rotation of the drill and the means by which it is suspended. I accomplish this object by providing two cutting wings or bits standing out at an angle to the body of the drill, said wings or bits each being substantially wholly at one side of the longitudinal axis of the drill, and the two wings extending in opposite directions, thus providing a large bearing surface at the lower end of the drill in lieu of the usual sharpened edge of the fish tail type of drill. My improvements are not only adapted for incorporation in and as a part of a drill when first made, but also lend themselves to incorporation in a drill formed from a blank produced by a used and worn drill of the fish tail type.

In the accompanying drawing, Figures 1-4, inclusive, represent a drill as originally made, with my improvements embodied therein, while the remaining figures show my improved drill as made from a used and worn fish tail drill. In this drawing:

Fig. 1 is a perspective view of a boring drill in which is embodied my invention;

Fig. 2 is a front elevation of the same;

Fig. 3 is a central vertical section through the drill;

Fig. 4 is a bottom view of the drill shown in the preceding figures;

Fig. 5 is a view in front elevation of an ordinary fish tail drill after it has been worn away by use, such view showing also a central slit formed in such worn drill preparatory to reshaping it to embody my improvements;

Fig. 6 is a front elevation of a drill embodying my improvements and constructed from a blank such as furnished by the worn fish tail drill of Fig. 5; and

Figs. 7-8 are edge and bottom views, respectively, of the drill shown in Fig. 6.

Referring to the several figures of the drawings, and particularly to Figs. 1 to 4, inclusive, wherein is shown a new drilling tool as distinguished from a drilling tool made from a worn drill, as in the other

figures—10 indicates the body portion of a drill, the opposite faces of which are flat and parallel. At its upper end it is provided with an integral neck 11 which is externally screw-threaded sufficiently to enable the drill to be screwed tightly into the lower member of a string of boring pipes. At its lower end portion the body 10 has formed therewith two wings or bits 12, which project in opposite directions from the flat faces referred to. Each of such wings or bits gradually decreases in width from the outer edge of the body to a point slightly beyond the longitudinal center of the body, where it terminates, as best shown in Fig. 1, in a cutting edge 13—the cutting edge of one member extending past the line of the cutting edge of the other member, as clearly shown in said Fig. 1. The outer edges of the wings are curved as best shown in Fig. 4, to conform to and fit against the wall of the bore being formed. Each wing has its upper face formed on an incline or gradual curve, so that, taken as a whole, each wing or bit approximates in shape an ordinary plow share. While I have termed the sharp edges 13 “cutting edges” it is to be understood that they are not the means relied upon for effecting a separation or breaking off of the particles of hard material that are removed in the process of making the bore, for while such edges will act to cut off and remove from the main body of hard strata any small upstanding portions that may present themselves to such edges, practically the whole of the work of making the bore through hard strata is accomplished by the frictional contact of the bottom of the drill with such strata as the drill is rotated. As the drawings show, the bottom faces of the wings or bits are perfectly flat and at a right angle to the axis of the drill. By reason of such construction broad surfaces are provided for effecting the grinding or wearing away of the hard material at the bottom of the bore in the manner stated, and while it is true that in time such bottom surfaces will also wear away such wear will be gradual and even and thus tend to maintain edges such as 13 at all times, until, in fact, the wings or bits have been almost wholly worn away. While such edges are not relied upon to effect the actual cutting away of portions from the hard material through which the bore is being formed their maintenance in the form shown is of importance in that they will engage and scrape up the loosened material and cause it to be deflected upward over the inclined upper faces of the wings or bits, such loosened material being forced into position to be so engaged by the edges on account of the movement given it by the rotary action of the drill, assisted also by the loosening effect of the

water that is delivered at the bottom of the bore in the manner about to be described.

14 indicates a central passage extending longitudinally through the neck of the drill, by which water under pressure that is forced down through the string of pipes will pass through the neck and out at opposite sides of the body 10 through two oppositely-disposed lateral openings through the faces of the drill body 10, such openings communicating with the central passage 14 at points immediately below the neck 11. Through such openings 15 water under pressure is discharged for the purpose of loosening up the material in the bore.

Turning now to the remaining figures, there is shown in Fig. 5 a representation of an ordinary fish tail drill in approximately the condition that it is brought to after a period of hard use in drilling, except that the central slot in the lower portion of the body of the drill is, of course, something that has been cut therein and is not a result of wear. In these figures 10^a indicates the body of the drill, and 11^a the screw-threaded attaching neck. 16 indicates the slot before referred to, which slot is made centrally of the body so as to divide the lower portion of such body into two substantially equal parts. As heretofore stated, the body of the fish tail drill, in addition to being slotted or cut centrally, as stated so as to form in effect two curved edges, is constructed so as to be somewhat thicker at its edge portions than it is along its longitudinal axis—in other words, a cross section through the body would show at each side of the longitudinal axis as an approximately wedge shaped figure. By reason of this formation of the body, it is evident that if the portions thereof at each side of the slot 16 are turned outwardly in opposite directions and into substantial horizontal positions, there will be produced wings or bits whose upper surfaces are inclined downwardly from the outer edges of the body to the longitudinal axis thereof. It is in this manner that I form the wings or bits, shown in Figs. 6, 7, and 8, which wings or bits are indicated by 12^a, and while the inclination of the upper surfaces of such wings or bits is not as great as in the construction illustrated in Figs. 1 to 4, still there is inclination enough so that each wing or bit is provided with an edge corresponding to the edge 13 and acting upon the loosened particles of material as hereinbefore described, and the width or thickness of such wings or bits is sufficient to enable them to provide an effective device for a very considerable length of time, although not to so great an extent, of course, as in the case of the construction shown in Figs. 1 to 4, where the wings or bits can be made of such thickness as may be desired. In the construction of Figs. 5 to

8, the water passage through which the water is received from the string of pipes is indicated by 14^a, and the water is discharged into the bore being made through lateral passages, one of which is shown and is indicated by 15^a. The edges of a fish tail drill will be worn away in use so as to present a rounded appearance at its lower portion, approximately as represented in Fig. 5, and therefore when the wings or bits 12^a are produced by bending the material at each side of the slot 16, as described, they will have rounded edges, as clearly shown in Fig. 8, each of which will be the arc of a circle that will conform to and fit against the cylindrical wall of the bore being formed. Of course, if the wear on the fish tail drill should not be sufficient to produce the required perfect curve, as will of course be frequently the case, the desired curvature can be given by a mechanical grinding operation, and thereby the proper fit of the wings in the cylindrical bore be secured, as in the case of the structure made in the first place from fresh stock, as indicated in Figs. 1 to 4.

By reason of the construction of bit described—whether made from new stock or from a worn fish tail drill—I provide a construction that has a great advantage over the fish tail type in that it is free from liability of catching in crevices in the bottom of the bore or between heavy stones embedded therein, and therefore it is capable of being continuously and smoothly operated. While my improved drill is free from the objections incident to the use of the ordinary fish tail drill, it retains the desirable feature of body construction of such fish tail type of drill in that its body is of comparatively narrow width, and hence leaves a large space opposite its flat faces for the passage of water and the material that has been loosened as hereinbefore described.

What I claim as my invention and desire to secure by Letters Patent, is:—

1. A well-boring drill comprising a body portion of materially less thickness than width and two bits at the lower end of the body, said bits projecting from opposite faces of the body and at opposite sides of said faces, the lower faces of the bits being substantially perpendicular to the said body to present a grinding face to the material at the bottom of the bore being formed.

2. A well-boring drill comprising a body portion of materially less thickness than width and two bits at the lower end of the body, said bits projecting from opposite faces of the body and at opposite sides of said faces, the lower faces of the bits being substantially perpendicular to the said body and their upper faces being inclined downwardly from the side edges of the body to-

ward the longitudinal center of the body to form a cutting edge on each bit.

3. A well-boring drill comprising a body portion of materially less thickness than width and two bits at the lower end of the body, said bits projecting from opposite faces of the body and at opposite sides of said faces, said bits each having a smooth lower surface approximately perpendicular to the longitudinal axis of the body, an inclined upper surface and a curved periphery.

4. A well-boring drill comprising a body of materially less thickness than width and having its lower portion divided centrally by a slot extending from its lower edge, said lower divided portion being turned outwardly in opposite directions and at substantially right angles to the body to form cutting bits, said bits having flat under surfaces and inclined upper surfaces.

5. A well-boring drill comprising a body of materially less thickness than width having its lower portion divided centrally by a slot extending from its lower edge, said lower divided portion being turned outwardly in opposite directions and at substantially right angles to the body to form cutting bits, said bits having flat under surfaces and inclined upper surfaces, and having their peripheries curved to conform to the wall of a hole being bored by the drill.

6. A rotary boring tool having wings that extend forward in the direction of rotation, said wings having flat bottom surfaces adapted by frictional contact with the material through which a bore is being formed by the rotation of the tool to disintegrate such material.

7. A rotary boring tool adapted to be operated by a string of pipes whose weight rests thereon, said tool having wings that extend forward in the direction of rotation, said wings having flat bottom surfaces adapted by frictional contact with the material through which a bore is being formed by the rotation of the tool to disintegrate such material, said tool having means for receiving a supply of water from said string of boring pipes to permit such water to pass to the bottom of the bore and wash out the disintegrated material.

8. A rotary boring tool adapted to be operated by a string of pipes whose weight rests thereon, said tool having wings that extend forward in the direction of rotation, said wings having flat bottom surfaces adapted by frictional contact with the material through which a bore is being formed by the rotation of the tool to disintegrate such material, said tool having means for receiving a supply of water from said string of boring pipes to permit such water to pass to the bottom of the bore and wash out the disintegrated material, and said wings hav-

ing at their forward lower portions edges that act to scrape and collect said disintegrated material and direct the same and the water with which it is mixed upward over said wings.

9. A rotary well boring tool having its bottom face in the form of a plurality of sectors and substantially flat and disposed at right angles to the axis of rotation of the tool.

10. A rotary well boring tool having a flat bottom face disposed at right angles to the axis of rotation of the tool and comprising a plurality of sections each of which is defined by a substantially radial line at its forward edge in the direction of rotation of the tool.

11. A rotary well boring tool having its bottom face in the form of a plurality of sectors and substantially flat and disposed at right angles to the axis of rotation of the tool, each of the sectors having an in-

clined upper face sloping upward from the forward edge of the sector in the direction of rotation of the tool.

12. A well boring tool adapted to be rotated under heavy downward pressure, said tool having a flat bottom face disposed at right angles to the axis of rotation of the tool and comprising a plurality of sections the forward edge of each of which in the direction of rotation of the tool is defined by a line extending substantially from the axis of the tool to the periphery, said tool being adapted by the extreme friction and corresponding heat to break up and disintegrate the material through which the bore is progressing.

ISAAC ^{his} ~~X~~ FEITEL.
mark

Witnesses:

IRVIN FEITEL,
HELEN FEITEL,
GLADYS FEITEL.