C. E. REED.
WELL BORING DRILL.
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1,236,982.

2 SHEETS—SHEET 1.

Inventor:

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To all whom it may concern:

Be it known that I, CLARENCE EDWARD REED, a citizen of the United States, and resident of Houston, Texas, have invented certain new and useful Improvements in Well-Boring Drills, of which the following is a specification.

This invention relates to rotary well-boring drills of the type which includes a head, or carrier, adapted to be rapidly rotated, by power mechanism, about its vertical axis and a disk cutter mounted in the carrier and adapted to rotate therewith and also have an independent rotary movement about its own axis.

The object of the invention is to provide a device of the kind which is particularly simple and durable in construction and which is highly efficient in operation, since it is well adapted for use in soft formations, gumbo, soft shale or gypsum, as well as for use in cutting hard rock strata.

The preferred exemplification of my invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of the tool;
Fig. 2 is a sectional view at a quarter turn from Fig. 1;
Fig. 3 is a bottom plan view;
Fig. 4 is a face view of a section of one of the cutting disks, and
Fig. 5 is a similar view of the companion cutting disk.

The head, or carrier, A, of the tool is preferably substantially of the construction disclosed in my Patent No. 1,159,087, granted November 2nd, 1915, and the cutters B, C, are mounted in the head in a manner substantially corresponding to the way the cutters are illustrated in said patent, so that the advancing portion of the cutter will project beyond the side of the head, or carrier, and the retracting portion of the cutter will be within the plane thereof. Each cutter is provided with peripheral teeth preferably of inverted V shape in cross section, these teeth being helically disposed, or each extending at an angle to a radial plane intersecting the same or at an acute angle to the side faces of the cutter, and each tooth includes a minor beveled portion 1 at the inner face of the cutter, or face of larger diameter, and a major reversely beveled portion 2 extending from the high part of portion 1 to the outer side of the cutter, or the side of smaller diameter.

As shown herein, the angular, or helical, arrangement of the teeth of the cutter B is substantially the reverse of the corresponding arrangement of the teeth of the cutter C, so that in the operation of the tool the teeth of one cutter will cross the path of the companion cutter.

The outer, or knife, edge of the major portion of each tooth is curved to present an arc substantially coextensive with the side wall of the opening cut by the tool which causes the lengthwise edge portions of the teeth to cut or mill the material at the side of the hole in contra-distinction to scraping the material from the side of the hole by the edge of the cutter of greatest diameter.

In the operation of the tool, as the cutter B rotates on its own axis, portions of each tooth are progressively brought into cutting action from the rear part of the major portion 2 toward the point of juncture of the latter with the portion 1, and as cutter C rotates the progressive action is from the front of portion 2 toward the rear end thereof.

What I claim is:

1. In a rotary drill for boring oil wells and in combination, a head adapted to be rotated on its vertical axis and a beveled disk cutter mounted in the lower end of the head to turn on a substantially horizontal axis which is offset from said vertical axis, the advancing portion of the cutter projecting beyond the outer side of the head and the retracting portion of the cutter being disposed within the plane of said side, the periphery of the cutter being provided with helically disposed teeth, the outer lengthwise edges of which cut the material at the side of the hole during the rotation of the cutting head.

2. In a rotary drill for boring oil wells and in combination, a head adapted to be rotated on its vertical axis and a disk cutter mounted in the lower portion thereof to turn on a horizontal axis offset from said vertical axis, the advancing portion of the cutter projecting beyond the side of the head and the retracting portion thereof being located within the plane of said side, said cutter being provided with peripheral teeth helically disposed and each comprising a minor beveled portion and a major differently beveled portion, the lengthwise outer edges of the latter portion of each
tooth cutting the material at the side of the hole during the drilling operation.

3. In a rotary boring drill of the class described and in combination a head adapted to be rotated on its vertical axis and a cutter mounted in the lower end thereof to turn on a horizontal axis and having its advancing portion projecting beyond the head and its retracting portion disposed within the plane of the side wall of the head, said cutter being provided with peripheral teeth helically disposed, each tooth comprising a minor beveled portion and a major differently beveled portion, the outer edge of the last named portion presenting an arc coextensive with the side wall of the opening cut by the tool.

4. In a rotary drill for boring oil wells and in combination, a head adapted to be rotated on a vertical axis and a disk cutter mounted in the lower portion thereof to turn freely on a horizontal axis offset from the vertical axis, said cutter having peripheral helically disposed teeth of inverted V-shape in cross section, and each tooth including a minor beveled portion disposed adjacent the inner face of the cutter and a major beveled portion extending from the high part to the first named portion to the outer face of the cutter, the lengthwise outer marginal edge of the last named portion having a cutting action at the side of the hole during the boring operation.

5. A rotary oil-well boring drill of the class described comprising a head adapted to be rotated on its vertical axis and a pair of beveled cutters mounted therein to rotate freely on horizontal axes, the faces of the cutters of larger diameter being opposed to each other and the axis of one of the cutters being offset in a horizontal direction in relation to the axis of the other cutter and said cutter being provided with peripheral beveled teeth helically disposed, the helical arrangement of one of the cutters being the reverse of that of the teeth of the other cutter.

6. In a rotary drill for boring oil wells and the like and in combination, a head adapted to be rotated on its vertical axis, a beveled cutter mounted in the lower portion of the head to turn on a substantially horizontal axis offset from said vertical axis, the cutter being provided with equi-distantly spaced peripheral teeth, each tooth extending transversely at an acute angle to the side face of the cutter and comprising two portions differently beveled.

7. In a rotary boring drill of the class described and in combination, a head adapted to be rotated on its vertical axis, a disk shaped beveled cutter mounted in the lower portion thereof to turn on a horizontal axis offset from said vertical axis, said cutter having equi-distantly spaced peripheral teeth, the outer edge of the major portion of which constitutes the arc of a circle, whereby in the operation of the tool each tooth will have different portions of said outer edge progressively brought into cutting operation.

8. In a rotary boring drill, and in combination, a head, a pair of cutters mounted in the lower end thereof and offset from each other in a horizontal direction, each cutter having peripheral teeth extending at an angle to radial planes intersecting the same, the angular disposition of the teeth of one cutter being different from that of the companion cutter, and said teeth each comprising a minor beveled portion and a major differently beveled portion, substantially as described.

9. In a rotary boring drill, and in combination, a head, companion cutters mounted in the lower end thereof, each having peripheral teeth extending at an angle to radial planes intersecting the same, said angular disposition of the teeth of one disk being in a direction reverse to that of the companion disk, and said teeth each comprising a minor and a major beveled portion, the minor beveled portions of the teeth being arranged nearer the vertical axis of the head than the major beveled portions.

10. In a rotary drill, in combination, a head adapted to be rotated on its vertical axis, a pair of cutters mounted in the lower end thereof to rotate therewith and to turn independently thereof on axes offset from each other and from the vertical axis, each of said cutters being provided with substantially equi-distantly spaced peripheral teeth extending at an acute angle to the side faces of the cutters, the outer lengthwise edges of the major portions of the teeth substantially conforming, in a plane intersecting the side of the hole, with the curvature of such hole at said point of intersection.

In testimony whereof, I affix my signature.

CLARENCE EDWARD REED.