

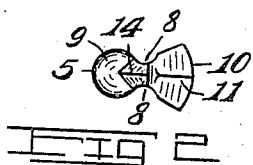
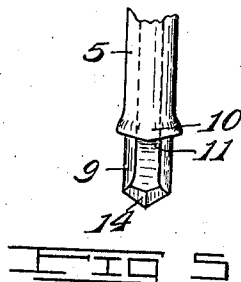
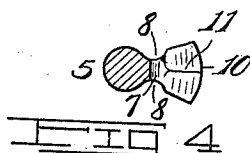
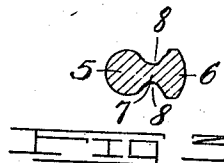
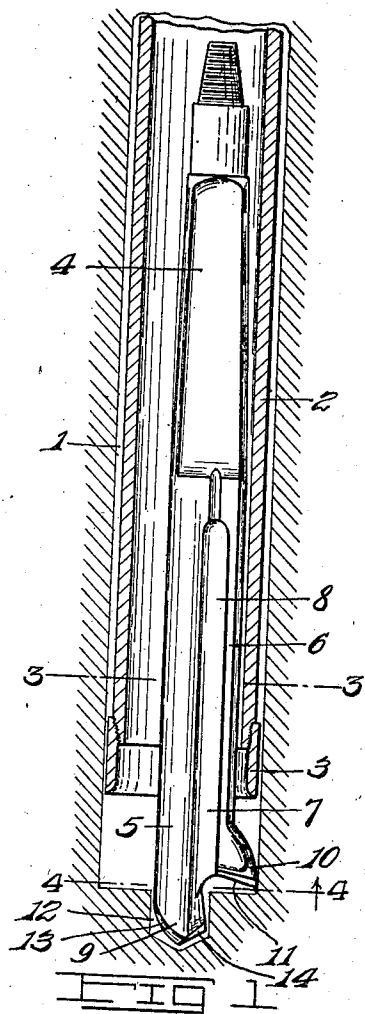
July 31, 1923.

E. J. AKINS

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UNDERDRILLING BIT

Filed March 13, 1922



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UNITED STATES PATENT OFFICE.

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UNDERDRILLING BIT.

Application filed March 13, 1922. Serial No. 543,196.

To all whom it may concern:

Be it known that I, EDWIN J. AKINS, a citizen of the United States of America, and resident of Moundsville, county of Marshall, and State of West Virginia, have invented certain new and useful Improvements in Underdrilling Bits, of which the following is a specification.

This invention relates broadly to drilling tools for oil wells and other deep wells, and more specifically to drilling bits of the eccentric type commonly termed underreamers.

The primary object of the invention is to provide a well-drilling bit having a construction which adapts it to function not only in the manner of underreamers whereby the diameter of the hole is enlarged below the end of the well-casing, but also for advancing the depth of the bore in direct axial alinement with the casing.

A further object is to provide a tool possessing the general characteristics of ordinary underreamers, which is adapted to function additionally in the manner of an ordinary drilling bit for advancing the depth of the hole or bore, thus permitting the lowering of the casing to be continued, following the progress made by the tool, to any extent required.

A still further object is to provide a tool, hereinafter termed an under-drilling bit, which embodies a mandrel or stem having at or on its lower end an integral vertically extending pilot member or portion and a laterally extending projection or nose located adjacent to said pilot, said pilot being adapted to automatically find, develop and maintain an accurately centered socket in advance of the bore and said nose being shaped to form a downwardly facing reaming shoulder which is rotated with the bit and which acts under the strokes of the bit to chip away and break down the ledge encircling such socket, and, at the same time, to ream a hole of a diameter greater than that of the casing through which the tool is directed.

With these and other important objects in view, the invention resides in the features of construction which will hereinafter be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the tool, showing the same in operative position at the bottom of a well;

Figure 2 is a lower end elevation of the tool;

Figures 3 and 4 are sections taken, respectively, on lines 3—3 and 4—4, Fig. 1; and—

Figure 5 is an edge view of the lower end portion of the tool.

Referring to said drawings, 1 indicates the bore of a well, 2 the casing suspended therein, and 3 the usual casing shoe borne by the lower end of said casing. Arranged to operate through the lower end of the casing somewhat in the manner of common forms of drills is the under-drilling bit which constitutes the present invention, said bit comprising an upper stem portion 4 of any appropriate form in cross section, and a lower working portion of more or less flattened form and shaped along one edge to provide a drill portion 5 of substantially cylindrical form. The opposite longitudinal edge portion 6 is of a somewhat irregular shape, and intermediate said portions 5 and 6 is a web 7 of reduced thickness formed by the provision in opposite sides of the bit of longitudinal channels 8 providing for the upward passage of loose material displaced by the drill in the downward strokes of the latter.

The drill portion 5 is extended or prolonged downward below the lower end of the opposite edge portion 6 throughout a suitable distance, as approximately six inches, said extended portion constituting a pilot 9 designed to find, develop and maintain a true and accurate center for the bore, as will hereinafter be explained.

The lower end of the edge portion 6 is dressed to form thereon a lateral beak-like projection or horn 10 which extends in a direction diametrically away from the drill portion 5 and which has an outwardly and downwardly inclined or curved outer surface for facilitating the guidance of the tool into the lower end of the casing on the up-stroke of the tool. Said horn 10 presents a downwardly facing shoulder 11 which is preferably inclined upward somewhat from the outer end of said horn to or adjacent to the axial center of the tool. Furthermore, said shoulder is preferably beveled in opposite directions from the center line thereof, as shown.

In drilling, the pilot 9 tends to find and to act in the center line of the bore and thus to produce an axially disposed socket 12 of a diameter approximating that of said pilot,

while the shoulder 11 acts to batter upon and break down the ledge-like walls encircling said socket. Obviously, due to the inclination of said shoulder, above referred to, the point of the horn or outer end of the shoulder, advances ahead of the shoulder proper, thus facilitating the drilling somewhat beyond that which would result from the use of a plain flat or horizontal shoulder.

The outer face portion of the end of the pilot 9 is gradually curved or rounded inward to the approximate axial center of the end of the pilot, as shown at 13, while the heel portion formed in the pilot extension of the web 7 is upwardly inclined from said axial center rearward and is beveled in opposite directions, as shown at 14. Said curved face 13 is designed to engage the upper edge of the socket and to guide the pilot inward to the axial center by glancing inward from said edge.

The diameter of the tool at the point of greatest width of the horn 10 must obviously be slightly less than the internal diameter of the well casing 2 in order that the tool shall be freely movable into and out of the lower end of said casing in the up and down strokes thereof.

It being understood that the tool rotates in the operation of drilling, it is apparent that the horn 10 will act on all sides of the socket 12, so that the diameter of the bore produced will be equal to the diameter of said socket plus twice the length of the horn shoulder 11. Thus, when desired, a bore of considerably greater diameter than the casing 2 may be produced, thereby to facilitate the lowering of the casing. In drilling through beds of loose or incoherent material which tends to cave in about the drill, obstructing or seriously interfering with the progress of the latter, this is an especially desirable feature, since the casing may follow the drill very closely and serve to support the walls against collapse or caving in.

Furthermore, as is manifest, the tool may be dressed to vary the ratio of the diameter of the pilot to the greatest width of the tool, thereby to increase or decrease the drilling speed as may be required by the character of the strata which is acted upon.

The form of the drill portion 5 readily lends itself to the dressing necessary to restore the form of pilot 9 following wear, and, as is apparent, such dressing may be continued until the entire length of the lower working portion embodying the cylindrical drill portion 5 and the edge portion 6 is used up.

What is claimed is—

1. An under-drilling tool consisting of a bit having in opposite sides thereof longitudinal channels defining a central web, said web being located intermediate a drill portion which has an approximately cylindrical form and an irregular shaped opposite edge portion of said bit, said irregular portion having the lower end thereof extended outward and constituting a projecting horn presenting a downwardly facing shoulder, and said drill portion being prolonged below said horn to form a center-finding pilot.

2. An under-drilling tool consisting of a bit having in opposite sides thereof longitudinal channels defining a central web, said web being located intermediate a drill portion which has an approximately cylindrical form and an irregularly shaped opposite edge portion of said bit, said irregular portion having the lower end thereof inclined outward and downward to form a projecting horn which presents an upwardly and inwardly inclined downwardly-facing shoulder, and said drill portion being prolonged below said horn and forming a center-finding pilot, said pilot having the outer face of its end gradually curved downward and inward from the circumferential plane to the axial center thereof.

3. An under-drilling tool consisting of a bit having in opposite sides thereof longitudinal channels defining a central web, said web being located intermediate a drill portion which has an approximately cylindrical form and an irregularly shaped opposite edge portion of said bit, said irregular portion having the lower end thereof inclined outward and downward to form a projecting horn which presents an upwardly and inwardly inclined downwardly facing beveled shoulder, and said drill portion being prolonged downward below said shoulder to provide a socket-forming pilot adapted to find the axial center of the bore and to maintain the bit in accurately centered position, said pilot having the outer face of its end gradually curved downward and inward from the circumferential plane to the axial center thereof, and having the heel portion thereof upwardly inclined from said axial center and presenting a beveled edge.

In testimony whereof, I affix my signature in presence of two subscribing witnesses.

EDWIN J. AKINS.

Witnesses:

G. O. SMITH,
M. T. MANION.