

Jan. 12, 1926.

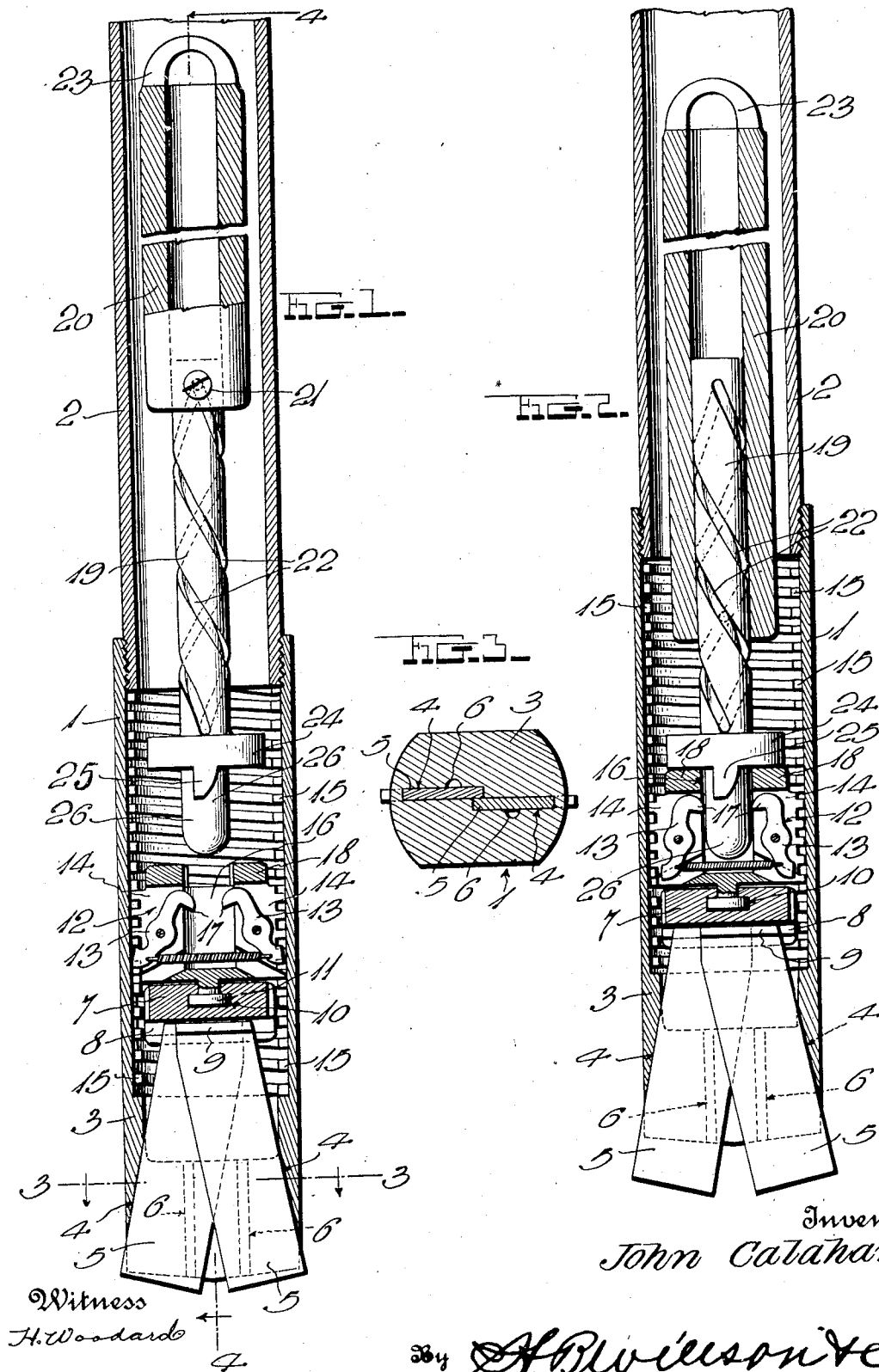
1,569,262

J. CALAHAN

ADJUSTABLE DRILLING BIT

Filed Feb. 14, 1924

2 Sheets-Sheet 1



Patented Jan. 12, 1926.

1,569,262

UNITED STATES PATENT OFFICE.

JOHN CALAHAN, OF LEBANON, INDIANA.

ADJUSTABLE DRILLING BIT.

Application filed February 14, 1924. Serial No. 692,807.

To all whom it may concern:

Be it known that I, JOHN CALAHAN, a citizen of the United States, residing at Lebanon, in the county of Boone and State of Indiana, have invented certain new and useful Improvements in Adjustable Drilling Bits; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in adjustable drilling bits and the present disclosure is directed to a device of this character designed primarily for use on deep well drilling machines, in which the bit is carried by the lower end of a tube which is driven by the usual rotary or other desired means.

It is one object of the invention to provide a simple and convenient bit which may be quickly and easily adjusted to extend its cutter or cutters a greater distance from the carrying body thereof, when wearing of said cutter or cutters has taken place, to decrease the efficiency thereof.

A further object of the invention is to provide a structure which may be readily adjusted to project the cutter or cutters, without the necessity of withdrawing the cutter-carrying body or the driving tube from the well or other bore being formed.

A still further aim is to make unique provision for locking the cutter-adjusting means against possible release, after adjustment.

The cutter-adjusting means above referred to, is carried by the cutter-carrying body, and it is a further aim to provide a unique device which may be lowered, for instance, by cable, through the driving tubing of said body, said device being operable to actuate said cutter adjusting means.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a vertical sectional view showing the relation of parts when the cutter adjusting means is about to be operated to further extend the cutter or cutters.

Figure 2 is a view similar to Fig. 1 but illustrating the manner in which the adjusting means is operated.

Figure 3 is a horizontal sectional view on line 3—3 of Fig. 1.

Figure 4 is a vertical sectional view as indicated by line 4—4 of Fig. 1.

Figure 5 is a side elevation showing the cutter adjusting and holding means.

Figure 6 is a similar view looking in a different direction.

Figure 7 is an upper end view of the rotatable adjusting member for the cutter or cutters.

Figures 8 and 9 are horizontal sectional views as indicated by lines 8—8 and 9—9 of Fig. 5.

In the drawings above briefly described, which illustrate the preferred form of construction, the numeral 1 designates a body adapted to be threaded or otherwise rigidly connected with the lower end of the tubing 2 by means of which said body may be rotated. This body is preferably of tubular form and is provided with a solid lower end 3, preferably having two cutter-receiving slots 4 therethrough. In the present disclosure, these slots are inclined upwardly and inwardly and they slidably receive a pair of cutters 5 which may well be of laminated form. Water is, of course, forced down the tubing 2 and through the body 1 in the usual manner, and the side walls of the slots 4 are preferably formed with grooves 6 to discharge this water at the cutting edges of the cutters 5.

Means are provided, carried by the body 1 and in the present instance within said body, for extending the cutters 5 whenever necessary and holding them in extended position. I have shown a circular head 7 in the body 1, having an undercut groove 8 in its lower side, receiving correspondingly shaped upper ends 9 of the cutters 5, so that the latter may slide radially of the head 7, as they are forced downwardly through the slots 4.

In the upper side of the head 7, I have illustrated an undercut groove 10 which receives a head 11 on the lower end of a rotatable adjusting member 12, within the body 1, so that a swiveled connection is provided between said head 7 and body 12. In the present showing, the member 12 is coarsely threaded into the body 1 and turning of said member in a direction to cause it to move downwardly, will of course project the cutters 5 from the lower end of the body 1. To hold this member in any position to which it is turned, I preferably provide a pair of spring-projected locking dogs 13,

pivottally mounted in recesses 14 in said member, the lower ends of said dogs being adapted to engage vertical grooves 15 formed across the screw threads of the body

5 1. The upper end of the member 12 is formed with a central socket 16, in the present disclosure, and the dogs 13 have their upper ends 17 disposed in said socket so that by the insertion of a member yet to be described, in the socket, the dogs will be released as shown in Fig. 2, thus permitting rotation of the member 12 to extend the cutters 5.

10 At opposite sides of the socket 16, I have shown shoulders 18 formed on the upper end of the adjusting member 12 for a purpose to be hereinafter described.

15 For turning the member 12 when required, I provide an operating device which is adapted to be lowered, for instance by a cable, through the tubing 2. This device preferably consists of a lower, rod-like section 19 and an upper, weighted, tubular section 20 in which said section 19 is slidably and rotatably received, connecting means being provided between the two sections, such as the studs 21 and the steeply pitched threads or grooves 22, for rotating the section 19 when the section 20 descends with respect to said section 19. The upper end of section 20 is provided with a suitable bail or the like 23 for connecting a cable thereto, and the lower end of the section 19 is shaped to release the dogs 13 and rotate the member 12. Preferably, said lower end of the section 19 is provided with an enlargement 24 having downwardly extending ratchet teeth or lugs 25 to engage the shoulders 18, and a central stud 26 extends below the enlargement 24 for reception in the socket 16 to release the dogs 13, said teeth 25 being beveled at their rear sides so that they will immediately ride upwardly out of engagement with the lugs 18, when the member 19 is retrogradely turned upon lifting of the weight 20. As soon as this weight entirely raises the member 19 so that the stud 26 is out of the socket 16, the dogs 13 immediately come into play, and if these dogs are not then in alinement with the grooves 15, they are in readiness to snap into said grooves and prevent further turning of the head or body 12, if the latter turns to some extent after it has been adjusted.

55 The operation of the invention is as follows:—Assuming that the body 1 has been driven by the tubing 2, until the cutters 5 are worn to an undesirable extent, the operating device, comprising the sections 19 and 20, is lowered through the tubing 2, as shown in Figs. 1 and 4. As soon as the stud 26 enters the socket 16 and engages the ends 17 of the dogs 13, said dogs are released as shown in Fig. 2. Then, as the lugs 25 engage the shoulders 18 and the descent of the

section 19 is checked, the section 20 descends with respect to said section 19, thereby rotating the latter and screwing the member 12 downwardly into the body 1, to project the cutters 5, as shown in Fig. 2. The operating device (19—20) may then be withdrawn and the dogs 13 will be spring-pressed outwardly for re-engagement with the grooves 15, to lock the cutter adjusting means against accidental release.

As excellent results may be obtained from the details disclosed, these details may well be followed, but it is to be understood that the present disclosure is principally for illustrative purposes and that within the scope of the invention as claimed, numerous changes may be made.

I claim:

1. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, rotatable means carried by said body for extending said cutter and holding it extended, and extraneous self-acting means adapted to be lowered through the operating tube for rotating said cutter-extending and holding means, said self-acting means and said cutter-extending and holding means being normally disconnected entirely from each other and having co-acting means for connecting them to rotate in one direction as a single unit when said self-acting means is lowered through the operating tube.

2. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means including a rotatable member associated with said body for extending said cutter and holding it extended, and an extraneous self-acting operating device for said rotatable member; said operating device being downwardly movable through the operating tube and comprising upper and lower relatively movable sections, and means connecting them for rotating the lower section when the upper section moves downwardly with respect thereto, said lower section being adapted to engage said rotatable member to turn the same, said upper section being in the form of a weight to effect operative downward movement thereof.

3. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means including a rotatable member associated with said body for extending said cutter and holding it extended, and an extraneous self-acting operating device for said rotatable member; said operating device being downwardly movable through the operating tube and comprising upper and lower relatively movable sections, and means connecting them for rotating

the lower section when the upper section moves vertically with respect thereto, said rotatable member having a socket opening through its upper end, the lower end of said operating device having a stud removably receivable in said socket.

4. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means associated with said body for extending said cutter and holding it extended, means for retaining said cutter-extending and holding means in adjusted position, and extraneous means downwardly movable through the operating tube for operating said cutter-extending and holding means, said operating means having means for releasing said retaining means.

5. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means including a rotatable member associated with said body for extending said cutter and holding it extended, means for retaining said rotatable member in adjusted position, and an extraneous operating device for said rotatable member, said operating device being downwardly movable through the operating tube and comprising upper and lower relatively movable sections, and means connecting said sections for rotating the lower section when the upper section moves downwardly with respect thereto, said lower section being adapted to engage said rotatable member to turn the same and having means for releasing said retaining means.

6. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means including a rotatable member associated with said body for extending said cutter and holding it extended, a locking device for retaining said rotatable member in adjusted position, said rotatable member having an upwardly opening socket into which a releasing portion of said locking device extends, and an extraneous operating device for said rotatable member, said operating device being downwardly movable through the operating tube and comprising upper and lower relatively movable sections, and means connecting said sections for rotating the lower section when the upper section moves downwardly with respect thereto, the lower end of said lower section having a stud removably receivable in the aforesaid socket to engage and release said locking device.

7. An adjustable drilling bit comprising a tubular body, an inclined extensible cutter

extending from the interior of said body to the exterior thereof and having a ribbed upper end, a head in said body having an undercut groove in its lower end slidably receiving the ribbed upper end of the cutter, and an adjusting member for said head swiveled thereto and threaded into said body, said member being accessible through the upper end of said body.

8. An adjustable drilling bit comprising a body adapted to be carried by the lower end of an operating tube, an extensible cutter carried by said body, means including a rotatable member associated with said body for extending said cutter and holding it extended, a locking device for retaining said rotatable member in adjusted position, said rotatable member having an upwardly opening socket into which a releasing portion of said locking device extends, and an extraneous operating device for said rotatable member, said operating device being downwardly movable through the operating tube and having a stud removably receivable in the aforesaid socket to engage and release said locking device, said operating device and said rotatable member having co-acting means whereby the former may rotate the latter to adjust the extensible cutter.

9. An adjustable drilling bit comprising a body, an extensible cutter carried thereby, means carried by said body and including a rotatable member accessible from the upper end thereof for extending said cutter and holding it in extended position, said rotatable member having an upwardly opening socket, and means for retaining said rotatable member in adjusted position including a portion extending into said socket to be operated by a tool.

10. A self-actuating device adapted to be lowered into the operating tube of an adjustable well drilling bit to adjust the latter, said device comprising upper and lower relatively slidable sections, the lower of which is adapted to engage cutter-adjusting means of an extraneous cutter and connecting means between said sections for turning the lower section when the upper section moves downwardly with respect thereto, said upper section being in the form of a self lowering weight.

11. A structure as specified in claim 10; the lower end of said lower section having a head provided with a central downwardly projecting stud, said head being also formed with a downwardly projecting ratchet tooth at one side of said stud.

In testimony whereof I have hereunto affixed my signature.

JOHN CALAHAN.