

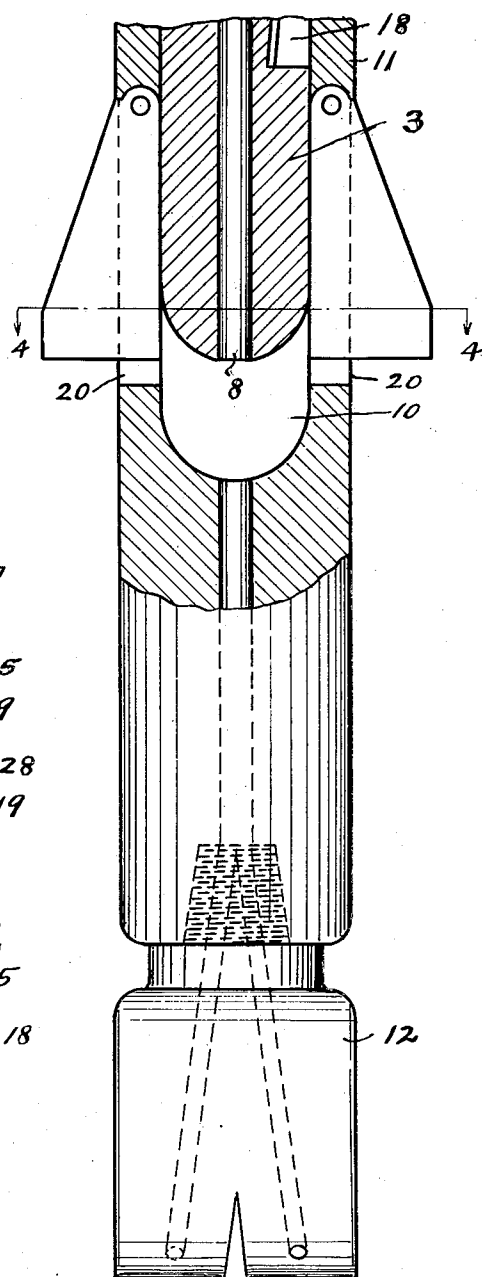
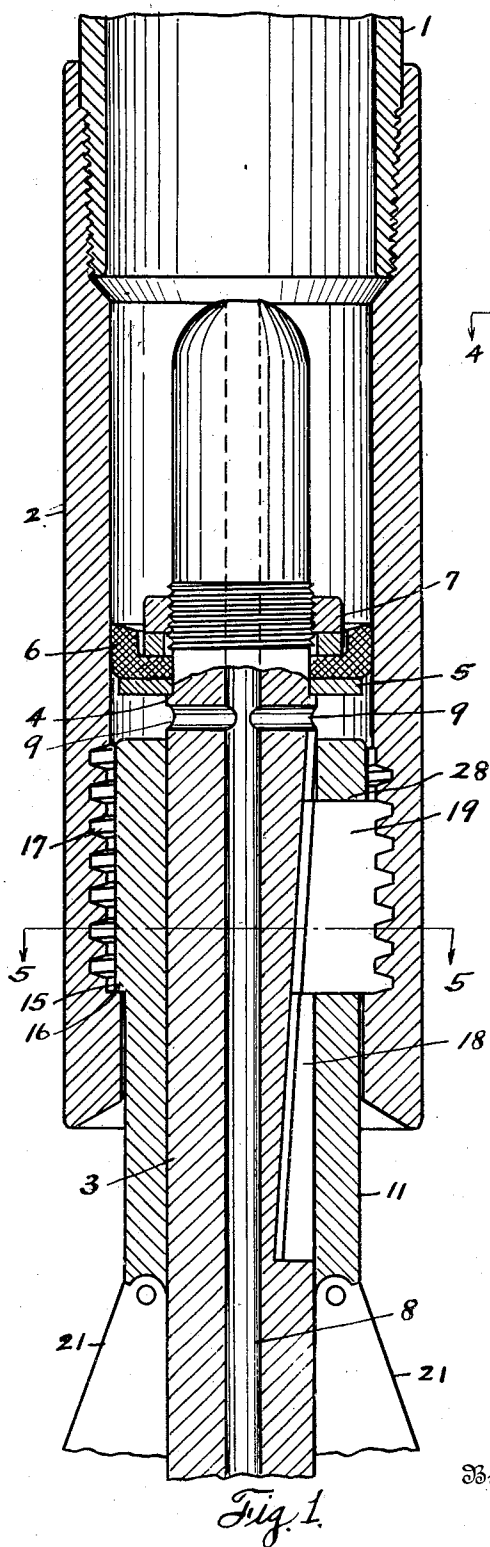
Feb. 9, 1926.

1,571,931

W. L. CHURCH
COLLAPSIBLE DRILL BIT

Filed Jan. 9, 1923

4 Sheets-Sheet 1



Inventor
Walter L. Church
Hardway Tachy

Attorney

Feb. 9, 1926.

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4 Sheets-Sheet 2

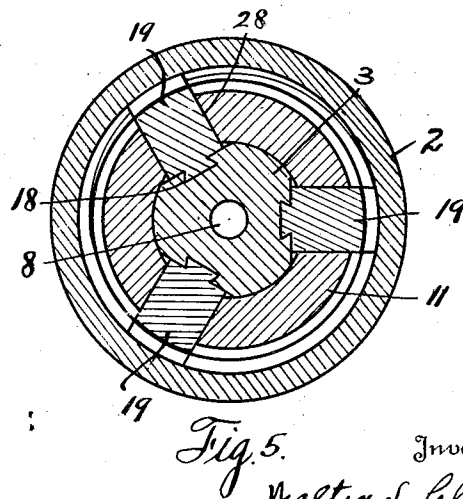
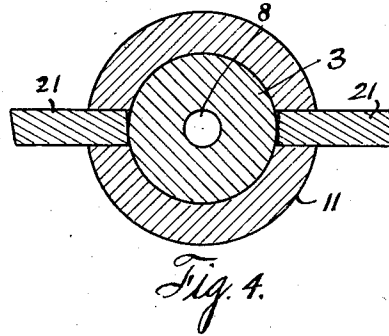
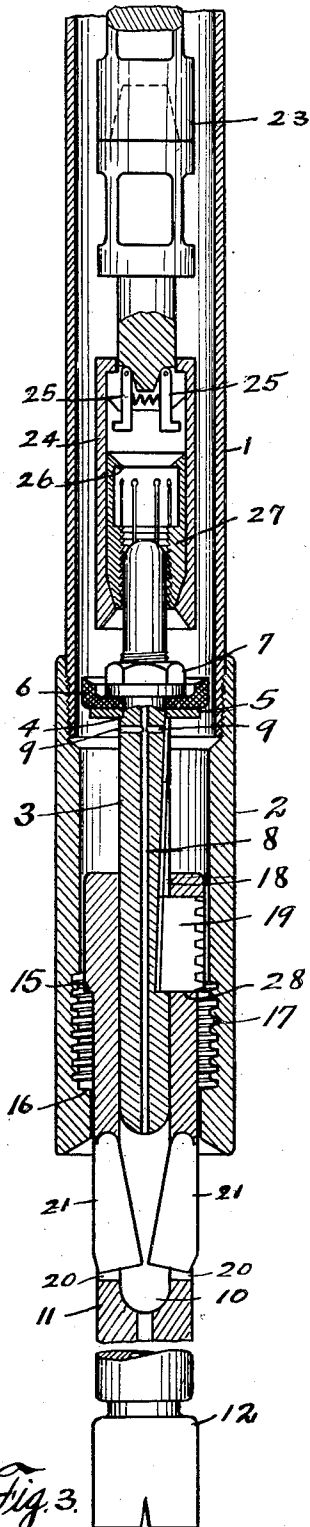


Fig. 5. Inventor
Walter S. Church

By

Handway & Co.
Attorneys

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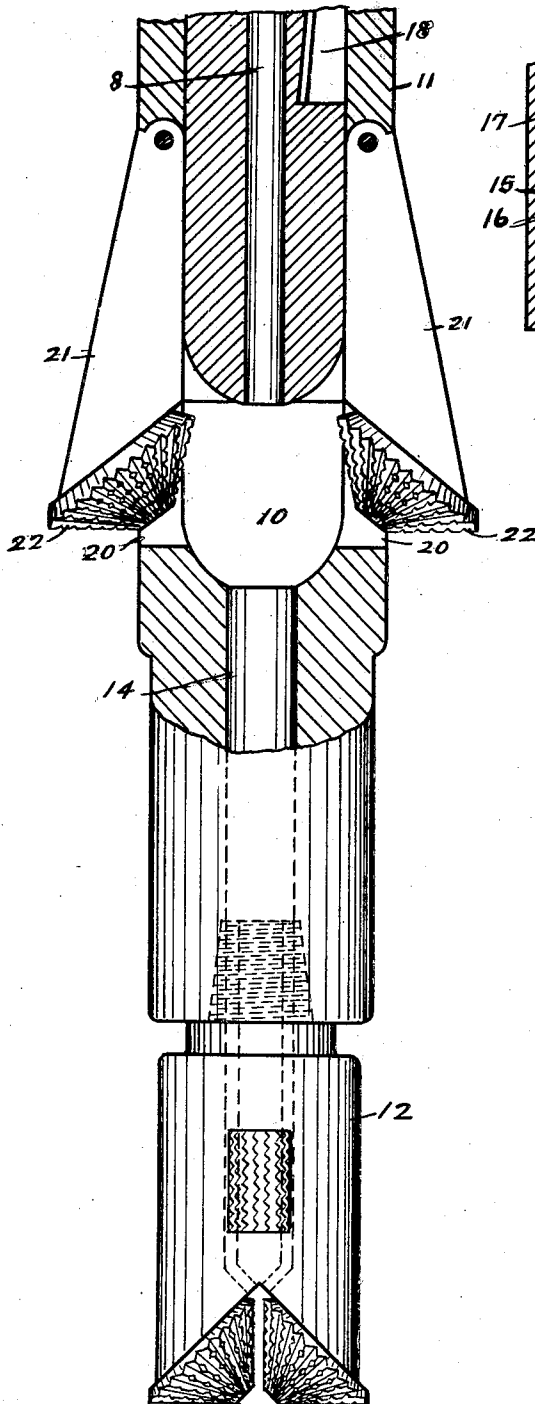


Fig. 6.

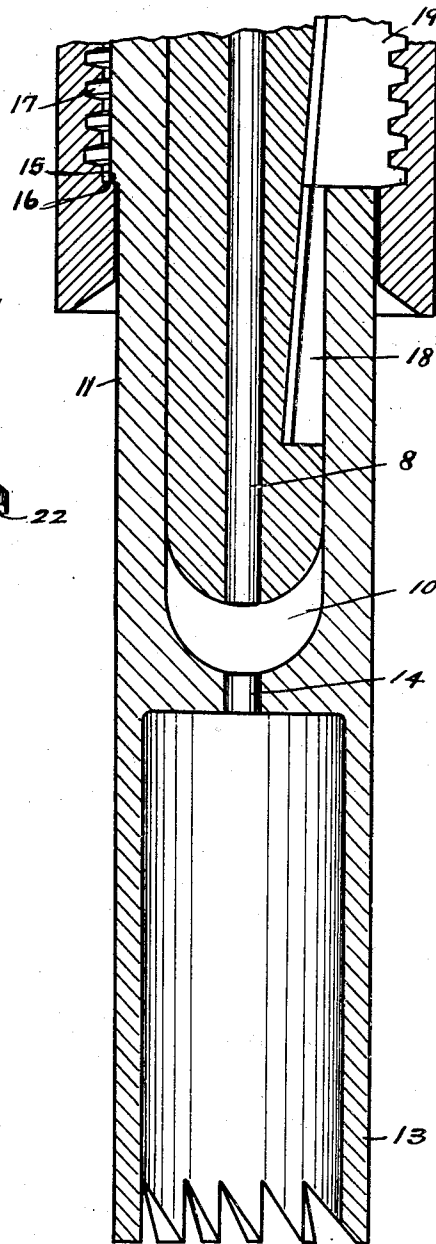


Fig. 7. Inventor
Walter L. Church
Handway & Cathey.
Attorney

Feb. 9, 1926.

1,571,931

W. L. CHURCH

COLLAPSIBLE DRILL BIT

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4 Sheets-Sheet 4

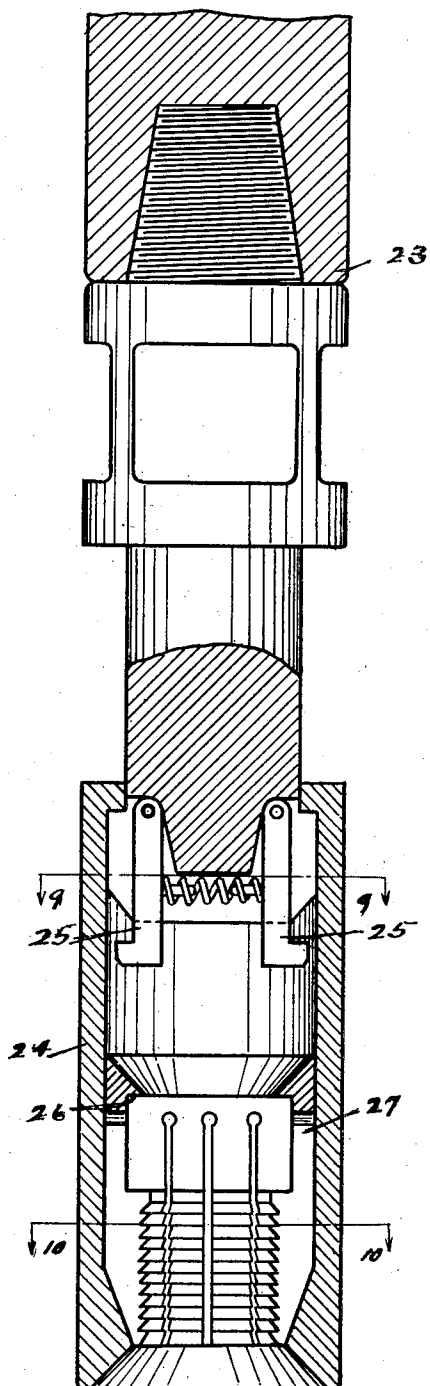


Fig. 8

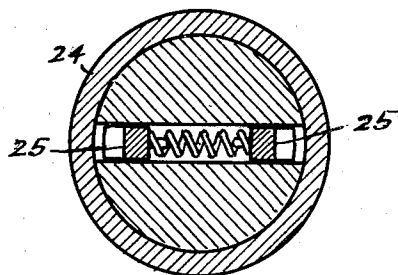


Fig. 9.

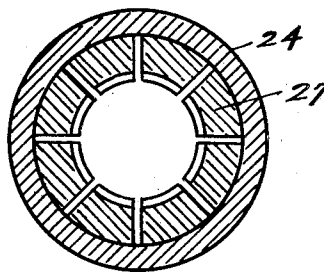


Fig. 10.

Inventor

Walter F. Church

Hardway Catty

Attorneys

By

Patented Feb. 9, 1926.

1,571,931

UNITED STATES PATENT OFFICE.

WALTER L. CHURCH, OF WEST COLUMBIA, TEXAS.

COLLAPSIBLE DRILL BIT.

Application filed January 9, 1923. Serial No. 611,632.

To all whom it may concern:

Be it known that I, WALTER L. CHURCH, citizen of the United States, residing at West Columbia, in the county of Brazoria and State of Texas, have invented certain new and useful Improvements in Collapsible Drill Bits, of which the following is a specification.

This invention relates to new and useful improvements in a collapsible drill bit.

One object of the invention is to provide a drill bit which may be readily attached to, or detached from, the lower end of the drill stem, without removing said stem from the bore.

Another object of the invention is to provide a drill which may be equipped with reaming side cutters, if desired, and includes means through which said side cutters or reamers may be expanded when the bit is attached to the drill stem, and may be contracted when it is desired to detach the bit from the stem.

With the above and other objects in view the 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 drawings, wherein:—

Figure 1 is a vertical sectional view of the upper end of said bit.

Figure 2 is a side view of the lower end of the bit shown partly in section.

Figure 3 is a vertical sectional view of the complete device.

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 1.

Figure 6 shows a side elevation partly in section of the lower end of the bit, showing abrading conical shaped rollers employed.

Figure 7 is a vertical sectional view of the lower end of the device, showing a core barrel for taking samples of the formation.

Figure 8 is a side view of a fishing tool employed.

Figure 9 is a transverse sectional view thereof taken on the line 9—9 of Figure 8 and,

Figure 10 shows a transverse sectional view taken on the line 10—10 of Figure 8.

In the drawings the numeral 1 designates the drill stem which is rotated from the ground surface by means of a suitable ro-

tary, the numeral 2 designates a drill collar whose upper end is threaded onto the lower end of the drill pipe. The numeral 3 designates an expander, of an elongated cylindrical form. Near the upper end of this expander it has an annular shoulder 4 forming a seat for a gasket 5 which supports a cup ring 6. This cup ring is locked in position by means of a lock nut 7 which is threaded onto the expander 3 thus forming a plunger. The expander has a central channel 8 extending from the upper end through it to its lower end and beneath said plunger there are the lateral ducts 9, 9 to admit water into said channel from the interior of the drill stem. The lower end of the expander works in a deep socket 10 of the tubular shank 11 to the lower end of which a drill bit, as 12, or a core taking barrel as 13, may be attached. This shank also has a central channel 14 to permit the passage of water downwardly to the bottom of the bore. The upper end of the shank 11 is enlarged forming an annular shoulder 15 adapted to contact against and rest on an internal annular shoulder 16 of the drill collar 2 to prevent the same from passing through said collar and above said internal shoulder 16 the collar has threads as 17. The expander has a plurality, preferably three, of downwardly converging dove tailed grooves as 18 in which locking jaws 19 are mounted to slide. The outer faces of these jaws have mutilated threads adapted to mesh with the threads 17.

Near the lower end of the socket 10 the shank 11 has side slots 20 through which the reaming cutters 21 work, said cutters being pivoted in said slots at their upper ends. These reaming cutters may be blade like in form, as shown in Figures 3 and 4, or may carry the frusto conical shaped cutting rollers 22, as illustrated in Figure 6.

The bit is let down through the stem by means of a grappling tool, illustrated in Figures 8, 9 and 10, said tool being equipped with a suitable rope socket 23 for the attachment of a cable thereto for lowering and elevating the same. The bit is lowered until the shoulder 15 rests upon the shoulder 16, as shown in Figure 1, this will stop the downward movement of the shank 11, but the rope socket 23 will move on downwardly through the upper end of the barrel 24 until the dogs 25, 25 engage under the internal annular rim 26 of the engaging slips 27.

An upward pull on the cable will elevate said slips in the barrel and permit them to expand and release the expander, thus permitting the withdrawal of the grappling tool.

In order to lock the bit securely in position preparatory to drilling water is forced, under pressure, down through the drill stem forcing the plunger, carried by the upper end of the expander downwardly, thus forcing said expander downwardly operating to expand the jaws 19 and engaging the threads thereof with the threads 17 of the drill collar 2, it being noted that these are left hand threads. The downward movement of the expander also operates to force the cutters 21, 21 outwardly into position to enlarge the bore formed by the bit 12.

In order to unlock and remove the bit from the drill stem the rope socket is again lowered down through said stem until the slips 27 engage over the upper end of the expander an upward pull on the expander draws the jaws 19 inwardly disengaging them from the drill collar 2. When in upper position the expander is withdrawn from between the reaming cutters 21 permitting them to swing inwardly so as to readily pass upwardly through the drill collar. It is to be noted that the jaws 19 work through suitable radial slots 28 cut through the shank 11.

The ordinary fish tail bit, as illustrated in Figure 2, may be used for drilling in soft formation. In piercing rock or other hard strata the cutting rollers, illustrated in Figure 6 will be employed. For the purpose of taking a sample of the formation a core barrel, as illustrated in Figure 7 may be used; but in all cases the same means of locking the drilling tool in the drill collar 2 may be employed.

What I claim is:—

1. In a drilling apparatus, the combination of a rotary tubular driving member having a threaded section, a detachable shank, a boring tool carried by the lower end of the shank, an expander movable within said shank, and an engaging member having a slidable connection with said expander and actuated thereby into intermeshing engagement with said section to lock said shank with said driving member.

2. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank, a boring tool carried by the lower end of the shank, an expander movable within the shank, radially movable jaws having a dove tail connection with the expander and actuated thereby, said jaws working through the shank and being effective to connect the same to, and disconnect it from said driving member.

3. In a drilling apparatus, the combination of a rotary tubular driving member, a

detachable shank, a boring tool carried by the shank, an expander movable in said shank, interlocking means operatively connected with said expander and adapted to be actuated thereby to lock said shank with, and release it from, said driving member, said interlocking means and shank being formed with threads, adapted to intermesh when said elements are in interlocking position.

4. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank, a boring tool carried by the shank, an expander movable in said shank, interlocking means operatively connected with said expander and adapted to be actuated thereby into interlocking relation with the driving member, or into released position relative thereto to lock said shank with, and release it from, said driving member, said interlocking means operating also to prevent detachment of the shank from the expander, lateral reamers radially movable in and connected to said shank, said expander being effective to expand the reamers when said shank is in locked position.

5. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank, a boring tool carried by the shank, an expander movable in said shank, interlocking means working radially through the shank and operatively connected with said expander and adapted to be actuated thereby to lock said shank with, and release it from, said driving member, a plunger working in the driving member and connected to said expander through which the expander may be actuated by fluid pressure to force said interlocking means into engagement with the driving member.

6. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank, a boring tool carried by the shank, an expander movable in said shank, radially movable interlocking means operatively connected with said expander and working through the shank and adapted to be actuated thereby to lock said shank with, and release it from, said driving member, radially movable reamers carried by the shank, a plunger working in the driving member and connected to said expander through which the expander may be actuated by fluid pressure to force said interlocking means into engagement with the driving member, and to wedge between and expand said reamers.

7. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank, a boring tool carried by the lower end of the shank, an expander movable within said shank, interlocking means movable radially through the shank

and in operative connection with said expander and actuated thereby to interlock the shank into threaded engagement with, and release it from said driving member, interengaging means carried by said driving member and shank respectively, to limit the downward movement of the shank relative to the driving member.

8. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank associated therewith, a boring tool carried by the lower end of the shank, an expander movable within said shank, interlocking means working through the shank and in operative connection with said expander and adapted to be actuated thereby to lock said shank into threaded engagement with, and release it from said driving member, a plunger working in the driving member and connected to the expander through which said expander may be actuated by fluid pressure to force said interlocking means into engagement with the driving member.

9. In a drilling apparatus, the combination of a rotary tubular driving member, a detachable shank associated therewith, a boring tool carried by the lower end of the shank, an expander movable within said shank, interlocking means working through the shank and in operative connection with said expander and adapted to be actuated thereby into threaded engagement with the driving member to lock said shank with said driving member, a plunger working in the driving member and connected to the expander through which said expander may be actuated by fluid pressure to force said interlocking means into engagement with the driving member, means for releasing said interlocking means, lateral reamers radially movable in and connected to the shank, said expander being adapted to wedge between, and thereby become effective to expand said reamers when the shank is locked with the driving member.

10. In a drilling apparatus the combina-

tion of a rotary tubular driving member, formed with internal abutments, a detachable shank associated therewith, a boring tool carried by the lower end of the shank, lateral reamers radially movable in, and connected to the shank, an expander movable within said shank and having a water course therethrough, interlocking means formed with external abutments and working through said shank and in operative connection with said expander and actuated thereby to lock said shank with said driving member said expander simultaneously wedging between and expanding said reamers.

11. In a drilling apparatus the combination of a rotary tubular driving member having internal threads, a detachable shank associated therewith, a boring tool carried by the lower end of the shank, lateral reamers radially movable in, and connected to the shank, an expander movable within said shank, interlocking means formed with internal threads and working through said shank and in operative connection with said expander and actuated thereby to cause said threads to intermesh to lock said shank with said driving member, said expander simultaneously wedging between and expanding said reamers.

12. A drilling apparatus including a tubular driving member, a detachable shank associated therewith and formed with a radial bearing, an expander movable within the shank, a jaw radially movable in said bearing, said jaw being connected to the expander so as to move radially as the expander is moved longitudinally in the shank, the outer face of the jaw and the opposing inner wall of the rotary member being formed with left hand threads which intermesh when the jaw is in its outer position to lock the shank with the driving member.

In testimony whereof I have signed my name to this specification.

WALTER L. CHURCH.