No. 862,381. PATENTED AUG. 6, 1907.

H. BENNERSCHEIDT.

HYDRAULIC DRILL AND REAMER.

APPLICATION FILED JUNE 5, 1906.

Fig. 1.

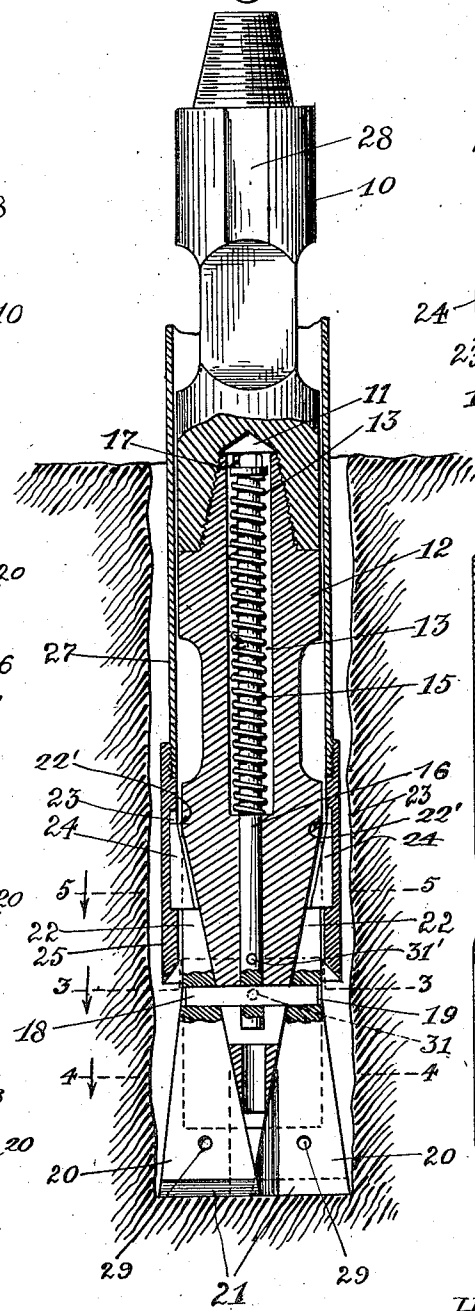


Fig. 2.

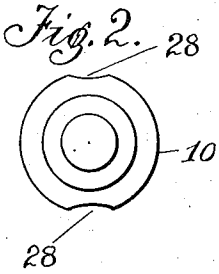


Fig. 3.

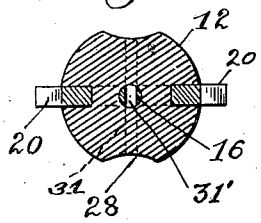


Fig. 4.

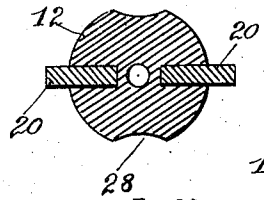


Fig. 9.

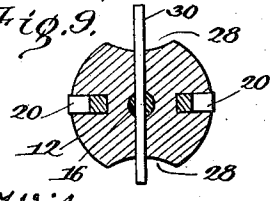


Fig. 8.

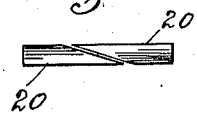


Fig. 5.

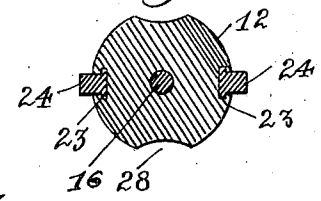


Fig. 6.

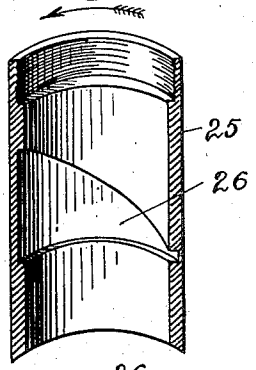
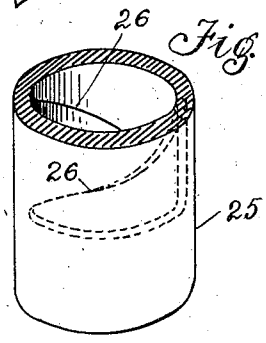


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC DRILL AND REAMER.

No. 862,381. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed June 5, 1906. Serial No. 320,350.

To all whom it may concern:

Be it known that I, HERMAN BENNERSCHEIDT, a citizen of the United States, residing at Anaheim, in the county of Orange and State of California, have invented new and useful Improvements in Hydraulic Drills and Reamers, of which the following is a specification.

My invention relates to drilling or reaming too's for oil or other wells and an object thereof is to provide a tool that may be used with a rotary drilling rig.

A further object is to construct a tool that can be locked within the casing and carried thereby and which may be readily put in or withdrawn therefrom.

I accomplish these objects by means of the device described herein and illustrated in the accompanying drawings forming a part of this specification in which:—

Figure 1.— is a central vertical section of my improved drill in its operative position in a well. Fig. 2.— is a plan view of the shank. Fig. 3.— is a section taken on line 3—3 of Fig. 1 looking in the direction indicated by the arrows. Fig. 4.— is a section taken on line 4—4 of Fig. 1 looking in the direction of the arrows. Fig. 5.— is a section taken on line 5—5 of Fig. 1 looking in the direction indicated by the arrows. Fig. 6.— is a sectional perspective view of the casing extension shoe. Fig. 7.— is a perspective view of a portion of the casing extension shoe. Fig. 8— is a bottom edge view of the cutters in their closed position. Fig. 9— is a cross section illustrating the method of temporarily holding the cutting bits in their closed or inoperative position, previous to inserting the tool within the casing.

Referring to the drawings 10 is the shank of the tool into the threaded socket 11 of which is screwed the mandrel 12. This mandrel is preferably cylindrical in form and has a central and preferably cylindrical opening 13 which extends downwardly and is enlarged a portion of the way to form a shoulder 14 for the coiled spring 15 to bear against. This spring is for the purpose of supporting a slip rod 16 and is threaded on its upper end to receive a nut 17 against which the outer end of the spring bears. Near the lower end of the rod 16 is a key 18 which projects on either side and at right angles thereto and engages slots 19 in cutting bits 20, by means of which the cutting bits are drawn upwardly into their cutting position as shown in Fig. 1 of the drawings. These cutting bits are preferably flat in cross section, the cutting edges 21 being preferably chisel-shaped and are designed to operate in oppositely disposed tapered slots 22 which extend downwardly from beginning approximately from a point 22′ to the bottom of the mandrel. The cutting bits 20 when in their operative position are prevented from becoming disengaged from the mandrel 12 and the key 18 by the lower portion of the extension shoe 25. The upper portion of the slots 22 are preferably dove-tailed as at 23 for the reception of the tapered tongued locking wedges 24. These wedges are for the purpose of locking the tool to an extension shoe 25, which has on its inner sides oppositely disposed cam grooves 26 in which the wedges operate to lock the tool to the casing. The extension shoe 25 is internally threaded at its outer end for the reception of the lower threaded end of the casing 27. The slots 22 act as guides to the cutting bits 20 which when drawn upwardly force them into their cutting or drilling position.

The upper portion of the shank of the tool and the mandrel are provided with oppositely disposed grooves 28 which in this instance are shown as segmental, by means of which the water may be introduced into the bottom of the well to free it of the detritus which is forced upwardly between the outside of the casing and the well.

The operation of the device is as follows: When it is desired to begin the operation of drilling the cutting bits are pulled downwardly by means of hooks placed in the holes 29 which are located in the lower part of the bits until the diameter of the bits equals the inside diameter of the casing. A pin 30 is then inserted in the aperture 31 of the mandrel 12, passing through the aperture 31′ in the slip rod 16, thus holding the bits 20 in a closed position until they have been inserted in the casing 27. The tapered wedges 22 that work upwardly and downwardly in the tapered grooves in the mandrel rest on top of the cutting bits and follow them downwardly until the outside faces are flush with the sides of the mandrel. The tool is then lowered into the casing and the pin 30 which was inserted in the apertures 31 and 31′ of the slip rod and mandrel is then withdrawn so that the cutting bits will assume their cutting or drilling position. The tool is then lowered further into the casing until the tapered wedges 24 rest in the grooves 26 in the extension shoe. The casing is then rotated in the direction of the arrow in Fig. 6, the tapered locking wedges wedging in the grooves in the extension shoe and locking it firmly thereto. When it is desired for any purpose to withdraw the tool from the well, the casing is rotated slightly in the direction opposite to its operative or cutting direction so as to loosen the wedges in the groove. The tool then being drawn upwardly compresses the spring 15 and the tapered wedges move inwardly with the cutting bits until the bits and wedges are flush with the sides of the mandrel. The tool can then be withdrawn the rest of the distance in a comparatively easy manner.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A drilling-tool comprising a hollow extension shoe having a plurality of cam grooves on the inner face thereof; a hollow mandrel having longitudinal tapered grooves in the lower end thereof for the reception of the cutting

bits; cutting bits slidingly mounted in said last grooves; and means secured to the mandrel adapted to enter the grooves in the shoe whereby the mandrel may be locked within the extension shoe.

2. A drilling tool comprising a hollow extension shoe having a plurality of cam grooves on the inner face thereof; a hollow mandrel having longitudinal tapered grooves in the lower end thereof for the reception of the cutting bits; cutting bits slidingly mounted in said last grooves; means secured within said mandrel to control the movement of the cutting bits; and means secured to the mandrel adapted to enter the grooves in the shoe whereby the mandrel may be locked within the extension shoe.

3. A drilling tool comprising a hollow extension shoe having a plurality of inclined cam grooves on the inner face thereof; a hollow mandrel having longitudinal tapered grooves in the lower end thereof for the reception of the cutting bits; cutting bits slidingly mounted in said last grooves; spring controlled means secured within said mandrel adapted to control the movement of the cutting bits; and means secured to the mandrel adapted to enter the grooves of the extension shoe, whereby the mandrel may be locked within the extension shoe.

4. A drilling tool comprising a hollow extension shoe having a plurality of inclined cam grooves on the inner face thereof; a hollow mandrel having longitudinally tapered grooves in the lower end thereof; cutting bits slidingly mounted in said last grooves; locking means slidingly secured in the upper end of said longitudinal grooves and adapted to enter the cam grooves of the extension shoe whereby the mandrel may be locked within the shoe; and spring controlled means secured within said mandrel adapted to control the movement of the cutting bits and locking means.

5. A drilling tool comprising a hollow extension shoe having a plurality of inclined cam grooves on the inner face thereof; a hollow mandrel having oppositely disposed longitudinally tapered grooves in the lower end thereof; cutting bits slidingly mounted in said last grooves; locking means slidingly secured in the upper end of said longitudinal grooves and adapted to enter the cam grooves of the extension shoe whereby the mandrel may be locked within the shoe; and spring controlled means secured within said mandrel adapted to control the movement of the cutting bits and locking means.

In witness that I claim the foregoing I have hereunto subscribed my name this 28th day of May, 1906.

HERMAN BENNERSCHEIDT.

Witnesses:
EDMUND A. STRAUSE,
G. E. HARPHAM.