Sept. 30, 1958 A. S. MacNEIL 2,854,219

APPARATUS FOR DEEP WELL DRILLING

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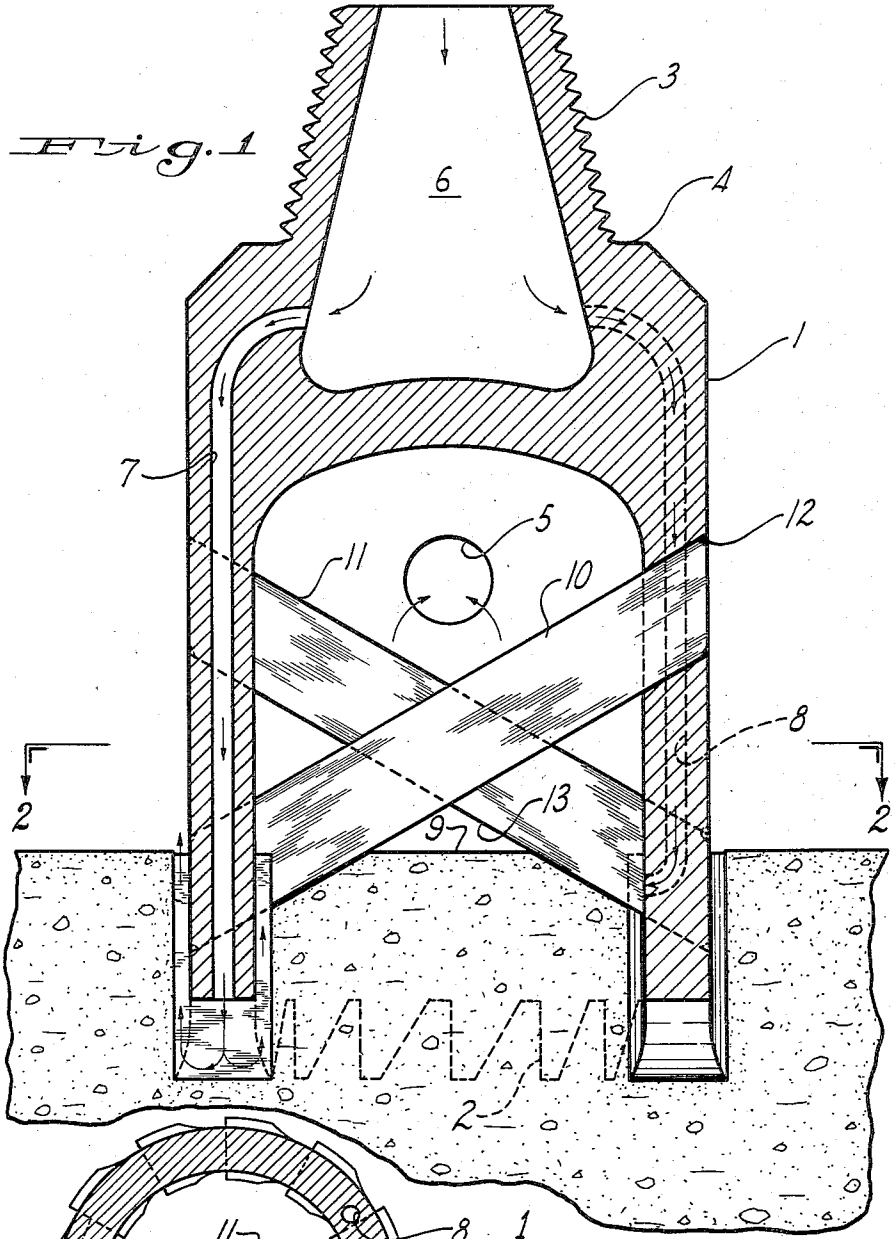
Fig. 1



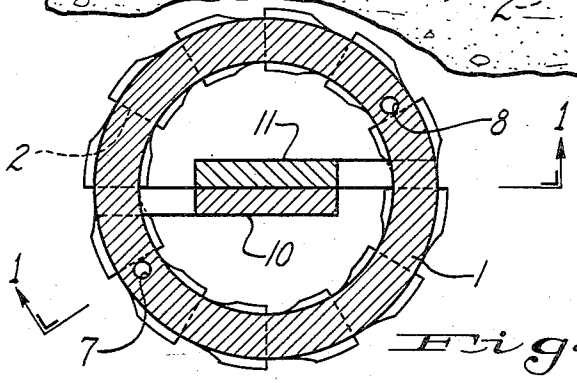


Fig. 2

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APPARATUS FOR DEEP WELL DRILLING

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Application November 22, 1954, Serial No. 470,172

1 Claim. (Cl. 255—72)

This invention relates to new and useful improvements in method of and apparatus for deep well drilling and it is among the objects thereof to provide a method of drilling wells by which the drilling action at the cutting area of the bit is supplemented by an erosive action supplied by high pressure fluid jets.

It is a further object of the invention to provide a cutting bit which is designed to cut an annular path and simultaneously break up the core by both a cutting and erosive action through the application of fluid pressure supplied through the walls of the bit at and above the cutting area of the bit teeth. The present invention is a continuation-in-part of an application filed by me August 12, 1954, serially numbered 449,395, now abandoned, wherein is disclosed a rotary deep well sleeve type drill bit generally useful for the purpose of the present invention. The invention will become more apparent from a consideration of the accompanying drawing constituting a part hereof in which like reference characters designate like parts and in which:

Figure 1 is a vertical cross-sectional view of a drill bit embodying the principles of this invention taken along the line 1—1, Figure 2; and,

Figure 2, a cross-sectional view taken along the line 2—2, Figure 1.

With reference to the several figures of the drawing, the numeral 1 designates a sleeve casting of a low alloy chrome carbide steel, the cutting edge of which is provided with teeth 2 and which is provided with a threaded shank 3 at the top having an abutting shoulder 4 against which the drill sleeve or pipe rests. An outlet opening 5 is provided in the body of the sleeve for the effluent of the erosive cutting and flushing fluid that is supplied from a chamber 6 in the threaded shank through ducts 7 and 8 provided in the side wall of the sleeve bit, the duct 7 terminating between adjacent teeth, as shown in Figure 1, and the duct 8 terminating a distance above the cutting area, as shown. As the drill progresses in its cutting action, a core 9 is formed which is cut away by cross

bars 10 and 11 that extend through slots in the walls of the sleeve and are secured by welding, as shown at 12. The duct 8 terminates above the lowest portion of the cutting edge 13 of the cross bars 11 and 10.

Water under great pressure to as much as 1,000 pounds per square inch is supplied to the chamber 6 and thence through the ducts 7 and 8 to the cutting area at the teeth 2 and above the core, as shown in the drawing. These high pressure water jets exert a terrific corrosive action on the materials on which the bit is acting to effect a far more rapid cutting than ordinarily, when only a flushing fluid is employed and the cuttings are flushed out with the water through the outlet opening 5. It is also evident that the high pressure fluid will escape around the outside of the bit from the jets supplied through the duct 7 to at all times maintain a cutting clear condition.

Instead of water, air at very high pressures up to 2,500 pounds per square inch may be employed effectively but it is deemed that the use of high pressure water jets is of greater effect to increase the cutting action and to remove the teeth and core cuttings from the hollow bit, the term fluid pressure is intended to mean both hydraulic or pneumatic pressure.

Although one embodiment of the invention has been herein illustrated and described, it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

A bit for rotary deep well drilling comprising a hollow sleeve having a threaded shank on one end thereof and having cutting teeth on the opposite end, cross bars extending diagonally from wall to wall of the sleeve above the cutting teeth to provide inclined cutting faces for disintegrating the core formed by the drilling operation, said shank portion being hollow to form a fluid chamber divided from the hollow sleeve portion by a partition member and the hollow sleeve portion below said partition member forming an effluent chamber above the core surface with an outlet passage in the wall of the sleeve below said partition for removing the core cuttings, and flow ducts for supplying streams of fluid under pressure from the first-named fluid chamber to the spaces between the cutting teeth and above the cutting faces of the cross bars.

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