Sept. 14, 1926. 1,600,073

H. C. SMITH

ROTARY CORE BARREL AND DRILLING BIT

Filed June 22, 1925

Fig. 1

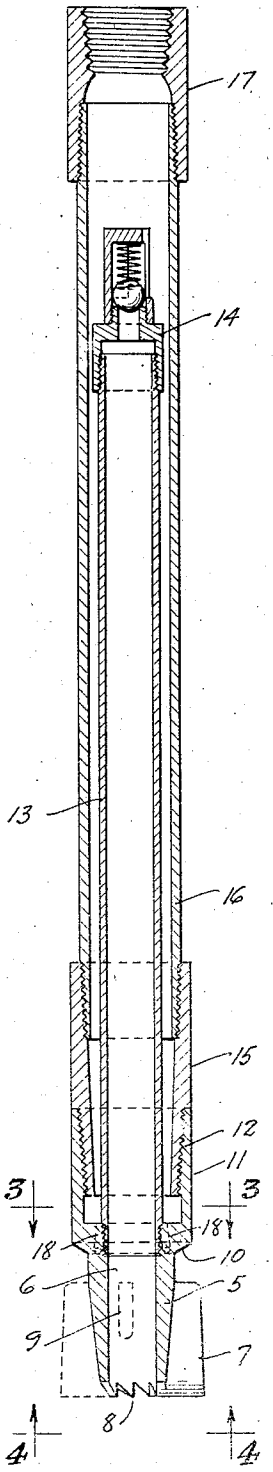



Fig. 3

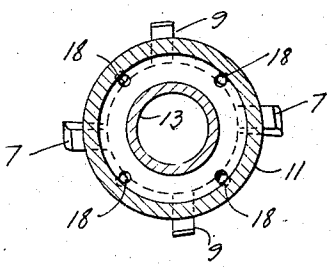



Fig. 4

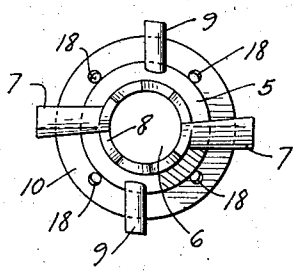
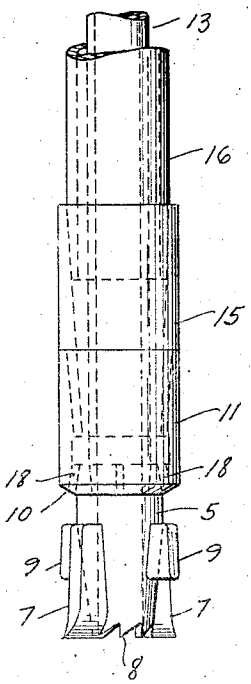



Fig. 2




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# UNITED STATES PATENT OFFICE.

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## ROTARY CORE BARREL AND DRILLING BIT.

Application filed June 22, 1925. Serial No. 38,654.

This invention relates to a tool for earth boring and pertains more particularly to a rotary hydraulic boring tool having lateral cutting blades. In tools of this character, it is common practice to employ two diametrically opposite fish tail blades. Such a tool advances through the formation rapidly and is efficient in this respect. However, two blades do not keep the tool centered in the hole, the tool wabbling and producing a hole which is not round.

If more than two blades are employed, it is found that the tool does not bite into the formation as rapidly. Efficiency of the tool in making hole is decreased, but the tool is maintained in centered alignment. Increasing the diameter of the body or stock of the tool above the cutter blades aids in maintaining the tool centered but interferes with circulation.

It is the primary object of this invention to provide a boring tool of the character described which has ribs interposed between cutting blades so as to keep the tool centered. These ribs are primarily for centering the tool. In addition to the broader objects of this invention, there are certain details of design, which produce a boring tool, which is efficient, durable, simple, and economical to manufacture.

These objects together with other objects and corresponding accomplishments are obtained by means of the embodiment of my invention illustrated in the accompanying drawing, in which:

Fig. 1 is an axial section through a complete tool; Fig. 2 is a fragmentary view in elevation of the tool; Fig. 3 is a section as seen on the line 3—3 of Fig. 1; and Fig. 4 is a section as seen on the line 4—4 of Fig. 1.

The invention is shown embodied in a tool adapted to take cores whereby the formation may be sampled. The present invention is especially adapted to a tool of this character, but not limited thereto.

The body 5 of the tool is tapered on the interior toward the bottom, there being a bore therethrough as indicated by 6. Extending from the body and radially thereof are cutter blades 7, which blades are flush with the mouth of the bore, the latter having cutting teeth to form a crown cutter 8. There are two cutter blades and interposed between the blades and extending from the body are ribs 9, the outer edges of the ribs lying in the periphery of the circle passing through the outer ends of the cutters. These ribs may incidentally aid in trimming the side wall of the hole, but their primary purpose is that of maintaining the tool centered. They do not serve to advance the hole and the lower edges are shown spaced a considerable distance above the lower cutting edges of the blades. An overhanging spaced shoulder 10 is provided on the body. This shoulder is spaced above the ribs and cutter blades for a purpose later referred to.

The upper portion of the body indicated by 11 is provided with a socket having a tapered threaded bore 12. The bottom of the socket is of larger diameter than the bore 6 of the body so that a water or slush space is provided. The bore 6 at the upper end is threaded and receives a retainer tube 13. Mounted upon the top of the retainer tube is a valve structure 14 having a check valve which permits passage of fluid from the retainer tube but not into the retainer tube. Threaded into the box 11 is an adapter 15 having a bore of greater internal diameter than that of the diameter of retainer tube 13 so as to provide an annular space about the retainer tube. The upper end of the adapter is internally threaded to receive a barrel 16. Secured to the top of the barrel is a fitting 17 having a tapered box adapted to receive a pin of a tool joint, whereby the tool may be connected to the drill pipe. Ports 18 lead from the water chamber in box 11, to the lower face of the shoulder 10 and above the blades 7 and ribs 9 so as to wash thereover.

The construction is such that the wash liquid is delivered to the blades and ribs and washes over the faces thereof. The ribs 9 do not interfere with the circulation of the wash, and the cuttings do not "ball up" in front of the blades or ribs. The cuttings may pass upwardly into the space between the shoulder and blades thereby freeing the space therebetween. It will be noticed that only two blades may be used, and yet the

ribs will maintain the tool centered during operation without interference with the circulation. While the structure is especially adapted for a tool employing two cutter blades, yet it is not limited to this number.

What I claim is:

1. In a rotary boring tool, a body, laterally extending cutter blades thereon, and ribs interposed between and in row with said blades and ending on their lower edges short of the cutting edges of said blades.

2. In a rotary boring tool, a body, a pair of fish tail blades on opposite sides thereof, and ribs interposed between and in row with said blades and projecting laterally from said body a distance radially substantially equal to the radial distance of said blades, said ribs ending short of the cutting edges of said blades.

3. In a rotary boring tool, a body having an overhanging ledge with water courses opening therethrough for directing circulation fluid axially downward, laterally extending cutter blades on said body below said ledge and spaced therefrom, and ribs on said body interposed between and in row with said blades, said ribs being spaced from said ledge and ending on their lower edges short of the cutting edges of said blades.

4. In a rotary boring tool, a body having an overhanging ledge with water courses opening therethrough for directing circulation fluid axially downward, laterally extending cutter blades on said body spaced below said ledge, ribs on said body projecting radially substantially the same distance as said blades, said ribs being spaced below said ledge between and ending short of the cutting edges of said blades so as to aid the latter in maintaining said tool centered during cutting operation.

5. In a rotary boring tool, a body having an overhanging ledge with water courses opening therethrough for directing circulation fluid axially downward, a pair of fish tail blades on opposite sides of said body disposed below said ledge and separated therefrom, and ribs interposed between and in row with said blades and projecting laterally from said body a radial distance substantially equal to the radial distance of said blades, said ribs being separated from said ledge and ending short of the cutting edges of said blades.

6. In a rotary boring tool, a body having a central tubular core bit, laterally extending cutter blades on said body, and ribs on said body interposed between and in row with said blades and ending on their lower edges short of the cutting edges of said blades.

7. In a rotary boring tool, a body having a central tubular core bit, a pair of fish tail blades on opposite sides of said body, and ribs interposed between said blades and projecting laterally from said body a radial distance substantially equal to the radial distance of said blades, said ribs ending short of the cutting edges of said blades.

8. In a rotary boring tool, a body having a central tubular core with a crown cutter at the lower end thereof, laterally extending cutter blades thereon having their cutting edges flush with the edge of said crown cutter, and ribs on said body interposed between said blades and ending on their lower edges short of the cutting edges of said blades.

9. In a rotary boring tool, a body having a central tubular core and a crown cutter, laterally extending cutter blades on said body having their edges flush with the edge of said crown cutter, ribs on said body projecting radially substantially the same distance as said blades and ending short of the cutting edges thereof so as to aid said blades in maintaining said tool centered during cutting operation.

10. In a rotary boring tool, a body having a central tubular core provided with a crown cutter at the lower edge, a pair of fish tail blades on opposite sides of said body and having their cutting edges flush with the edge of said crown cutter, and ribs interposed between said blades and projecting laterally from said body a radial distance substantially equal to the radial distance of said blades, said ribs ending short of the cutting edges of said blades.

11. In a rotary boring tool, a body having a central tubular core ending in a crown cutter and provided at the upper portion thereof with an overhanging ledge provided with water courses opening therethrough for directing circulation fluid axially downward, laterally extending cutter blades on said body having their cutter edges ending flush with the edge of said crown cutter, and ribs on said body interposed between said blades and ending on their lower edges short of the cutting edges of said blades.

12. In a rotary boring tool, a body having a central tubular core ending in a crown cutter and provided at the upper portion thereof with an overhanging ledge having water courses opening therethrough for directing circulation fluid axially downward, laterally extending cutter blades thereon, ribs on said body projecting radially substantially the same distance as said blades and ending short of the cutting edges thereof so as to aid said blades in maintaining said tool centered during cutting operation, the upper edges of said blades and ribs being spaced from said ledge and the cutting edges of said blades being flush with the edge of said crown cutter.

13. In a rotary boring tool, a body having a central tubular core ending in a crown cutter and provided at the upper portion thereof with an overhanging ledge having water courses opening therethrough for di-

recting circulation fluid axially downwardly, a pair of fish tail blades on opposite sides of said body, said blades being separated at their upper edges from said ledge and having their cutting edge flush with said crown cutter, and ribs interposed between said blades and projecting laterally from said body a radial distance substantially equal to the radial distance of said blades, said ribs being separated from said ledge and ending short of the cutting edges of said blades.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of June, 1925.

HERMAN C. SMITH.