

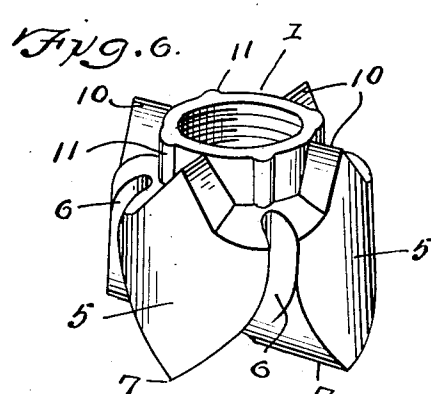
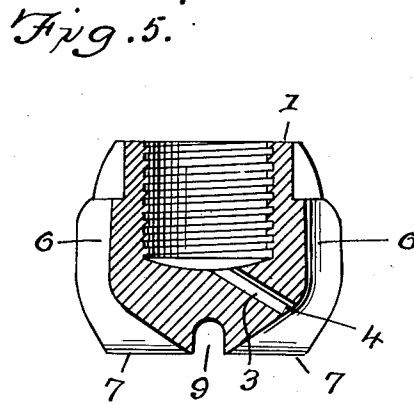
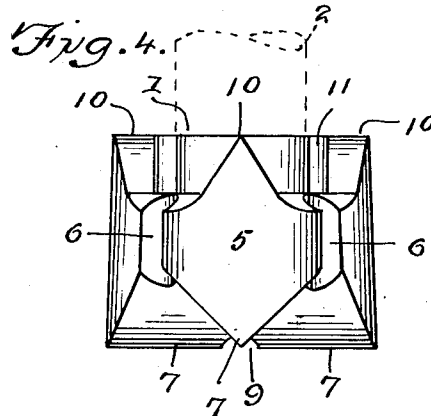
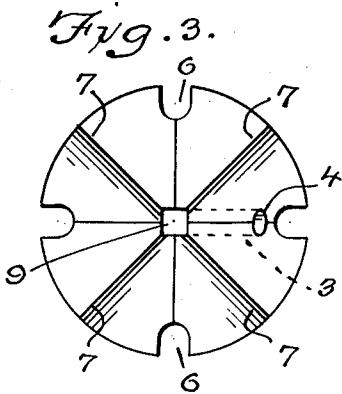
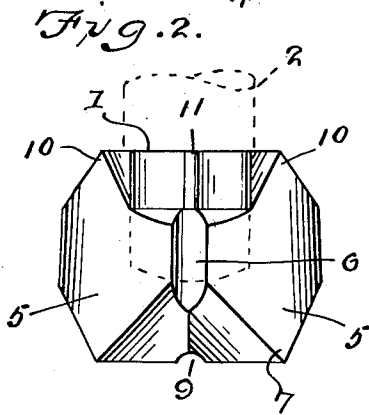
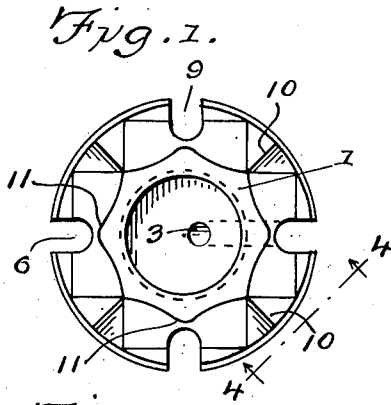
Aug. 22, 1950

F. G. TURNER

2,519,861

DOUBLE-ACTING DRILL BIT

Filed Jan. 14, 1947



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UNITED STATES PATENT OFFICE

2,519,861

DOUBLE-ACTING DRILL BIT

Frank G. Turner, Twin Falls, Idaho, assignor, by direct and mesne assignments, of nine-twentieths to John D. Bilbao and two-twentieths to Harry Povey, both of Twin Falls, Idaho

Application January 14, 1947, Serial No. 722,003

1 Claim. (Cl. 255—64)

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My present invention relates generally to earth boring tools, and more specifically to an improved double acting drill bit of the type having an impact or vibratory stroke and rotary action, for drilling wells and similar earth drilling or boring operations.

As is well known to those familiar with boring, fragments of rock from the wall of the hole being drilled, and other undesirable materials, frequently fall into the hole as it is being drilled, and lodge on top of the bit and within the wall of the hole. This excess material becomes wedged in the hole above the bit, impedes the operation of the bit, and frequently results in loss and abandonment of the bit due to the inability of the operator to extricate the bit from the jammed material.

The primary purpose of my invention is the provision of a bit that is capable of cutting itself clear of such excess material as the bit is being removed from the hole; and to this end the bit of my invention is equipped with double acting cutters, including a set of auxiliary cutters designed for action in breaking and pulverizing any excess material lodged above the bit. This action is attained by elevating the drive shaft and the bit mounted thereon, and the resulting debris may be disposed of in usual manner.

The invention consists in certain novel features of construction and combinations and arrangements of parts as will hereinafter be described and more specifically pointed out in the appended claim.

In the accompanying drawings I have illustrated one complete example of a physical embodiment of my invention wherein the parts are combined and arranged in accord with one mode I have devised for the practical application of the principles of my invention. It will however, be understood that changes and alterations are contemplated and may be made in these exemplifying drawings and mechanical structures within the scope of my claim, without departing from the principles of the invention.

Figure 1 is a top plan view of a drill bit in which my invention is embodied.

Figure 2 is a side view of the drill bit; and Figure 3 is a bottom plan view of the bit.

Figure 4 is a side view of the bit as seen from line 4—4 of Fig. 1.

Figure 5 is a central vertical sectional view of the bit; and Figure 6 is a perspective view of the bit of my invention.

In carrying out my invention I employ an integral bit, or bit stock, of generally cylindrical

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shape and fashioned of tool steel, with an upper cylindrical central collar 1 that is internally threaded to form an attaching socket for a conventional tubular drive shaft 2 which is shown in dotted lines in Figs. 2 and 4.

The tubular steel drive shaft in addition to operating the bit, is designed to convey air and water under pressure to the bit, and the latter is fashioned with a laterally extending conduit or duct 3 from the bottom of the socket which terminates in a discharge port 4 for blowing out the powdered rock and other debris resulting from the impact or vibratory strokes and the rotary action of the drill bit.

As here shown the integral bit stock or body is equipped with four circumferentially spaced lobes 5, each having an outer segmental or arcuate face conforming to the annular wall of the hole being drilled, and these four lobes form diametrically arranged vertical recesses, flutes, or grooves 6 for upward movement of the debris as it is cleared from beneath the bit.

Each lobe, at its lower end, terminates in a radially extending main cutter or cutting edge 7, and these four diametrically arranged cutters merge with the walls of a central clearance recess 9 of rectangular shape located in the working face of the tool.

In addition to the main cutters, each lobe 5, at its upper portion is formed with two acutely arranged angular faces that merge to provide a horizontally extending radial auxiliary cutter or cutting edge 10, and these auxiliary cutters, adapted to cut upwardly, extend inwardly from the outer convex faces of the lobes to the exterior surface of the collar 1.

The auxiliary cutters or cutting edges are shorter than the main cutters, and the auxiliary cutters have less width than the main cutters; but all of the cutters have the same overall exterior diameter that permits ready withdrawal of the tool from a bored hole.

Between the circumferentially spaced auxiliary cutters clearance spaces are provided over the main cutters into which spaces debris from the grooves or channels 6 flows, upwardly, and exterior ribs 11 arranged vertically on the collar above the channels, divide and aid in clearing the debris on its way up through the bored hole exterior of the drive shaft.

From this description taken in connection with my drawings it will be apparent that, in its drilling operation as it vibrates or reciprocates with a rotary action, the bit is effective in pulverizing rock and other hard materials and in disposing

of the debris in usual manner. In the drilling operations the auxiliary cutters on the upper parts of the lobes tend to clear the material flowing upwardly from the bit, and to prevent clogging or jamming of the bit. Should, however, excess material above the bit and within the bored hole become lodged or wedged over the bit and in the bored hole, the bit may be activated with upward strokes for dislodging any accumulated material that would impede removal of the bit from the bored hole.

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

In a drill bit, a body provided with an upper cylindrical collar, said collar being threaded interiorly to define an attaching socket, there being a laterally extending duct leading from said socket, a plurality of circumferentially spaced arcuate lobes arranged on the exterior of said body, said lobes having a smooth exterior surface lying in a circle of a common radius, said lobes defining spaced, parallel grooves therebetween, the lower end of each of said lobes terminating in a main cutting edge, said main cutting edges extending radially of the longitudinal axis of the bit, the inner portion of the main cutting edges being cut away to define a

central recess, the upper portion of each of said lobes being provided with angular faces inclined upwardly to define auxiliary cutters, said auxiliary cutters extending radially of the longitudinal axis of the bit, said auxiliary cutters extending inwardly from the outer surface of the lobes to the exterior surface of the collar, horizontal faces on the upper ends of the lobes merging with the lower ends of said angular faces, and a plurality of spaced parallel vertically disposed ribs arranged on the exterior of said collar, said ribs being positioned intermediate the auxiliary cutters.

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