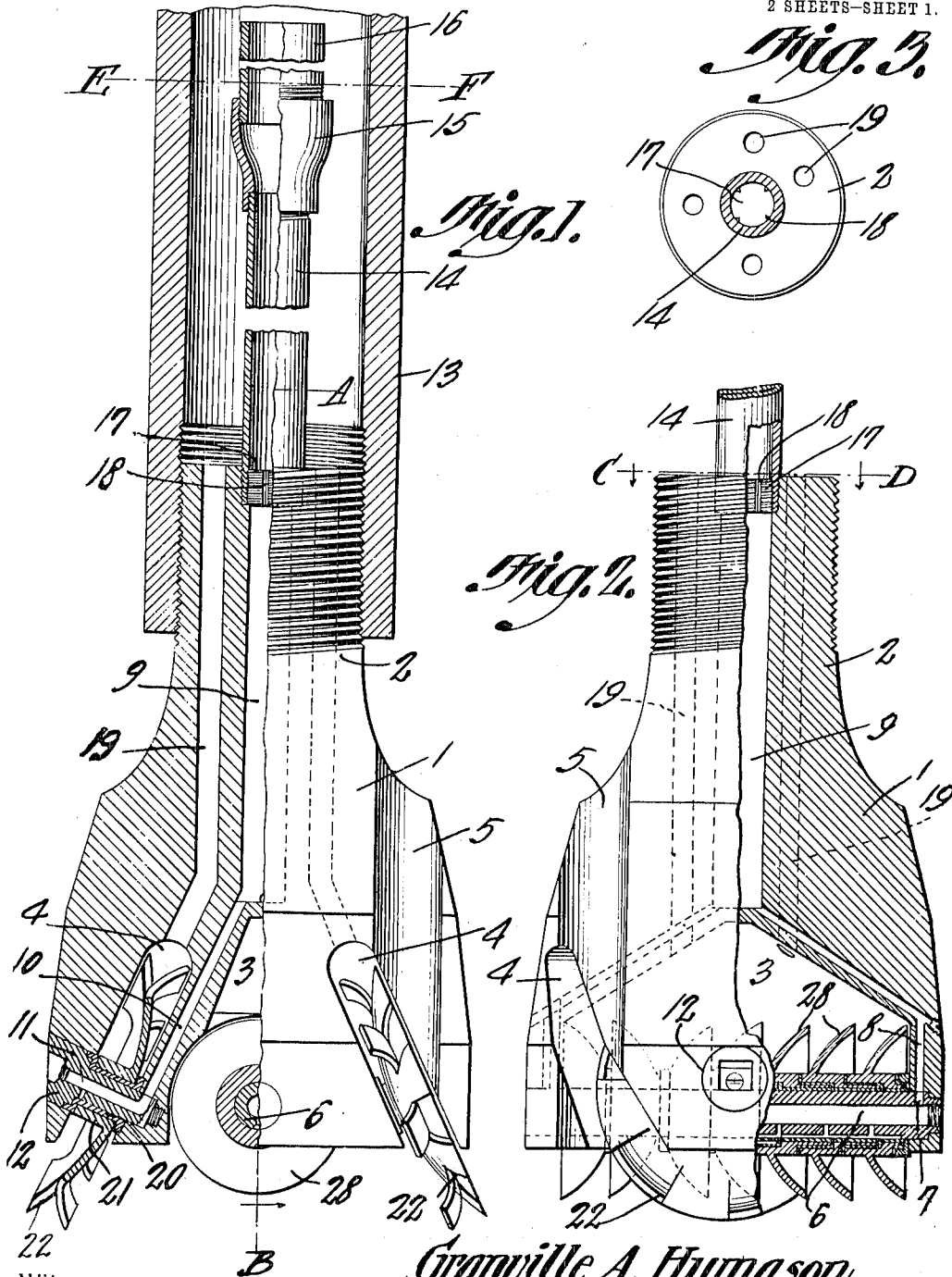


1,120,198.

Patented Dec. 8, 1914.

2 SHEETS-SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

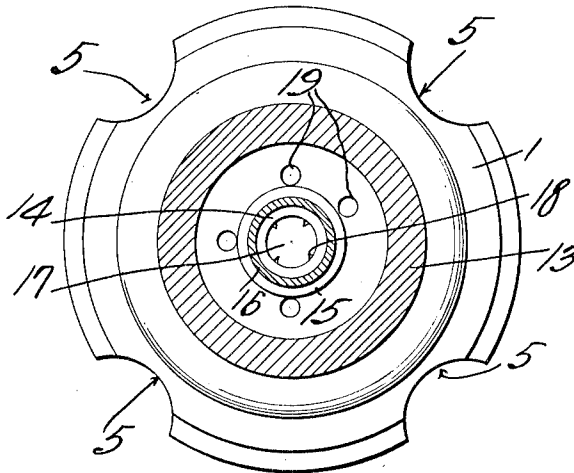


Fig. 7.

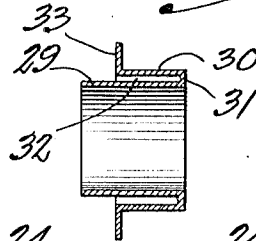


Fig. 8.

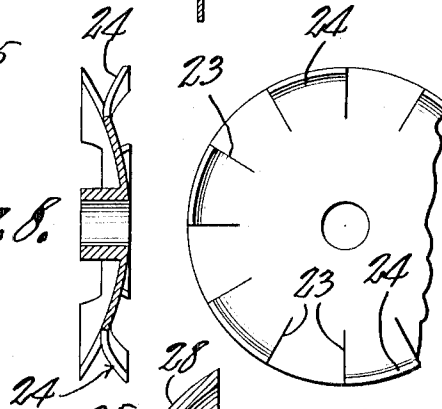


Fig. 9.

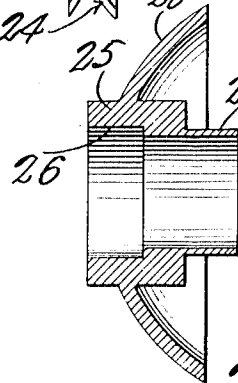


Fig. 6.

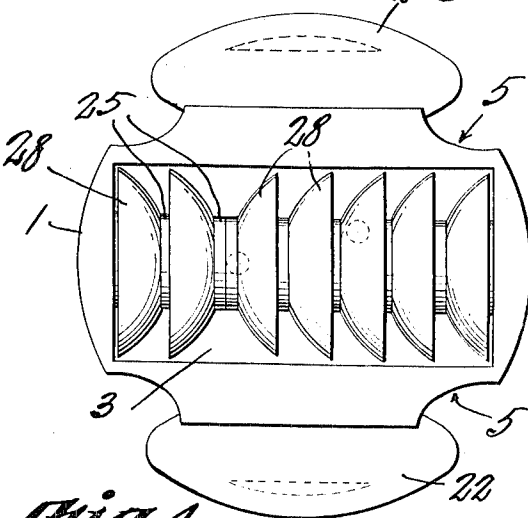


Fig. 4.

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DRILL.

1,120,198.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed April 7, 1913. Serial No. 759,524.

To all whom it may concern:

Be it known that I, GRANVILLE A. HUMASON, a citizen of the United States, residing at Shreveport, in the parish of Caddo and State of Louisiana, have invented a new and useful Drill, of which the following is a specification.

This invention relates to drills particularly designed for use in cutting through gumbo and like substances, the invention being more particularly an improvement upon the structure disclosed in an application filed by me on February 10, 1913, said application bearing Serial No. 747,461.

One of the objects of the invention is to provide the drill with plowing or digging means of novel form which, during the rotation of the drill, will plow into the substance to be removed, thereby loosening it so that it will be carried off by a current of water directed onto said cutting means.

A further object is to provide a drill head so shaped as to permit water and all substances mixed therewith, to flow freely out of the bore without danger of clogging.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings, the preferred forms of the invention have been shown.

In said drawings:—Figure 1 is a view partly in section and partly in elevation of a drill having the present improvements combined therewith. Fig. 2 is another view partly in section and partly in elevation of the drill, that portion thereof in section being taken on the line A—B Fig. 1. Fig. 3 is a section on line C—D Fig. 2. Fig. 4 is an elevation of the lower end of the drill. Fig. 5 is a section on line E—F Fig. 1. Fig. 6 is an enlarged section through one of the end cutters. Fig. 7 is a section through one of the bushings used in connection with the end cutters. Fig. 8 is a section through one of the side cutters. Fig. 9 is a face view of said side cutter shown in Fig. 8.

Referring to the figures by characters of reference 1 designates a head having a threaded stem 2, this head being provided, in its active end, with a recess 3 extending diametrically across said end and between channels 4 which converge inwardly within the head. Grooves or sluices 5 are formed in the outer face of the head and intersect the ends of the channels 4 so that water can thus flow freely along the outer side of the head.

A tubular bearing shaft 6 is secured in any suitable manner within the head and extends longitudinally along the center of the recess 3. The ends of this shaft are formed with ducts 7 constantly registering with passages 8 designed to convey a lubricant to the interior of the shaft from a bore 9 formed in the head 1 and its stem 2. Additional lubricant passages 10 are formed in the head 1 and extend from bore 9 to bores 11 formed longitudinally within bearing pins 12 which extend across the channels 4, these bearing pins being similar to those disclosed in my application hereinbefore referred to.

A tubular drill rod 13 engages the threaded stem 2 of the head and extends around a tubular lubricant container 14 which engages the stem 2 and opens into the bore 9. This lubricant container 14 is preferably provided with a coupling 15 connecting it to a larger tube 16 for containing a lubricant. Thus it will be seen that the coupling 15 forms an interior shoulder constituting means for retarding the movement of a lubricant downwardly within the tubular container. The lower end of the container 14 has a screw threaded plug 17 seated therein, this plug being formed with longitudinal grooves 18 in its periphery forming outlets for the lubricant within the container 14 whereby said lubricant can pass into the bore 9. The container 14 and the tube 16 are adapted to hold a paste-like lubricant and the drill rod 13 is adapted to hold water being supplied to the cutting elements hereinafter described. A portion of this water is adapted to press on the lubricant within the container 14—16 so as to cause it to press through the grooves 18 and into bore 9 from which it is distributed to the various smaller bores at which points the lubricant is heated and liquefied by the

heat generated from the frictional engagement of the cutting devices with the material being cut.

Water ducts 19 are formed in the head 1 and serve to convey water from the interior of the tubular rod 13 to the channels 4 and also to the recess 3. One of these ducts extends to each channel 4 while two additional ducts extend to the recess 3, said ducts opening into the recess adjacent opposite ends thereof.

Arranged on each bearing pin 12 is a bushing 20 and mounted on the bushing is the hub 21 of a concavo-convex disk or colter 22, the lower portion of the periphery of which extends outwardly beyond the wall of the head 1. As shown this disk is formed with a plurality of radial incisions 23 forming tongues 24 which can be bent backwardly, as shown particularly in Fig. 8 so that, when the disk rotates, it will cut a wider path than would be the case should an ordinary concavo-convex disk be used. However, if desired, an ordinary concavo-convex disk may be used in lieu of the form illustrated. Such a disk is well known in the art and it is not believed to be necessary to illustrate the same.

Mounted on the tubular shaft 6 is a series of cutters, one of which has been shown in detail in Fig. 6. Each cutter includes a hub 25 having a counter bore 26 extending thereinto from one end up to a point adjacent the center of the hub. From the other end of the hub extends a circular flange 27. A concavo-convex body 28 extends from the hub and has the appearance of an ordinary colter disk. The hub is adapted to bear upon a bushing of peculiar construction and which has been shown in detail in Fig. 7. This bushing includes an inner cylindrical portion 29 adapted to fit snugly on the shaft 6. A sleeve 30 extends around a portion of the tube 29 and is connected thereto at one end by a web 31. The recess 32 so formed is so proportioned as to receive snugly the flange 27 of one of the hubs 25. An annular flange 33 extends from the free edge of the sleeve 30 and is adapted to extend between hubs of adjacent cutting elements. The counter bore 26 in each hub is of sufficient size to receive not only a portion of the tubular portion 29 of the bushing, but also the sleeve 30, the web 31, and the flange 29 of the next adjoining hub. This arrangement of parts has been clearly illustrated in Fig. 2.

As shown in Fig. 4, the cutting elements mounted on shaft 6 are disposed in two series, the elements of one series being disposed oppositely to those of the other series and one series containing a greater number of cutting elements than the other so that one series of cutting elements will extend across the axis of rotation of the head 1.

In using the device herein described, the

bore 9 and the container 14—16 are filled with a lubricant in the form of a paste, it being understood of course that the plug 17 is to be seated in the upper end portion of bore 9 as shown. The drill is then lowered against the surface to be cut and water is supplied to the interior of the tubular rod 13 so as to flow through the ducts 19 into the channels 4 and recess 3. Thus said channels and the recess will be thoroughly flushed and the water after passing under the drill head will flow upwardly freely through the grooves or sluices 5 and carry therewith all substances which may have been cut out by the drill. As the drill is moved upwardly and downwardly, it is gradually rotated and the disks 28 thus plow into the bottom of the bore and loosen the material in the paths thereof, this material being washed away as soon as loosened. At the same time the concavo-convex side cutters 22, which are disposed along lines converging upwardly, will cut into the side portion of the bore so as to make a bore the diameter of which is greater than that of the head 1. As soon as material is cut away by these disks 22, the said material will be flushed out of the bore by the water supplied thereto in the manner hereinbefore stated. By arranging the cutters as shown, all parts of the bottom of the bore will be reached thereby and no portion of the bottom will be left standing uncut. The engagement of the cutters and the head with the material in the bore will soon raise the temperature of the head so that the lubricant contained within the various ducts will be heated and liquefied and thus flow by gravity to the various bearings. Furthermore the water contained within the tubular rod 13 will bear downwardly upon the lubricant within the tube 16 so as to force the lubricant downwardly slowly through the grooves 18 and into the bore 9.

What is claimed is:—

1. A drill including a head having channels extending thereinto along converging lines, and concavo-convex cutters mounted for rotation within the channels and having their concave faces outermost.

2. A drill including a head having concavo-convex side cutters revoluble in planes converging into the head, the concave faces of the cutters being outermost.

3. A drill including a head having inwardly converging channels in its active end, inwardly converging concavo-convex cutters mounted for rotation within the respective channels and having their concave faces outermost and fitted close to the outer walls of the channels in which they are mounted, said cutters projecting beyond the periphery of the head.

4. A drill including a head having a diametrical recess within its active end, there

being inwardly converging channels within
said end and at opposite sides of the recess,
a concavo-convex disk mounted for rota-
tion within each of the channels, said disk
5 having its concave face outermost and its
cutting edge disposed close to the outer wall
of the channel and projecting beyond the
active end and the periphery of the head, a
tubular bearing shaft disposed longitudi-
10 nally within the recess and held against ro-
tation, said shaft having inlets adjacent its
ends and a plurality of outlets, means for
directing a lubricant to said inlets, a plu-
rality of concavo-convex cutters carried by
15 the shaft and within the recess, said cutters
extending beyond the active end of the head,
each cutter including a hub, and a circular
flange extending from one end of the hub,
the other end of the hub being formed with
20 a recess, a plurality of cylindrical bushings
mounted on the shaft, each bushing having a
concentric sleeve around one end portion

thereof to form an annular recess, there be-
ing an annular flange upon the sleeve, the
flange on each hub being adapted to be 25
seated in the recess in one bushing and said
bushing with the flange therein being adapt-
ed to be seated in the recess in one of the
hubs, the annular flanges on the bushing
constituting means for spacing the hubs. 30

5. A bit including a head having channels
extending into the active end thereof, and a
cutting element mounted for rotation within
each channel and projecting beyond the ac-
tive end of the bit, said element including 35
a concavo-convex disk having outwardly
diverging peripheral tongues.

In testimony that I claim the foregoing
as my own, I have hereto affixed my signa-
ture in the presence of two witnesses.

GRANVILLE A. HUMASON.

Witnesses:

SELINA WILLSON,
JOHN L. KIMBELL.