

No. 694,534.

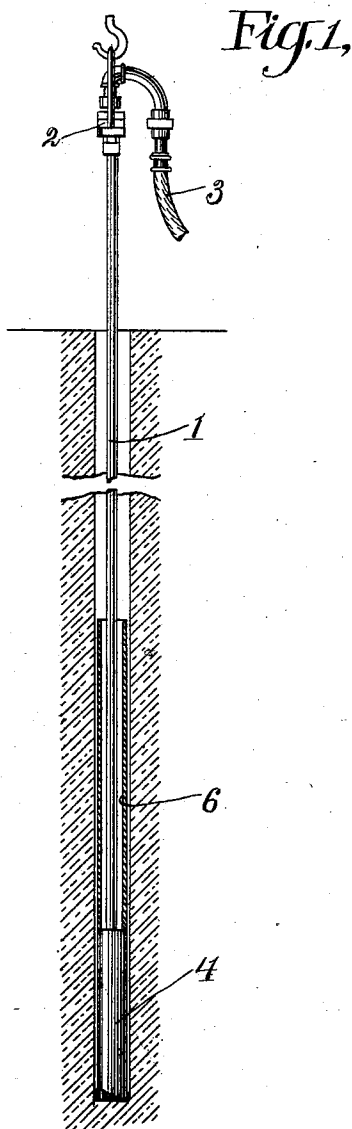
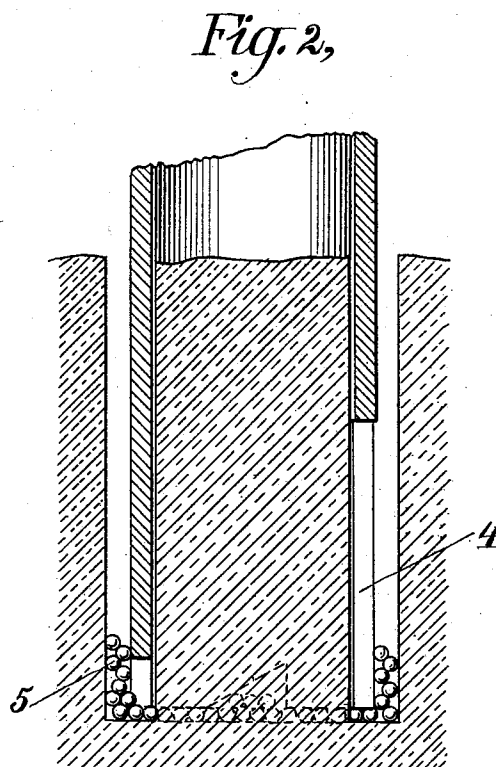
Patented Mar. 4, 1902.

F. H. DAVIS.

PROCESS OF BORING HOLES IN ROCK, &c.

(Application filed Aug. 8, 1901.)

(No Model.)



WITNESSES:

M. M. Conover.

INVENTOR

Francis H. Davis

BY

Chapin & Haymond
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANCIS H. DAVIS, OF NEW YORK, N. Y., ASSIGNOR TO DAVIS CALYX DRILL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA.

PROCESS OF BORING HOLES IN ROCK, &c.

SPECIFICATION forming part of Letters Patent No. 694,534, dated March 4, 1902.

Application filed August 8, 1901. Serial No. 71,287. (No specimens.)

To all whom it may concern:

Be it known that I, FRANCIS H. DAVIS, a subject of the King of Great Britain, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Processes of Boring Holes in Rock or Similar Material in the Earth's Strata, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My improved process refers particularly to the boring of holes in rock or similar material forming a part of the earth's strata, and consists in milling or grinding an annular channel in the same with a free or loose material, in forcing water into the hole to carry up the millings or grindings as they are produced, in so regulating the force of water that the same shall, after the hole has been bored a predetermined distance, be sufficient to carry up the millings or grindings a portion of the distance only to the surface of the hole, the force being so regulated as to be not sufficient to carry the milling or grinding material therewith, and in catching the said millings or grindings so carried upwardly at a point intermediate of the top and bottom of the hole.

My improved process permits the use of the "shot system," as it is known in the art, for boring to a very much greater depth than has heretofore been possible. Heretofore it has only been possible to use the shot system for holes of inconsiderable depth, for the force of water necessary to be used in carrying up the millings or grindings from the bottom to the surface of the hole where the hole is of considerable depth would necessarily be sufficient to also carry up the shot or milling material therewith. This is especially true of holes of large diameter. In carrying out my improved process I regulate the force of water so as to carry up the millings or grindings a predetermined distance only, and hence the force or head of water employed may be substantially the same regardless of the depth of the hole. I then catch the material so carried upward at a point intermediate the bottom and top of the hole, and thus prevent the same from falling back and clogging or jamming the drill-head.

In the drawing herewith, and which forms a part of this specification, I have shown such portions of an apparatus as is necessary for a complete understanding of my invention and with which my improved process may be carried out.

Figure 1 therein is a view in vertical sectional elevation of a drill as it would appear at work boring in the earth's strata and with which my improved process may be carried out. Fig. 2 is an enlarged sectional detail view of a portion of the same, taken at the foot of the hole.

The boring-rod 1 therein shown is preferably hollow, and is connected at its upper end with a suitable swivel 2 and a water connection 3. Suitable rotating apparatus (not shown herein) will be applied to the boring-rod in order to rotate same in a manner well known. The lower end of the hollow boring-rod is provided with a boring-head 4, suitable for receiving and rotating a free or loose material, (designated by the reference character 5.) This free or loose material is commonly called "shot" in the art, and preferably comprises a number of small chilled-iron spheres, and the rotation of the boring-head 4 produces a milling or grinding action upon the rock or similar material through the medium thereof. So far the apparatus is well known and commonly used in the art.

Water is forced through the hollow boring-rod 1, through the water connection 3, and the swivel-head 2, and the same passes through the boring-head 4 and up around the boring-head and the boring-rod, carrying with it the millings or grindings. The force or pressure of this water must not be sufficient to carry away the milling or grinding material 5, and the limit of depth to which the hole has been made under the shot system prior to my invention has been reached when the force of water required to carry the millings or grindings up to the surface has substantially reached the point at which the milling or grinding material would also be carried up. In my process, however, I do not attempt to apply a sufficient force of water to carry the millings or grindings up to the surface of the hole after the latter has reached a predetermined depth, but merely

apply a sufficient force to carry them a part of the way up, and I then catch them at a point intermediate of the bottom and the top of the hole. For this purpose I provide any
5 suitable receiver, and have herein shown a cup 6, carried by the drill rod and head, and in which the grindings or millings may be received. By this means I am enabled to carry the hole down to an indefinite depth, for the
10 force of water has no relationship to the depth of the hole.

I do not desire, of course, to be limited to this particular form of apparatus shown and described, as the apparatus in itself forms no
15 part of the present invention, the invention herein residing entirely in a new and improved process.

What I claim is—

The herein-described process of boring
20 holes in rock, or similar material in the earth's strata, which consists in milling or

grinding the same with a free or loose material, introducing water under pressure into the hole to carry up the millings or grindings, and, after the hole has reached a pre-
25 determined depth, maintaining a substantially uniform pressure upon the water at the bottom of the hole, regardless of the depth of the latter, to carry the millings or grindings a portion of the way only to the sur-
30 face of the hole without carrying the milling or grinding material therewith, and catching said millings or grindings at a point intermediate the bottom and top of the hole, substantially as set forth.

In witness whereof I have signed my name
35 to this specification in the presence of two subscribing witnesses.

FRANCIS H. DAVIS.

Witnesses:

ABRM. H. GOLDBERG,
M. M. CONOVER.