

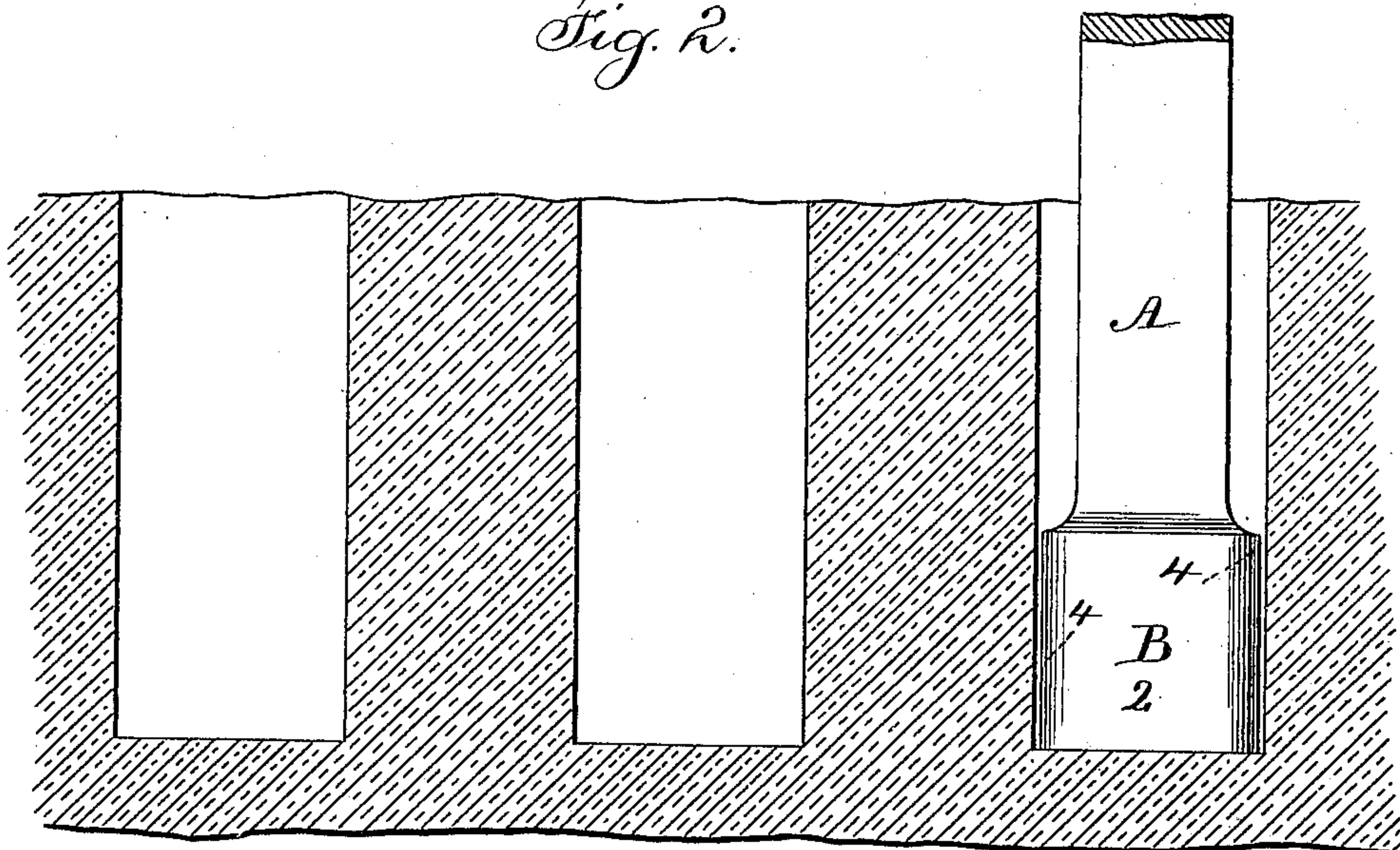
(No Model.)

G. M. GITHENS.  
ROCK DRILLING AND SPLITTING.

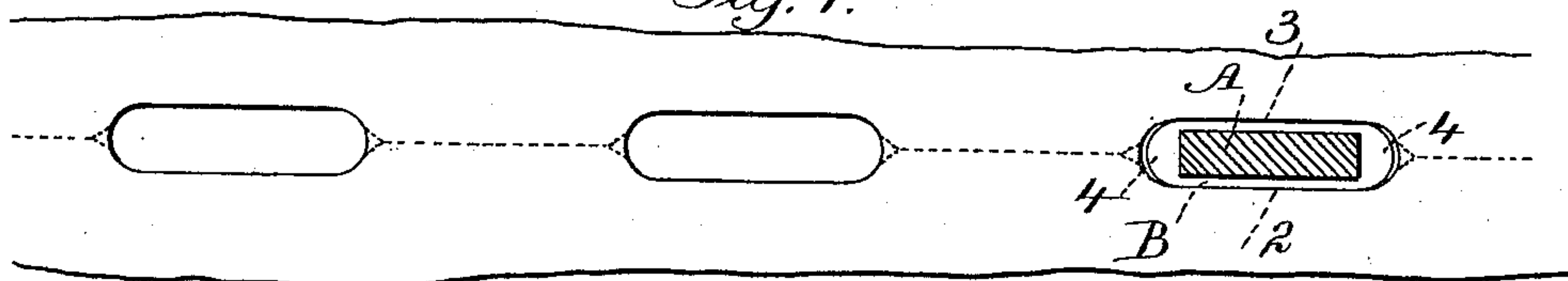
No. 486,101.

Patented Nov. 15, 1892.

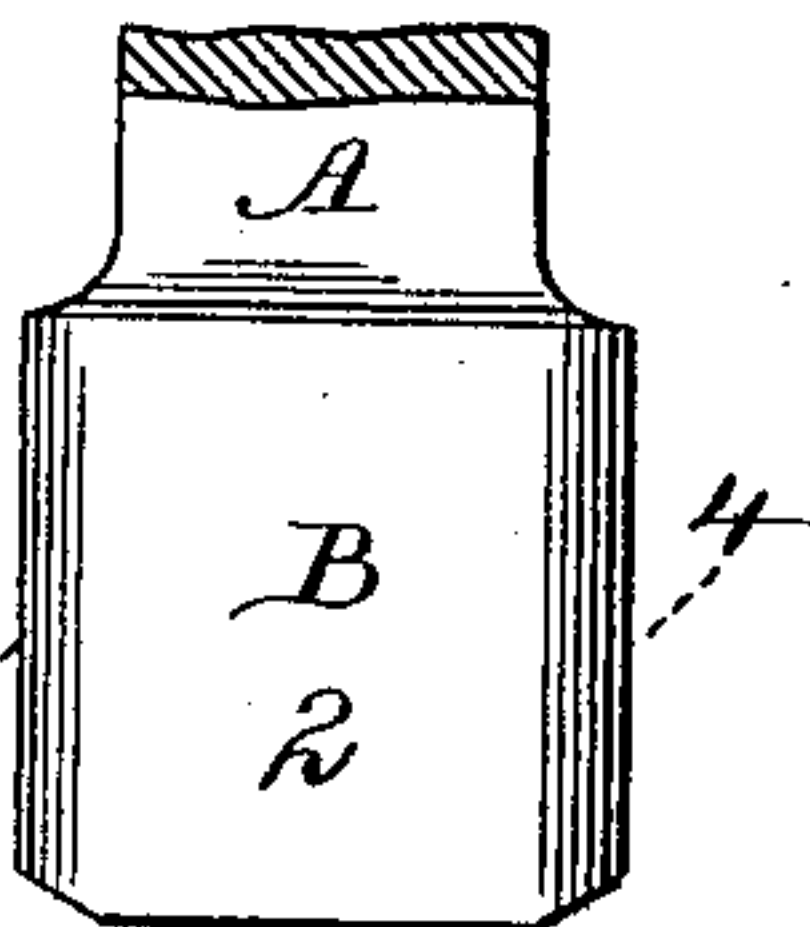
*Fig. 2.*



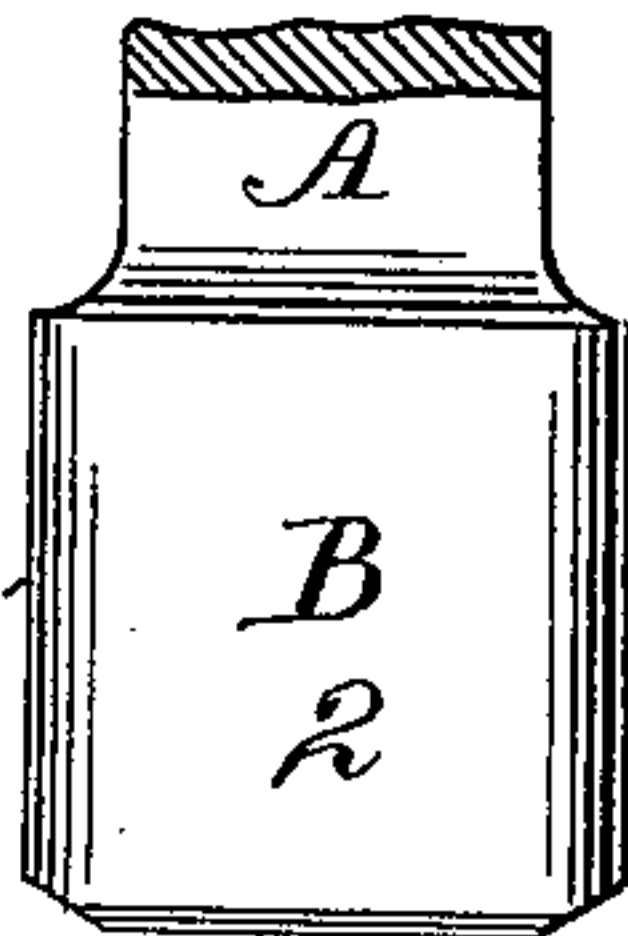
*Fig. 1.*



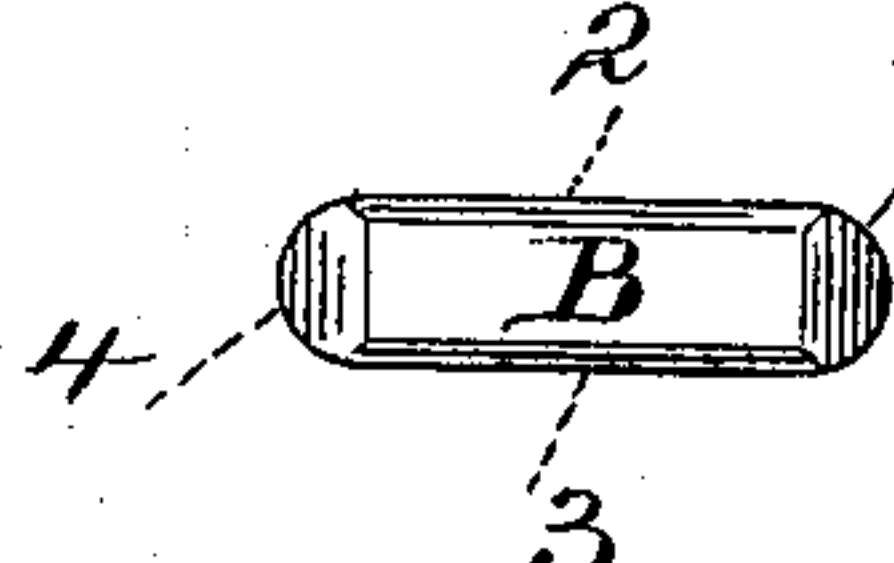
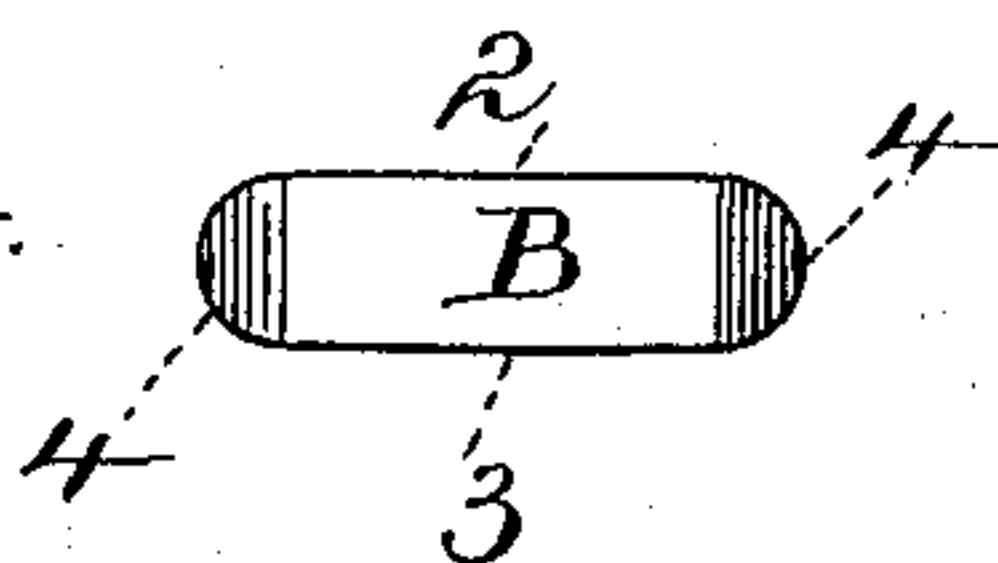
*Fig. 3.*



*Fig. 5.*



*Fig. 4.*



*Fig. 6.*

Witnesses

Chas H. Smith  
J. Staib

Inventor

George M. Githens  
per Lemuel W. Serrell  
Atty.



# UNITED STATES PATENT OFFICE.

GEORGE M. GITHENS, OF BROOKLYN, NEW YORK.

## ROCK DRILLING AND SPLITTING.

SPECIFICATION forming part of Letters Patent No. 486,101, dated November 15, 1892.

Application filed July 7, 1892. Serial No. 439,229. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE M. GITHENS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Rock Drilling and Splitting, of which the following is a specification.

In Letters Patent No. 395,105, granted December 25, 1888, to J. W. Wyckoff, a rock-drill is represented for drilling elliptical holes with V-shaped ends, and in Patents Nos. 257,727, granted to F. A. Lane May 9, 1882, and 257,730, granted to E. P. Lynch May 9, 1882, devices are represented for forming a channel or channels at the sides of a round hole, and in Patents Nos. 291,606, granted to J. L. L. Knox January 8, 1883, and 475,647, granted to G. L. Weller May 24, 1892, devices are represented for forming holes in rocks with straight sides and V-shaped ends, and in Letters Patent No. 371,679, granted to me October 18, 1887, a method of and tools for drilling rock are set forth, in which the drill is adapted to make an elliptical hole or a half-elliptical hole with a flat side.

The present improvements are made for the purpose of overcoming difficulties heretofore experienced in the use of either one or more of the before-mentioned devices. Where the hole that is being drilled is a flat or narrow ellipse with sharp or V-shaped ends there is difficulty in keeping the tool from breaking, as the edges of the tool for channeling the rock are liable to wear away with rapidity or to chip because they are thin. In cases where a tool is made with flat sides and V-shaped ends the angles of the drill score the rock, leaving channels or angles at the junctions of the sides with the V-shaped ends, as well as the V-shaped angles at the opposite ends or edges of the drill. In consequence of these channels in the rock when an explosion takes place the force of the explosion is exerted equally, or nearly so, in all six of the scores or channels that are left in the rock by the tool. The consequence is that the splitting operation is liable to commence in either one of the angles or scores, and thus the face of the stone is injured by cracks in the surface thereof, and the line of cleavage through the opposite or end scores in the rock is only the

result of the superior pressure upon the comparatively-flat surfaces of the hole.

In my present improvement I make the tool with flat or nearly-flat sides and with rounding or semicylindrical ends, so that the drilling operation performed upon the rock may result in a hole that is as narrow in width as possible and as long in the other direction as consistent with the convenience in the manufacture of the tools and in the handling of the same, and the vertical ends of the hole are semicircular. Hence when the explosion takes place there are two flat or nearly-flat surfaces for the pressure to act upon, and the extent of surface is sufficiently great to prevent the disintegration of the rock itself where the explosion acts upon the same, and such explosion simply tends to crack and open the rock in the line of the greatest diameter of the holes, and there are no scores or angles between the flat sides of the hole and the rounding ends, and for this reason there is nothing that will produce a false or imperfect line of cleavage.

It is advantageous in making use of the present improvements to introduce water into the hole and to have the end of the drill square or flat, so that the drilling operation may be performed in the manner set forth in Patent No. 371,679.

In the drawings, Figure 1 is a plan view showing a row of holes, and Fig. 2 is a vertical section representing some of the holes as bored and another hole as containing the drill. Fig. 3 is a side view, and Fig. 4 is an inverted plan, of a drill with beveled edges to the face; and Figs. 5 and 6 are similar views with all the edges of the face slightly beveled.

The shank or handle of the drill is a bar A, preferably oblong in cross-section and as thin as consistent with the proper strength, and the width of this bar will depend upon the strength required and the measurement of the hole to be drilled.

The head B of the drill is oblong with flat sides and rounded ends and of the proper length to provide for the required extent of wear, and it is welded or otherwise permanently secured to the shank A, and the lower end of the drill-head is a flat face, so that the drilling action is effected by the concussion of the face against the rock; and this is most



efficacious when water is introduced into the hole and the drilling operation is carried on in the manner set forth in my aforesaid patent, No. 371,679, in order that the water may serve to wash out the fine disintegrated rock that results from the concussion of the drill-head against the same.

It will now be observed that the flat sides 2 3 of the drill-head present a much larger surface in guiding the drill in the drilling operations than the rounded ends 4 of the drill. Hence there is very little risk of the hole that is drilled becoming much wider than the thickness of the drill-head; but the hole may become longer in the other direction, and this is advantageous, because the extent of surface upon which the pressure resulting from the explosion acts is thereby increased, and under all circumstances the drill will maintain its original size and shape, or nearly so, with the exception of the wear upon the operative face shortening the length of the drill-head, and this is especially the case where water is provided in the drill-hole, so that the water intervenes all around the drill-head between the same and the stone.

After the desired number of holes have been drilled in line with each other powder is introduced and the charges are fired as nearly simultaneously as possible, and in consequence of the peculiar shape of the holes heretofore described there is no tendency to break or injure the surface of the stone; but the action is simply to split the stone between one hole and the next in a plane passing through the holes in the direction of their longest diameters, or nearly so, and by my improvement the drill is rendered much more durable and the drilling operation much more simple than in the devices heretofore referred to.

In some kinds of rock the edges of the face at the rounding ends of the drill may be liable to break. To avoid this risk, the edges of the drill-face may be beveled, as indicated in Figs. 3 and 4, or all the edges of the face may be slightly beveled, as shown in Figs. 5 and 6. If desired, the end portions of the hole may be V-shaped or channeled, as shown by

dotted lines in Fig. 1. Under most circumstances this is not necessary, because the force of the explosion in acting upon the flat sides of the hole will separate the rock in a regular plane of cleavage without injury from cracks that are almost sure to commence in angles that may be formed in the hole.

By my improvement there are no angles to produce false cracks and injuries to the face of the stone and the use of grooving-tools is rendered unnecessary; but when preferred grooves or channels can be made in the well-known manner.

I claim as my invention—

1. A rock-drill having a shank and a head that is comparatively thin, with flat sides and rounded ends, whereby the hole as drilled is much longer in one direction than the other and has flat or nearly-flat sides and round ends, substantially as set forth.

2. The method herein specified of drilling and splitting rock, consisting in drilling into the rock a range of holes, each hole being much wider in the line of cleavage than in the opposite direction and with flat sides and rounded ends to such hole, and introducing into such holes powder and exploding the same, so that the powder may act between the nearly-flat opposite surfaces to pry the stone apart in the line of cleavage and in a plane passing through the longest diameter of the holes, whereby false cracks and injury to the surface of the stone are avoided, substantially as set forth.

3. A rock-drill having a shank and a head that is comparatively thin, with flat sides and rounded ends, and a face that is flat and beveled on two or more of its edges, whereby the hole as drilled is much longer in one direction than the other and has flat or nearly-flat sides and round ends, substantially as set forth.

Signed by me this 2d day of July, 1892.

GEO. M. GITHENS.

Witnesses:

GEO. T. PINCKNEY,  
WILLIAM G. MOTT.