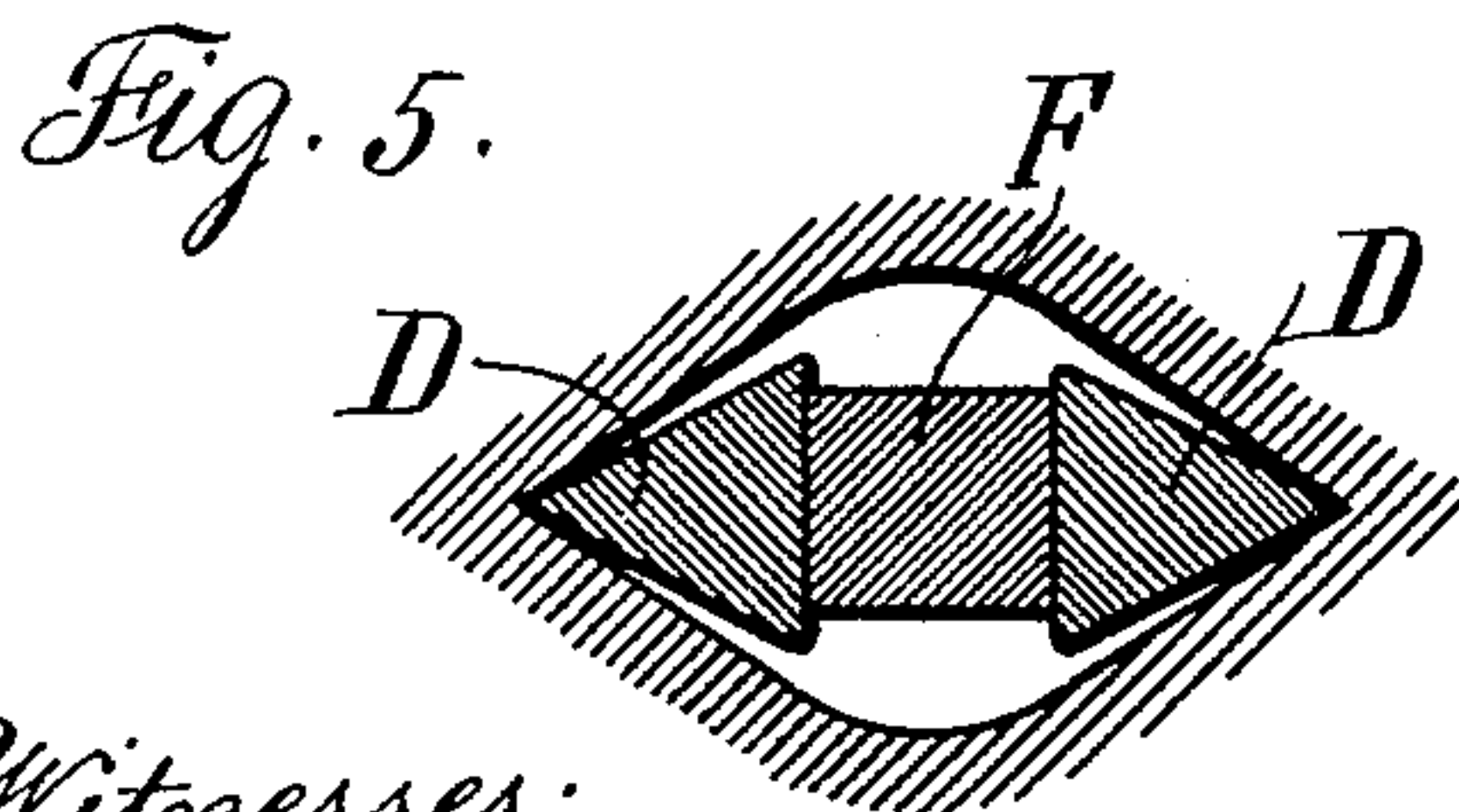
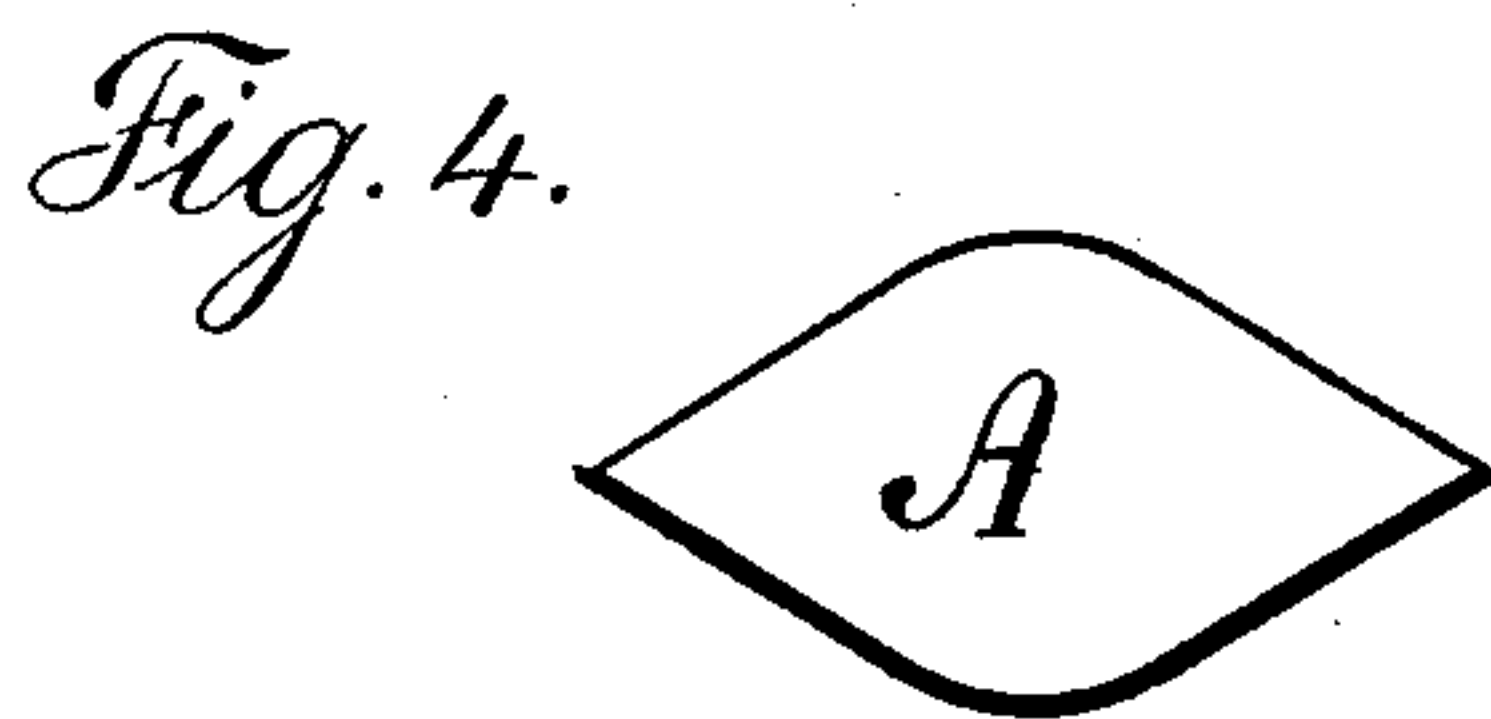
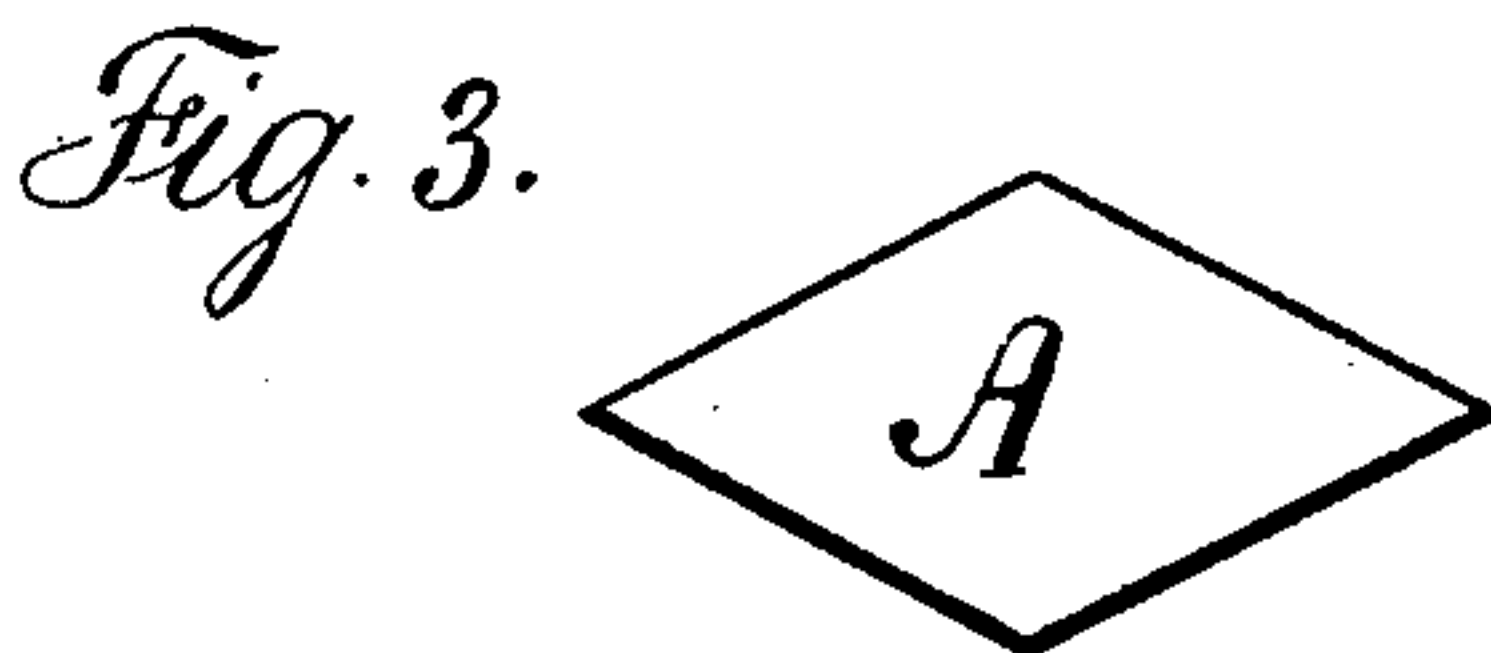
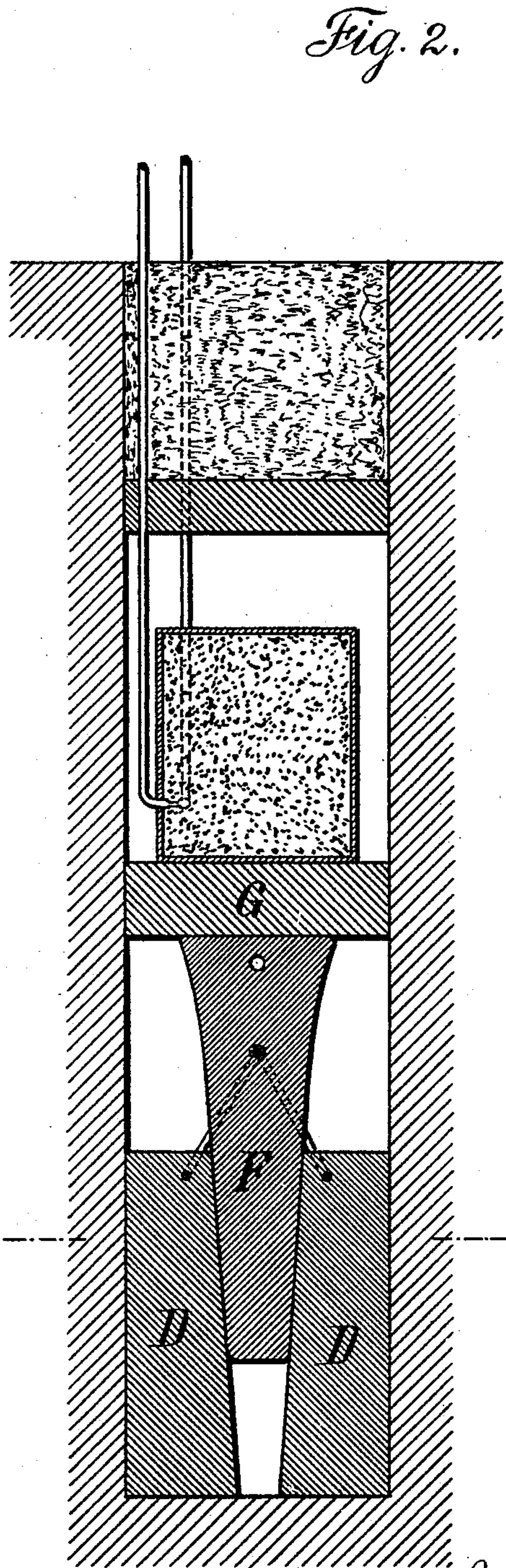
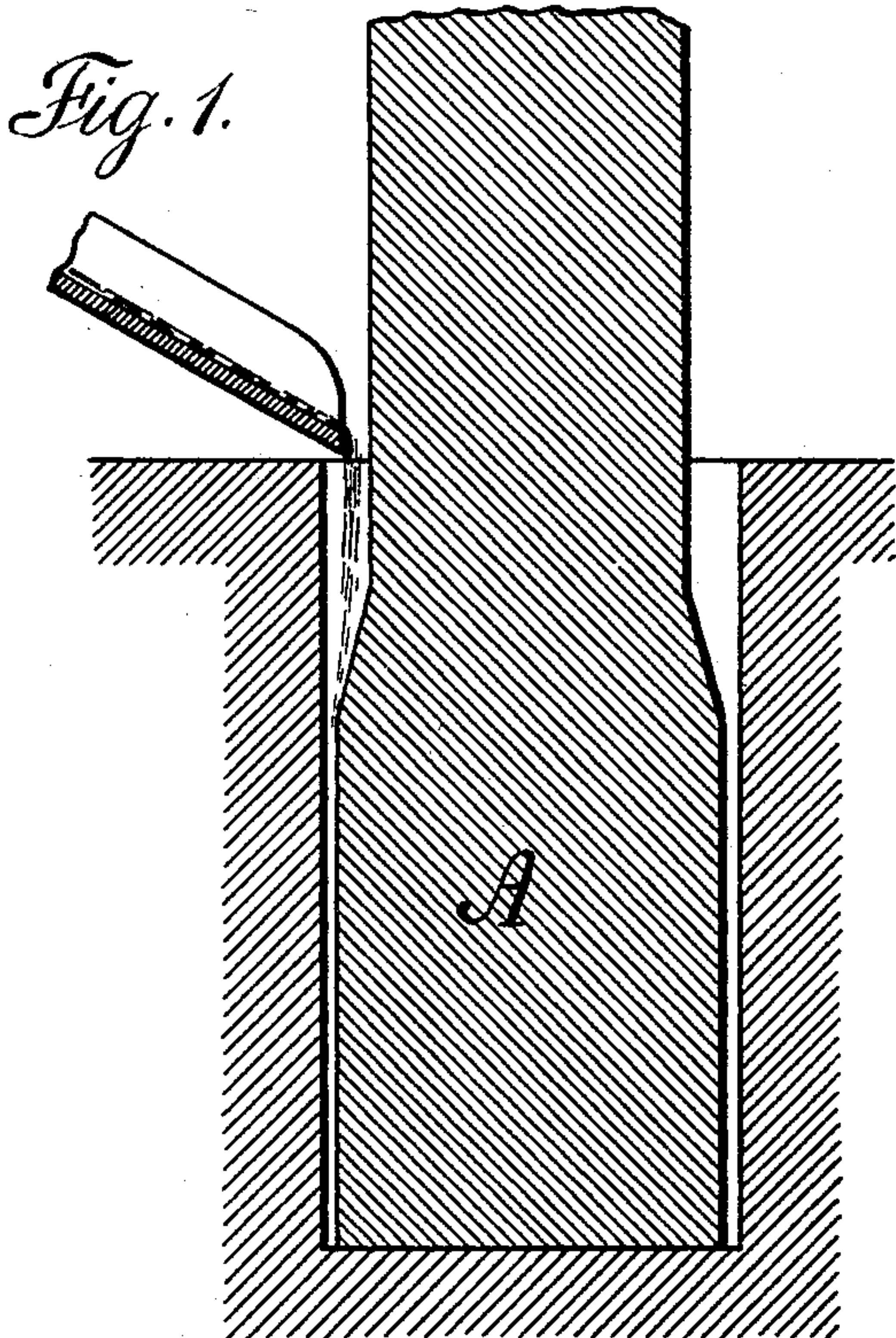


(No Model.)

G. M. GITHENS.  
ROCK DRILLING AND SPLITTING.

No. 517,689.

Patented Apr. 3, 1894.



Witnesses:  
*J. Stait*  
*Chas. Smith*

Inventor:  
*Geo. M. Githens*  
*(per Lemuel W. Penell)* *Atty*



# UNITED STATES PATENT OFFICE.

GEORGE M. GITHENS, OF BROOKLYN, NEW YORK.

## ROCK DRILLING AND SPLITTING.

SPECIFICATION forming part of Letters Patent No. 517,689, dated April 3, 1894.

Application filed May 15, 1893. Serial No. 474,225. (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. 371,679, granted to me October 18, 1887, a method of and tools for drilling rocks are set forth, in which the rock is disintegrated by blows from the flat face of a drilling tool, water being supplied into the drill hole, and in Letters Patent No. 486,101, granted to me November 15, 1892, for rock drilling and splitting, a series of holes is employed, such holes being elongated in the direction of the line of cleavage, and in Letters Patent No. 479,500 granted to me July 26, 1892, wedges are represented and chisels for starting the fracture in the line of cleavage, such wedges however acting at the bottom of the holes.

In my present invention I make the holes substantially diamond shape so as to provide opposite angles into which are driven by the action of the powder, cutting and cleaving wedges which not only concentrate the force of the explosion upon the line of cleavage, but also prevent the stone from commencing to split in jagged or irregular lines.

In the drawings, Figure 1 is a vertical section representing my improved drilling tool. Fig. 2 shows the drill hole with the wedges in position. Figs. 3 and 4 are plan views showing the faces of the drills that are made use of with my improvement, and Fig. 5 is a sectional plan view showing the cleaving wedges in their position for use within the drill hole.

The drill A made use of by me is substantially diamond shape in its section, as indicated in Fig. 3, two of the corners however may be rounded, as illustrated in Fig. 4. The drill may be made with a head of suitable length, as illustrated in my Patent No. 371,679, or the shank of the drill may be of the same section or nearly so as the head, and this drilling tool is to be reciprocated by suitable machinery and the head brought into contact with the stone where the drill hole is to be made, and as the drilling progresses water is to be supplied into the hole, in order that the

movement of the water under the action of the drill may wash out and eject the stone that is disintegrated or pulverized under the action of the face of the drill striking the stone in a manner similar to that of a hammer. This drill forms a hole of substantially the same shape as the drill but slightly larger, hence the hole is diamond-shaped sectionally throughout its length, and when an explosion is effected within the drill hole, the force of the explosion is concentrated into the opposite angles of the hole in the line of the greatest diameter of the diamond, and I increase the efficiency of the explosion and effect a splitting action in a straight line by the insertion into the hole of cleaving bars or cutters D which are of suitable length, but the angle of the bar at the cutting or cleaving edge is slightly less than the angle of the diamond-shaped hole drilled in the stone, in order that the cleaving bars may bear uniformly and forcefully with their cleaving edges into the opposite angles of the V-shaped hole drilled in the stone; and it is advantageous to introduce a wedge F between the cleaving bars D with a suitable wad G between the top end of the wedge and the cartridge or canister of powder, so that the force of the explosion acting downwardly upon the wedge F will drive the same in between the cleaving bars D and force them powerfully into the stone and commence the cracking of such stone upon the line of cleavage; and I remark that by this present improvement there is no risk of the cleaving bars becoming displaced as sometimes occurs in a round hole such as shown in my Patent No. 479,500, hence the hole is especially adapted to the cleaving bars, and the cleaving bars are adapted to crack the stone in the line of cleavage at the opposite angles within the diamond-shaped hole.

In instances where wedges have been used for splitting stone, the fracture has usually been made in a plane passing through between the converging surfaces of the wedge. In my improvement the edges of the cleaving bars act upon the stone in the angles between the converging surfaces thereof at the opposite sides of the hole, regardless of the manner in which the hole with such converging surfaces has been formed, and the wedge that



acts between the cleaving bars exerts its force perpendicular to the plane of cleavage and the action of the cleaving bars and wedge is the same whether the wedge is driven in by percussion or by the action of the explosion, the cleaving bars serving to commence the splitting action on the stone.

The wedge F and cleaving bars D may be connected together by any convenient devices, such as cords or wires through holes, so as to be lowered conveniently into position to the bottom of the drill hole.

I claim as my invention—

1. The method herein specified of splitting rock consisting in forming a hole with opposite angular grooves, introducing into such hole cleaving bars having edges at less angles than the angles in the stone and driving in an intermediate wedge and forcing the edges of the cleaving bars into the opposite angles of the stone to split the same substantially as set forth.

2. The method herein specified of splitting stone, consisting in forming a hole with opposite angular grooves, introducing into such hole cleaving bars having edges at a less angle than the angles in the stone and driving the cleaving bars into the opposite angles of

the stone to split the same, substantially as specified.

3. The two cleaving bars D. D having longitudinal angular edges and inclined back faces, the narrowest ends of the bars being uppermost, in combination with an intermediate wedge with its widest end uppermost, and means for suspending the cleaving bars below the wedge bar so that the three parts can be lowered into the hole in the rock, substantially as specified.

4. The two cleaving bars D. D, having longitudinal angular edges and inclined back faces, the narrowest ends of the bars being uppermost, in combination with an intermediate wedge with its widest end uppermost, and means for suspending the cleaving bars below the wedge bar so that the three parts can be lowered into the hole in the rock, and a wad resting on the wedge and supporting the explosive material substantially as specified.

Signed by me this 9th day of May, 1893.

GEO. M. GITHENS.

Witnesses:

GEO. T. PINCKNEY,  
A. M. OLIVER.