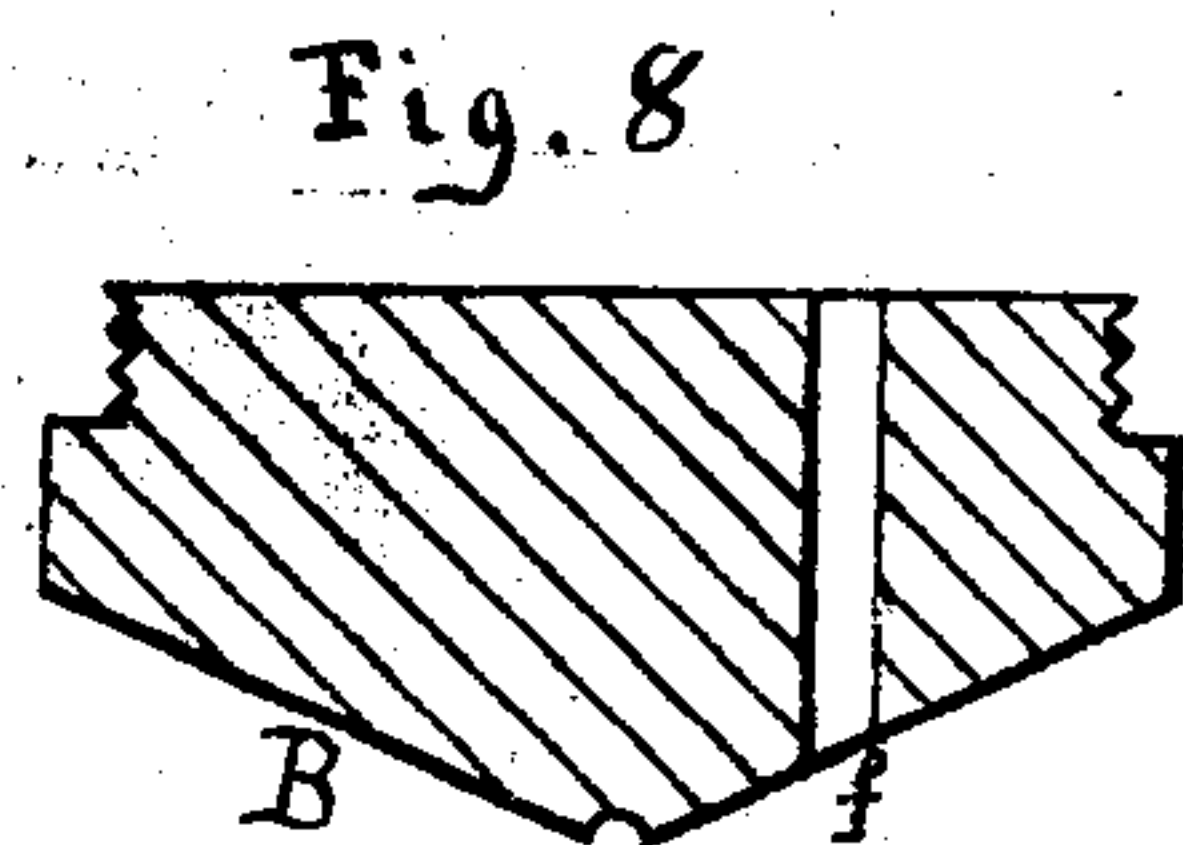
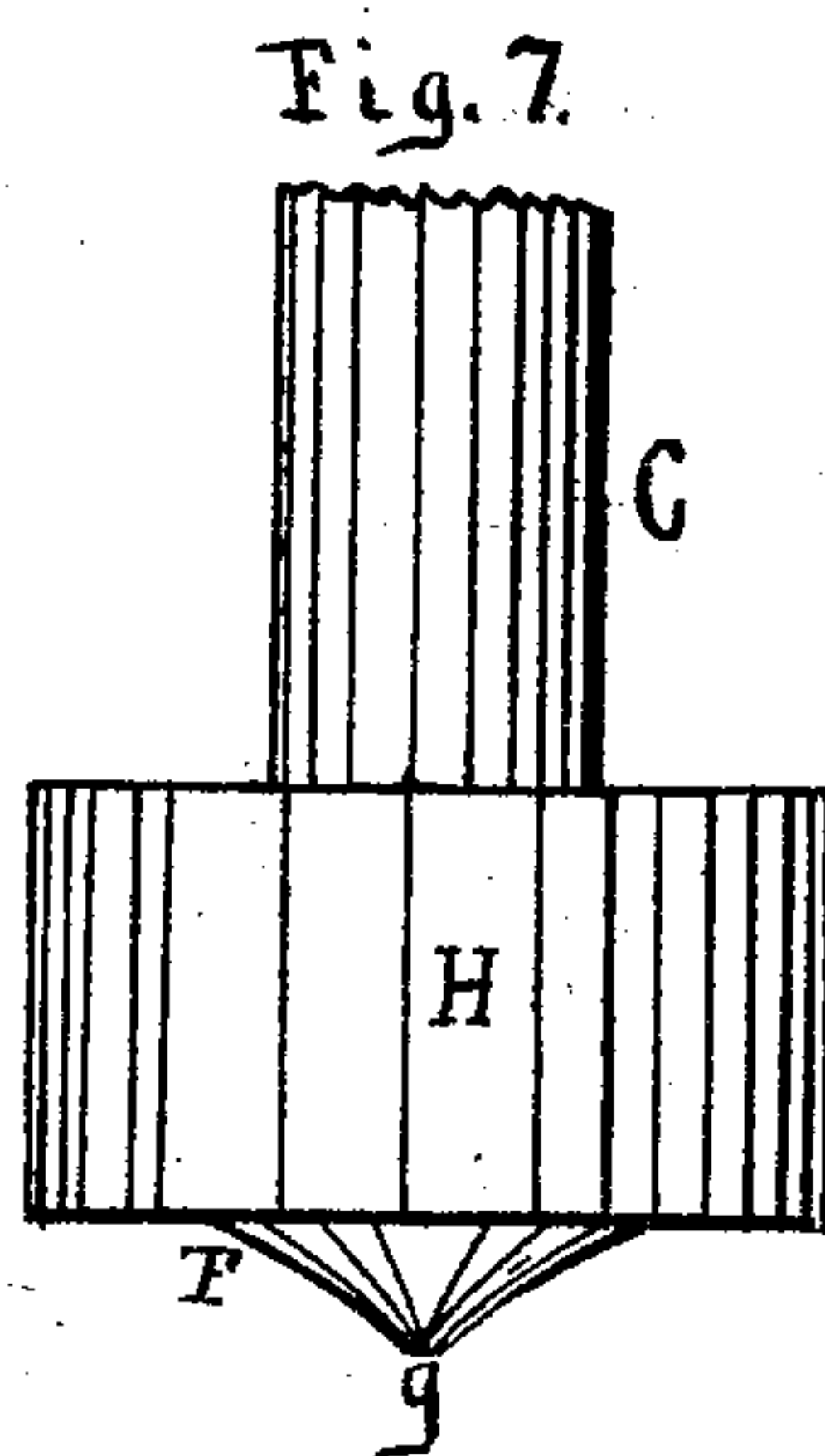
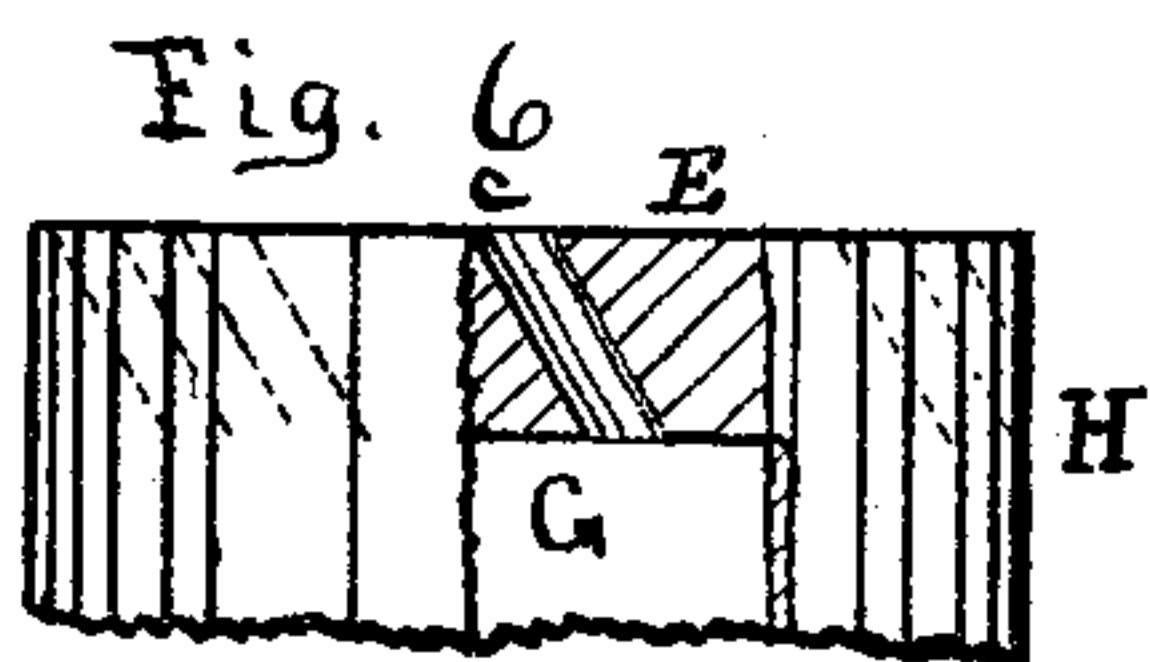
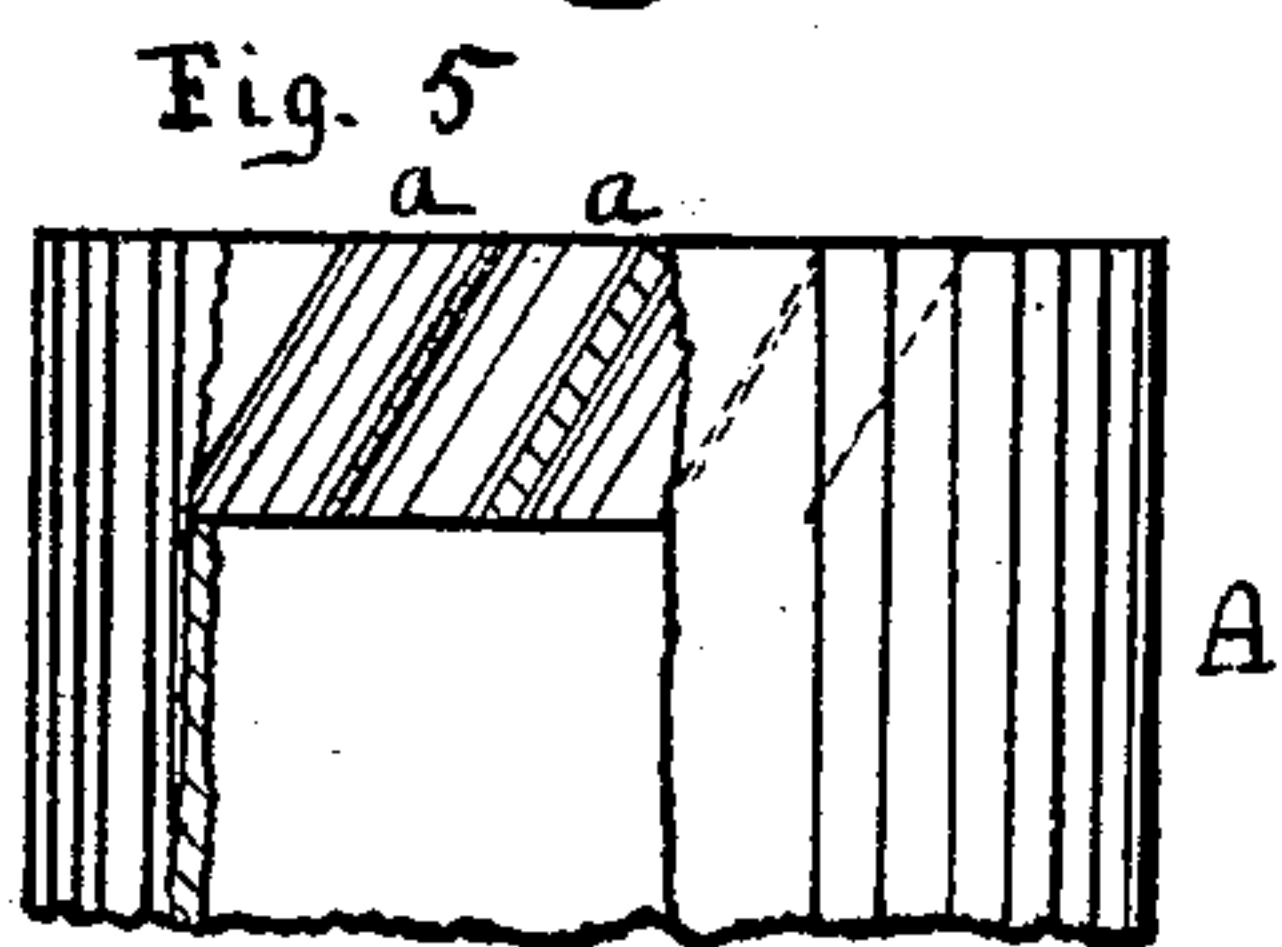
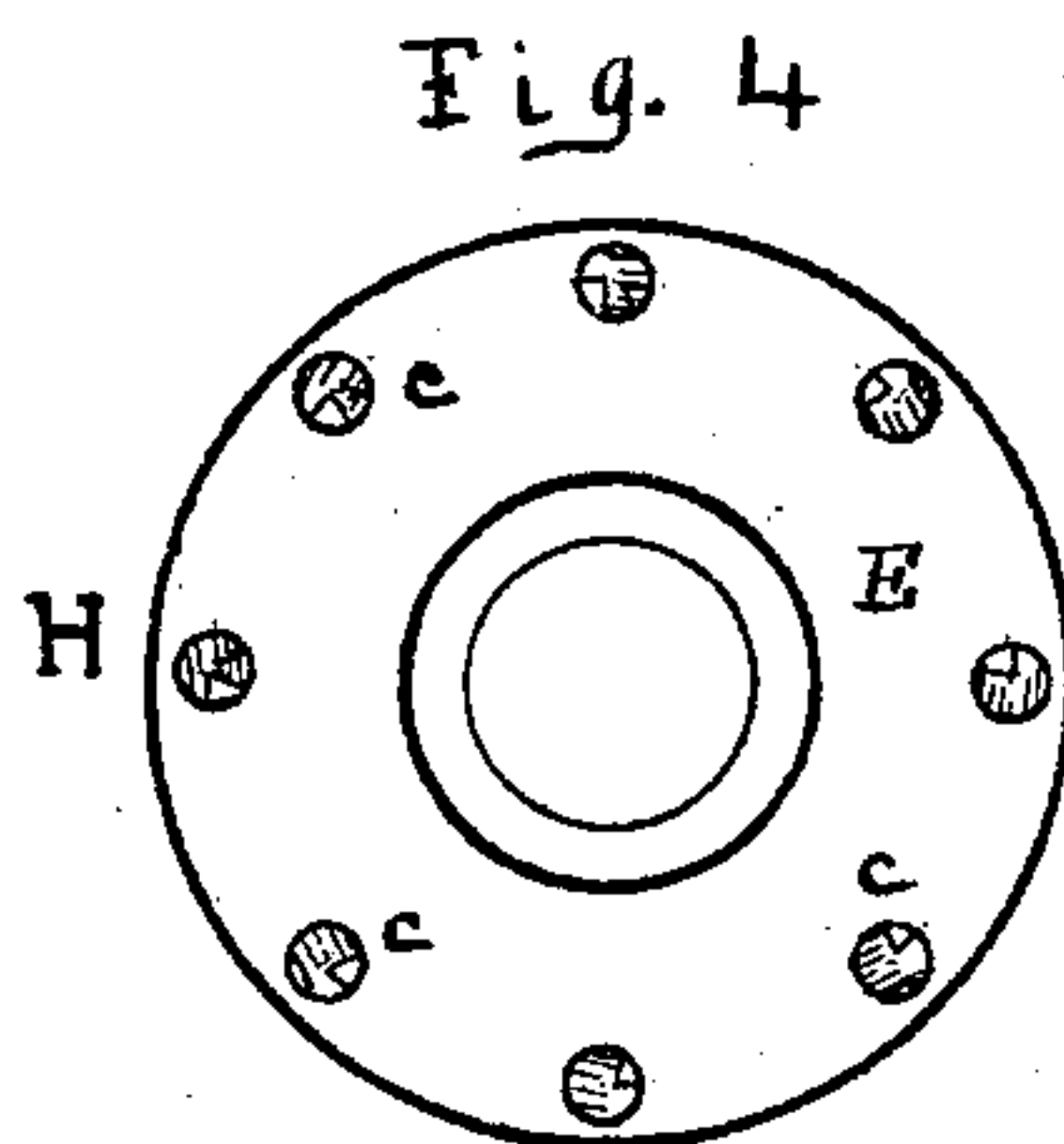
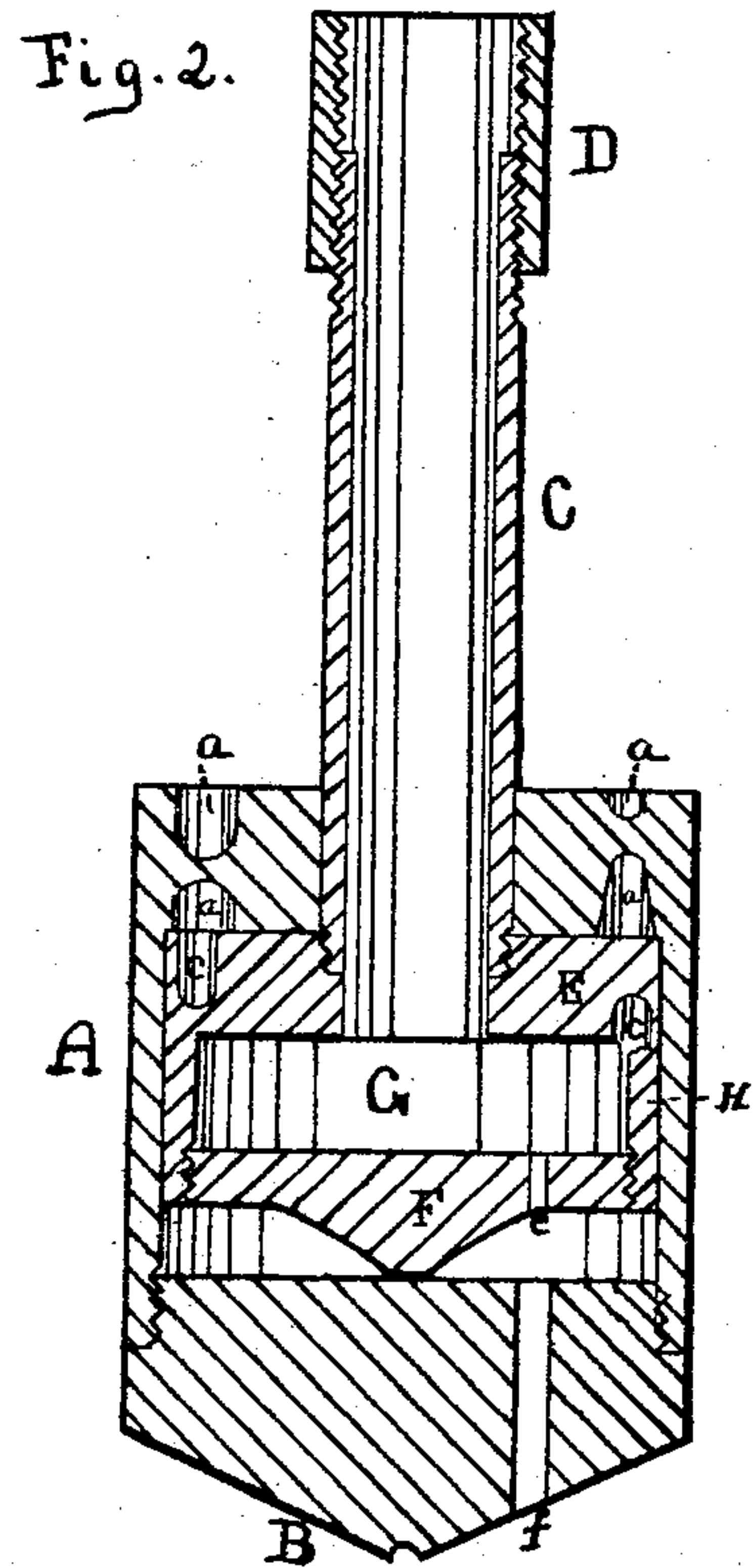
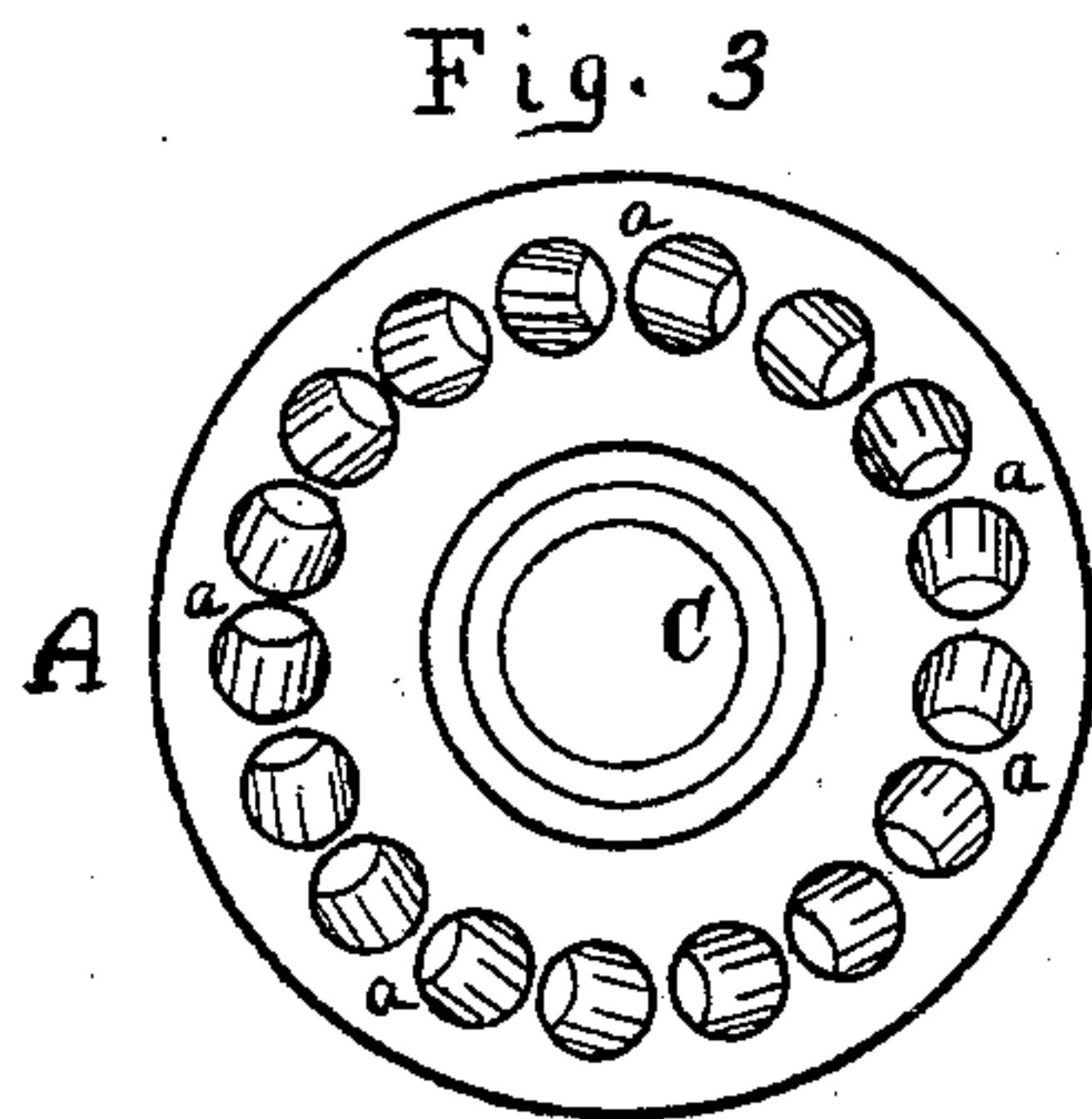
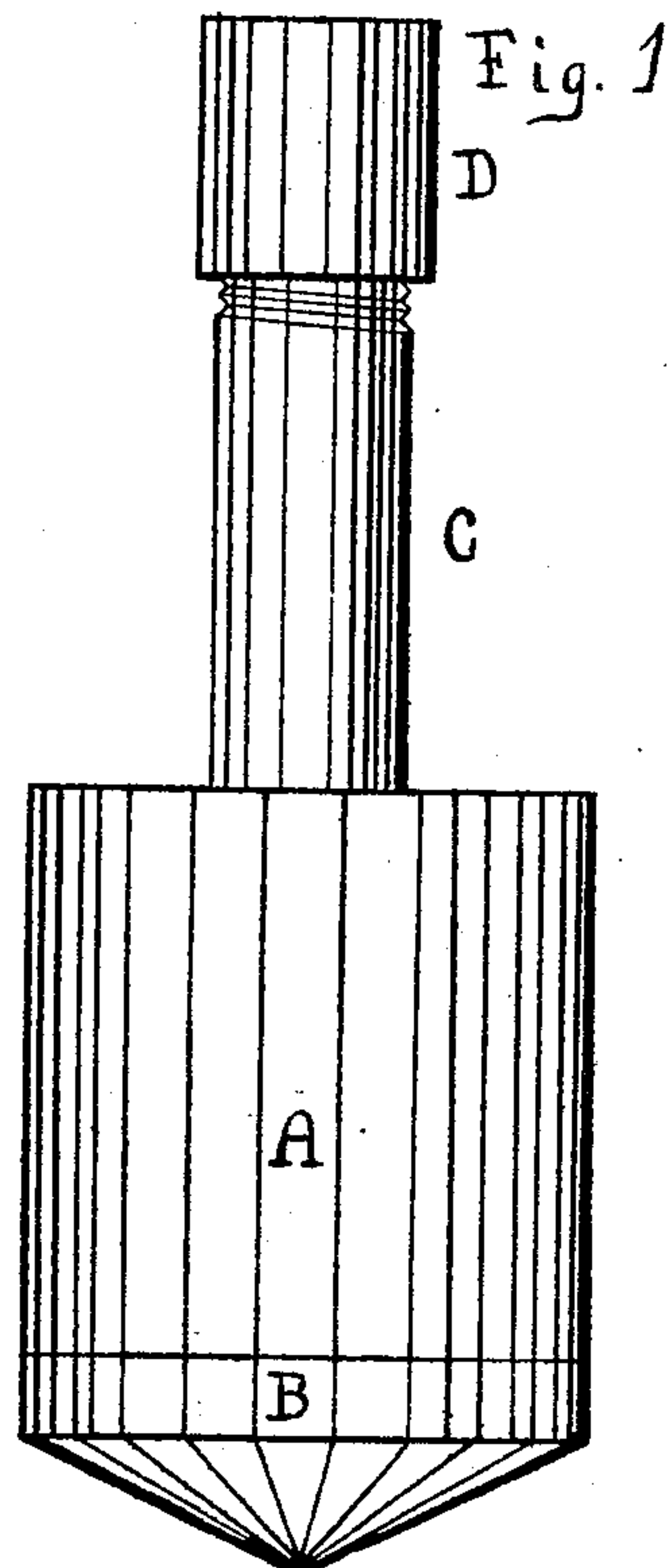


C. G. CROSS.

Drills for Boring Artesian Wells.

No. 142,992.

Patented September 23, 1873.



Witnesses.
E. A. West.
O. W. Bond

Christopher G. Cross
Inventor

UNITED STATES PATENT OFFICE.

CHRISTOPHER G. CROSS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN DRILLS FOR BORING ARTESIAN WELLS.

Specification forming part of Letters Patent No. **142,992**, dated September 23, 1873; application filed January 14, 1873.

To all whom it may concern:

Be it known that I, CHRISTOPHER G. CROSS, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Drills for Boring Artesian Wells and analogous uses, of which the following is a full description, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 represents an elevation; Fig. 2, a vertical section; Fig. 3, a top view; Fig. 4, a top view of the inside cylinder. Figs. 5 and 6 represent the direction of the holes through the heads of the two cylinders; Fig. 7, an elevation of the inner cylinder; and Fig. 8, a vertical section of the drill-head detached.

The drawings represent a device adapted to bore a four-inch well.

Diamond drills have been heretofore used in boring artesian wells and for other analogous purposes. The drill-head has been permanently connected to a rod or tube extending from the bottom of the well to the top thereof, and has been driven by mechanism which revolved the rod or tube and drill together. This method has been used with considerable success to a depth of three hundred feet; but at this depth the work is very uncertain, the rod or tube to which the drill is connected being liable, in consequence of the great strain upon it and its great length, to become bent, twisted, or broken.

The object of my invention is to drive a drill at the bottom of a well without turning the rod or tube with which the drill-head is connected, thus obviating the difficulty mentioned, and rendering it practicable to drive a drill at the bottom of a well of great depth; and this I accomplish by attaching the drill-head proper to a small water-wheel, which is to be driven at the bottom of a well, the wheel being loosely connected with a tube extending to the top of the well, the wheel and drill attached thereto being driven by the force or pressure of the water conveyed through the tube to the wheel.

In the drawings, A represents a cylinder; B, the drill-head proper, in which the diamonds are secured. It is connected with the cylinder A by a screw. Through the top of the cylinder A are a number of holes, *a*, standing at an

angle of about forty or forty-five degrees, as shown in Fig. 5, and in the top of the wheel A is a hole, through which the tube C passes, the wheel revolving upon this tube. D is an ordinary coupling-pipe, used for coupling together sections of the tube C, which are to be added as the work progresses. Within the wheel or cylinder A is another cylinder, H, the bottom of which, F, can be screwed into place. The top E of this cylinder has in it a number of holes, *c*, which also stand at an angle of about forty or forty-five degrees, as shown in Fig. 6; but the angle of the holes *c c* is in a direction opposite to that of the holes *a a*, so that the holes *a* and *c* stand at, or nearly at, right angles with each other. Within the inner cylinder H is a chamber, G. The tube C opens into this chamber G, passing through a hole in the top E, and fitting tightly therein. Through the bottom F of this inner cylinder is a small hole, *e*, and through B is a hole, *f*, somewhat larger than the hole *e*. The bottom F of the inner cylinder H I make in the form shown in the drawings, its point resting upon the upper surface of B. The parts are so constructed that there is little or no space between the head E and the under surface of the top of the wheel A.

The operation of my device is as follows: Water is forced into the tube C in any suitable manner, most readily by means of a steam force-pump, passing into the confined chamber G under pressure, from which it escapes through the openings *c* in the head E of the inner cylinder, and enters the lower part of the holes *a* with great force, and then escapes from the top of the wheel A through these holes *a*. By this means I am able to drive the wheel or cylinder A with great velocity, even at the bottom of a deep well. The water escapes from the wheel A, rising to the top of the well, where it may be permitted to flow away, or may be saved and used a second time. The cuttings of the drill will be washed away by the water which escapes through the openings *e f*. The drill may be forced down gradually, as necessary, by hand, or by mechanism already in use, the wheel A being loose upon the tube C, and the point *g* of the lower end of the inner cylinder H resting upon the top of the head B.

In making the holes *a c* I do not limit myself to the angle shown.

The device represented in the drawings is adapted to be used in boring a four-inch well, but the proportions of the several parts may be somewhat varied without departing from the spirit of my invention. The hole *e* should be quite small.

I think that water may be introduced into the chamber *G* under pressure of one hundred pounds to the square inch, and an engine of about ten-horse power will be sufficient to drive a four-inch drill.

The diamonds are not shown in the drawings, but are secured in the head *B* of the drill in the usual manner.

I prefer to make the head *B* of the drill

somewhat pointed or egg-shaped, as represented; but I do not limit myself to this form, to the hole *f*, nor to the exact number or size of the holes in the top of the wheel *A* or head *E*. The capacity of the holes in *A* is greater than in *E*, to permit a free discharge from *A*.

What I claim as new is as follows:

1. The combination of the wheel *A* with the drill *B* and pipe *C*, arranged to descend together in operation, substantially as specified.
2. The combination of the cylinder *H* with the wheel *A*, drill *B*, and pipe *C*, substantially as specified.

CHRISTOPHER G. CROSS.

Witnesses:

E. A. WEST,
O. W. BOND.