

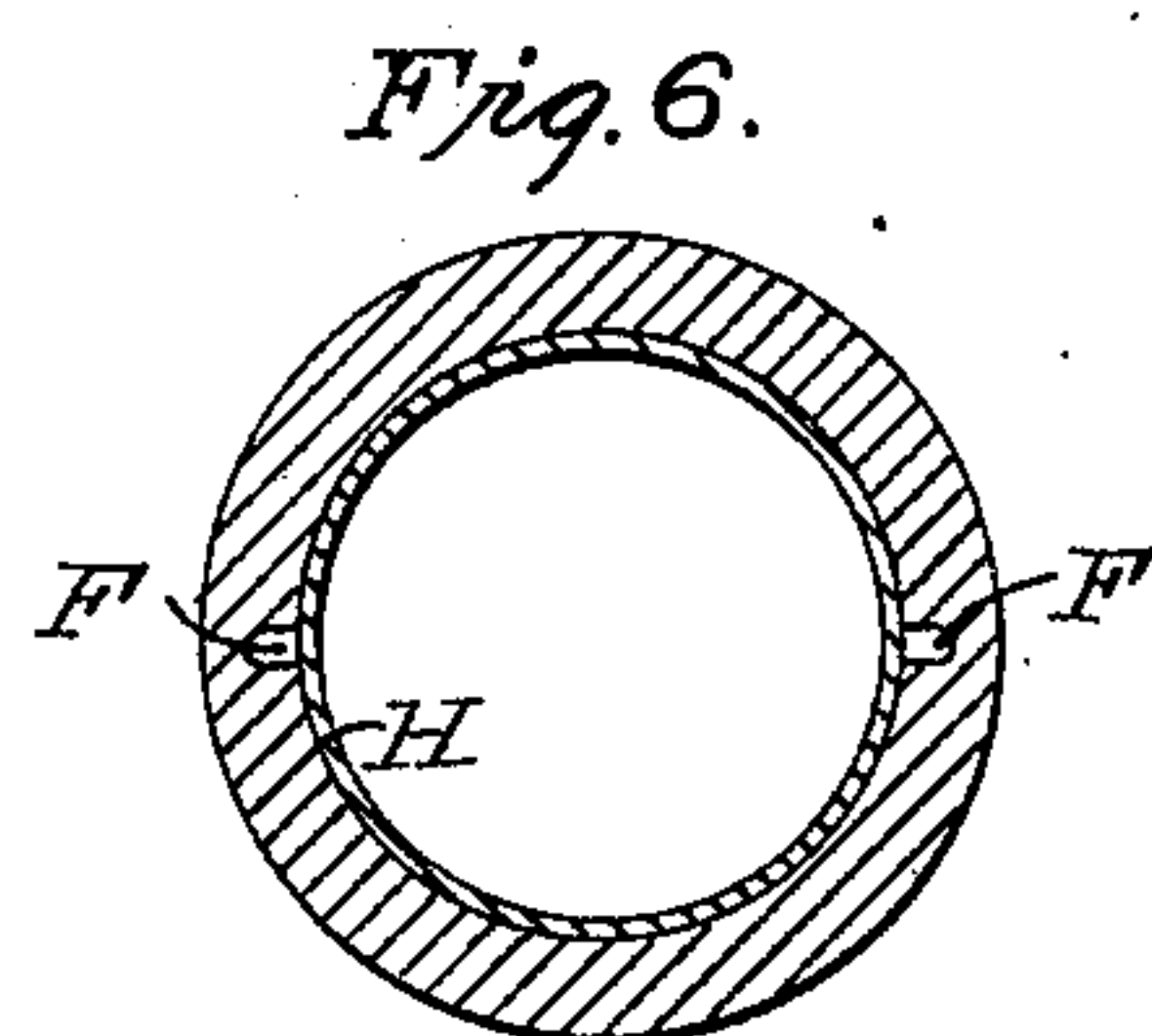
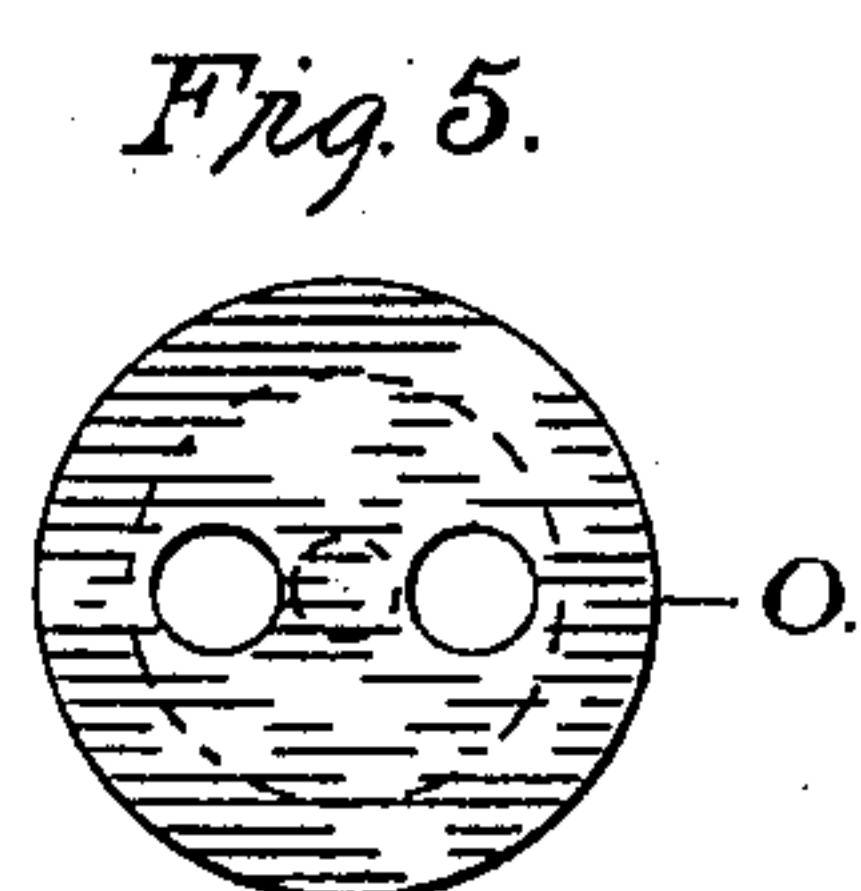
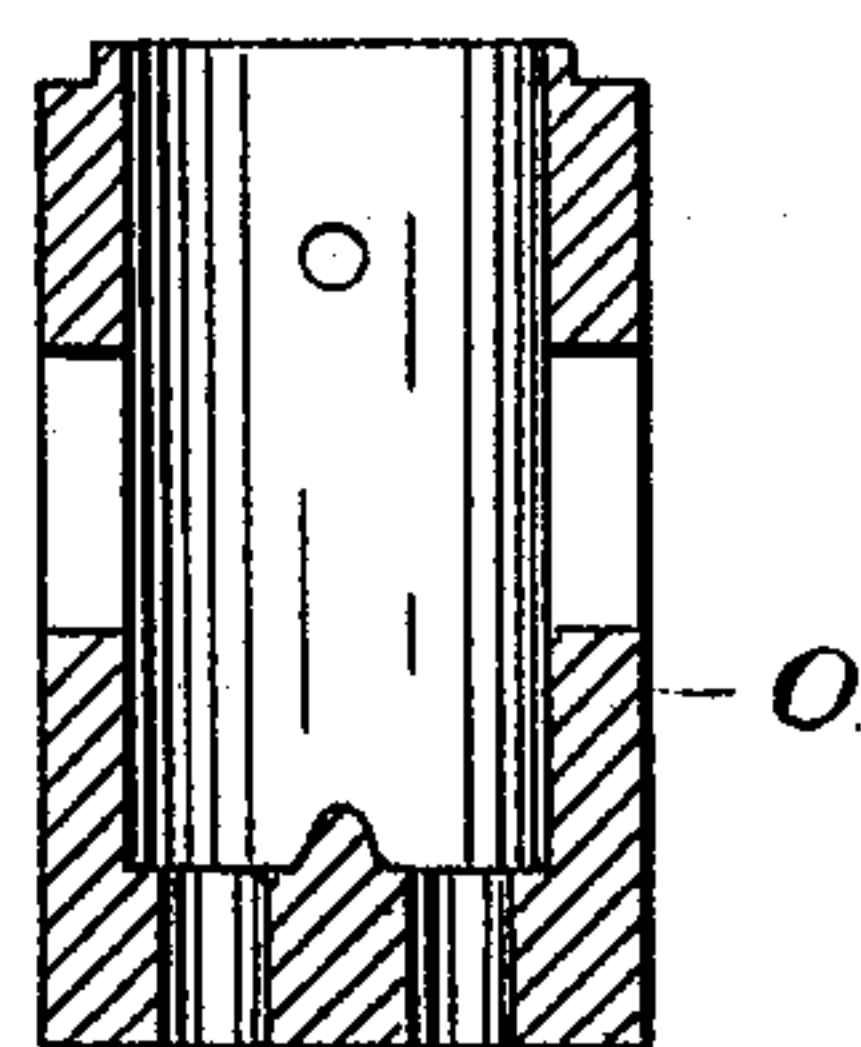
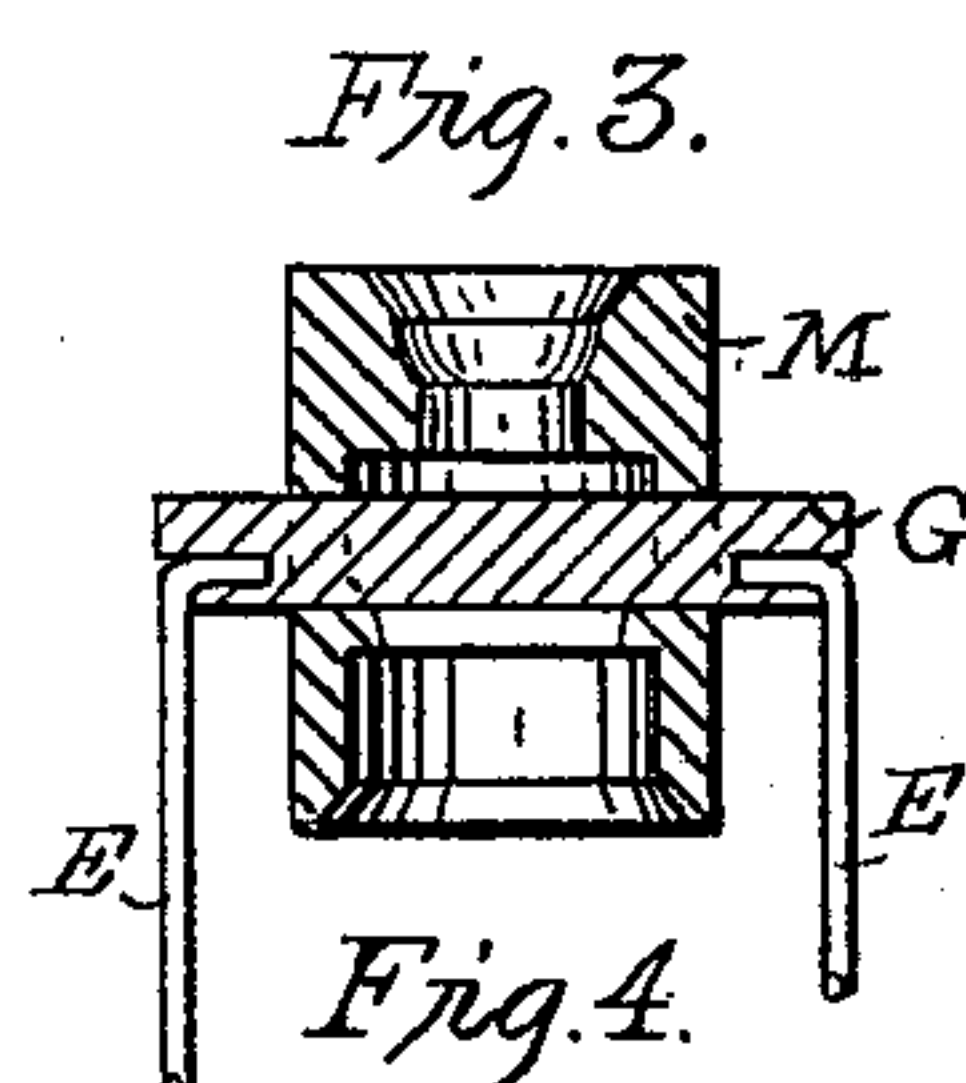
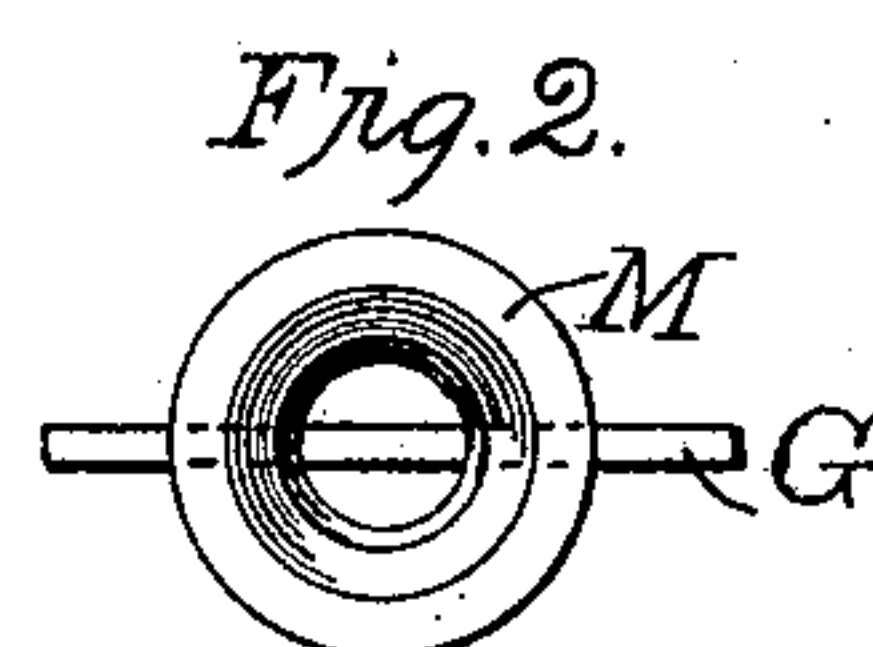
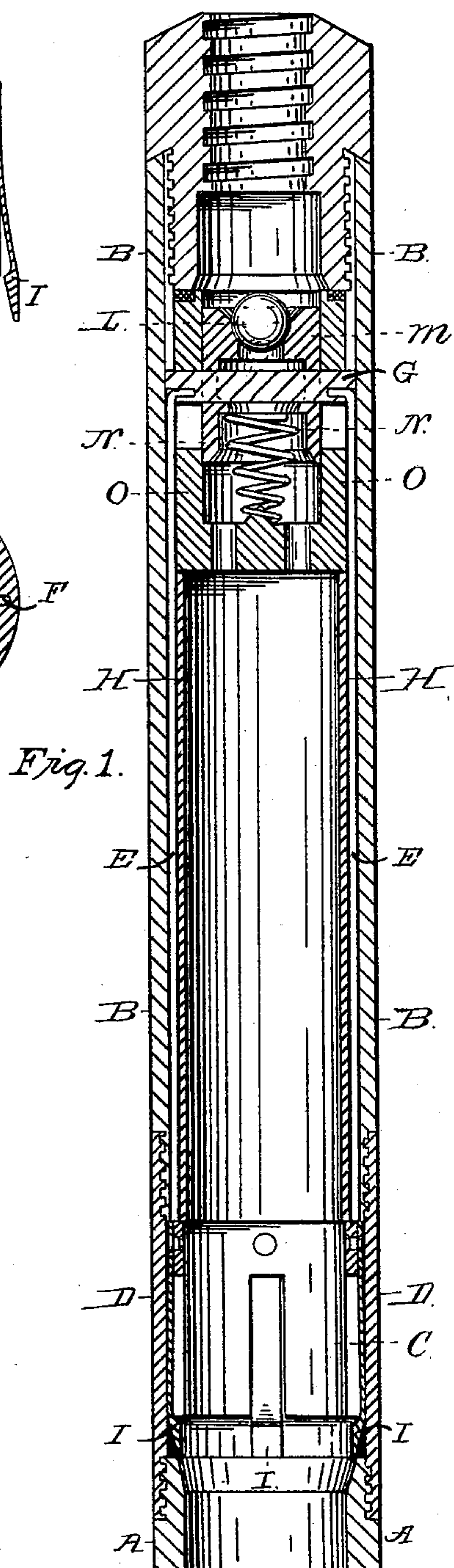
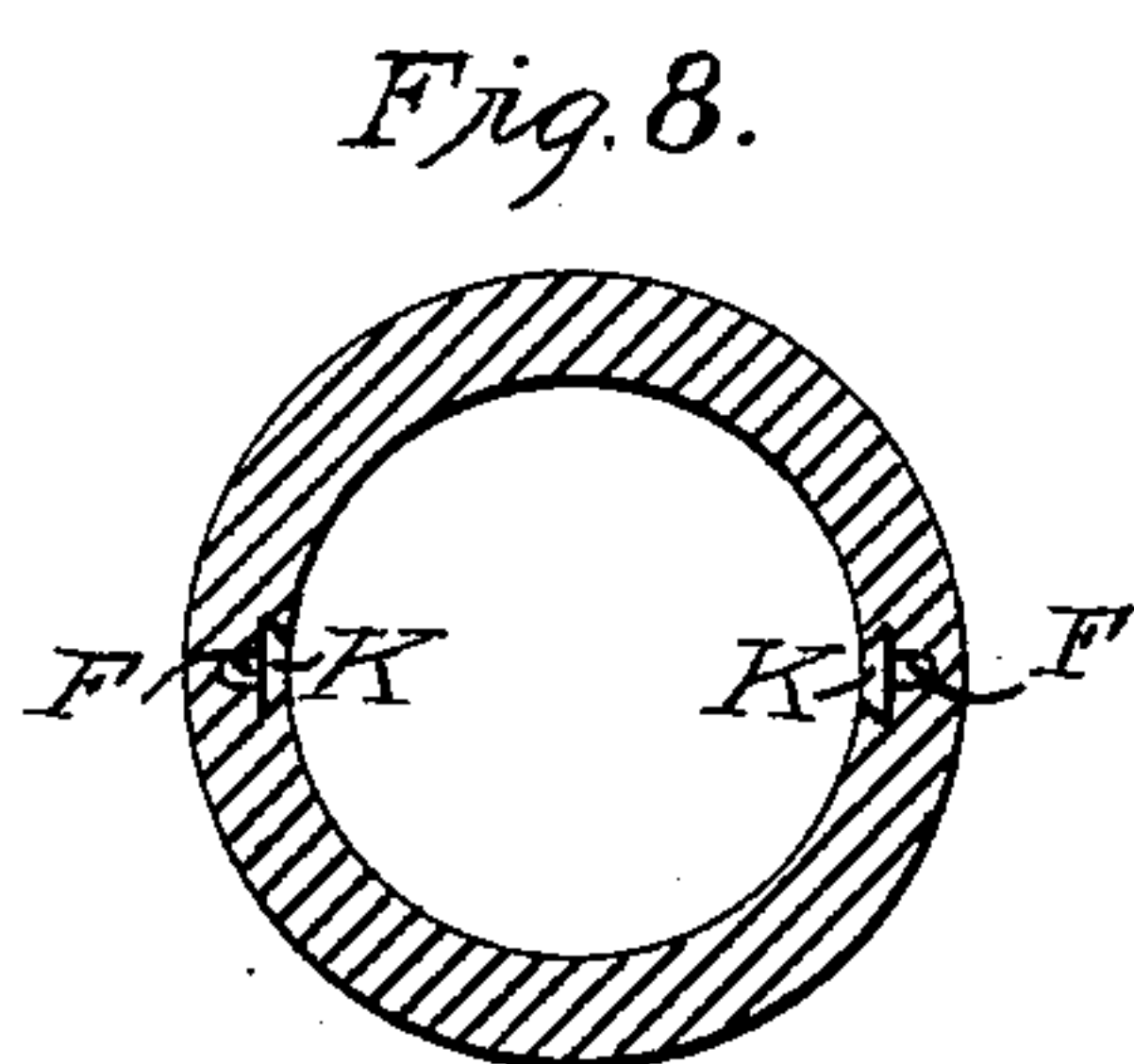
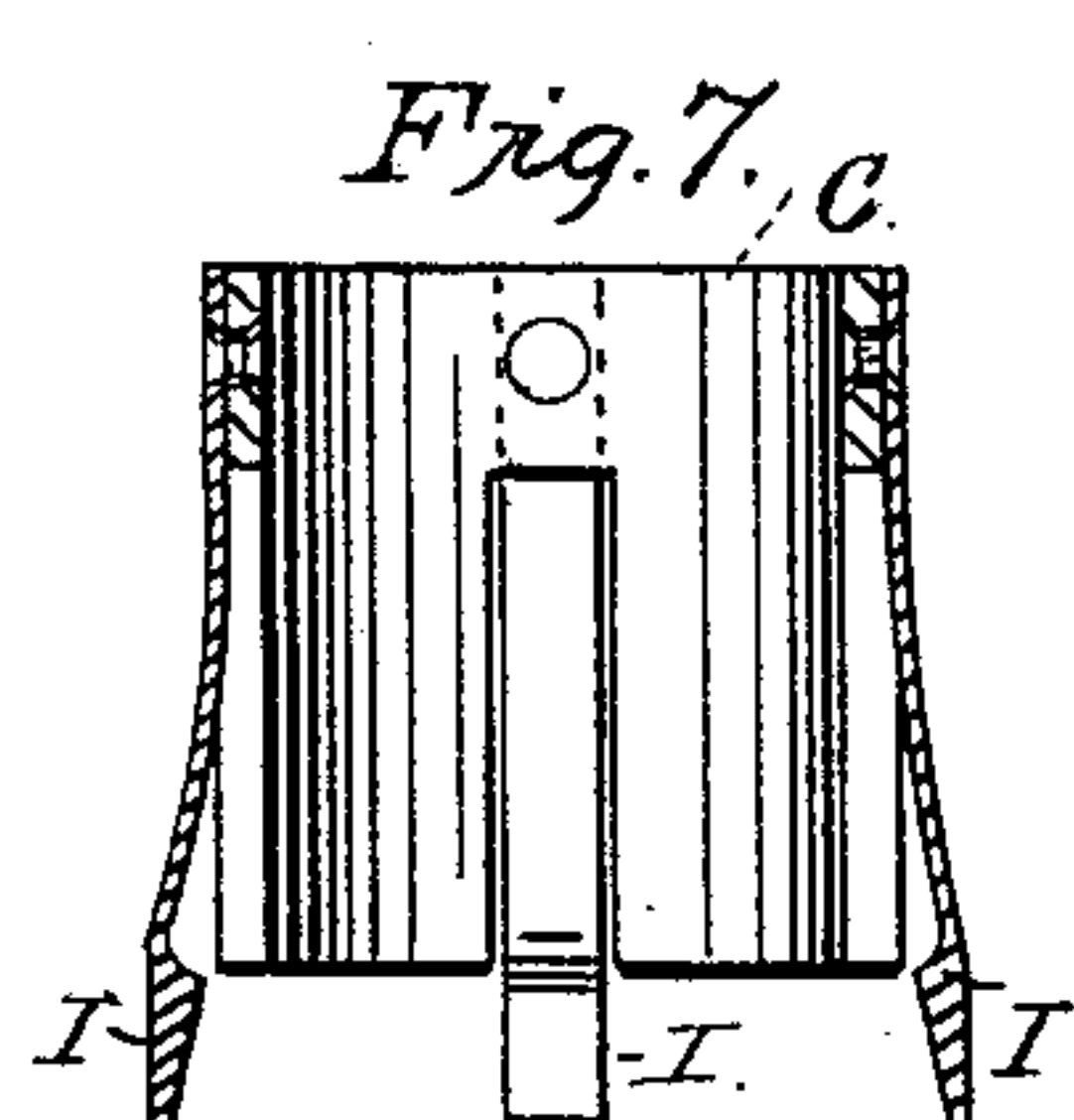
(No Model.)

A. BALL.

CORE BREAKER FOR ANNULAR ROCK DRILLS.

No. 366,913.

Patented July 19, 1887.



Witnesses.  
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# UNITED STATES PATENT OFFICE

ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO THE  
SULLIVAN MACHINE COMPANY, OF SAME PLACE.

## CORE-BREAKER FOR ANNULAR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 366,913, dated July 19, 1887.

Application filed November 13, 1886. Serial No. 218,775. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT BALL, of Claremont, in the county of Sullivan and State of New Hampshire, have invented a new and  
5 Improved Core-Breaker for Annular Rock-Drills; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference  
10 marked thereon.

My invention relates to improvements in prospecting or rock-boring annular drills; and my object is to obtain the longest and most perfect core and to break off and secure the  
15 same in the most effective manner. It is a modification of and utilizes some of the devices shown in three several Letters Patent heretofore granted upon applications made by me, and severally numbered 315,887, 315,888,  
20 and 315,889, which last-named devices, so far as shown in said Letters Patent, are disclaimed in this application.

In this improvement the core is held or broken off by a number (one can be used, but  
25 I prefer four) of spring-wedges riveted to a short cylindrical holder, the wedges being at the end of the springs and below the cylindrical holder or carrier and the springs springing outward against the sides of the shell or tube  
30 away from the core. This outward tension of the springs assists also in keeping the holder in its position when at rest. The wedge-holder (and wedges) is driven by wires or rods, (I prefer two,) which work in protected  
35 grooves in the walls of the core-barrel, and which wires or rods are driven by direct pressure of the water, brought to bear by means of a driving-valve operated at the drilling-machine by dropping a ball.

40 For the better comprehension of my invention reference should be had to the accompanying drawings, in which—

Figure 1 is a vertical central section of the drill-head, the spring wedge-holder and the  
45 shell or tube within which the wedge-holder moves and which couples the drill-head to the length of tubing nearest to the drill-head and commonly known as the "core-barrel," the core-barrel, the wires or rods which work in  
50 grooves therein, and an inside tube or shell to cover and protect the same, the valve to

which the wires or rods are secured, and the coupling which connects the core-barrel to the length of tubing next above; Fig. 2, a top view of the valve; Fig. 3, a vertical section of the  
55 valve and valve-bar carrying the wires; Fig. 4, a vertical section of the valve receiver or holder; Fig. 5, a bottom view of the same; Fig. 6, a cross-section of the core-barrel, showing the grooves wherein the rods or wires work and the method  
60 of protecting them (indicated also in Fig. 1); Fig. 7, a vertical section of the wedge holder or carrier and the spring-wedges attached thereto; Fig. 8, a cross-section of the core-barrel, showing the grooves wherein the rods or  
65 wires work and a different method of protecting them than that shown in Figs. 1 and 6.

In the different drawings like letters refer to corresponding parts.

A represents the drill-head, made, preferably, with a bevel at the top for the better  
70 reception of the breaking-wedges I I I when these are forced down. The bevel is, however, so cut as to leave at the top of the drill-head a narrow cylindrical shelf or face at  
75 right angles to its vertical sides, and upon which the wedges rest when they are sprung up and back and not at work.

D is a cylindrical shell which receives the wedge-holder C, and serves as a coupling to  
80 unite the head A with the core-barrel B, and its inside diameter is preferably greater than that of the core-barrel and drill-head, so as to leave a chamber or recess to receive the wedge-holder C. This wedge-holder C carries the  
85 spring-wedges I I I, which are riveted to the same at the upper ends, and has a slot opposite each wedge to allow them to work in and out. When this holder is in position, the  
90 wedges exert a constant pressure outward against the sides of the shell by reason of the curves of the springs I I, and thus enable the holder to maintain its position when at rest.

E E, Figs. 1 and 3, are two wires or rods which impinge at the lower ends against the  
95 top of the wedge-holder C, are secured at the other ends to the valve-bar G, Figs. 1, 2, and 3, and work freely in slots or grooves F F, Figs. 6 and 8, in the inside wall of the core-barrel.

H H, Figs. 1 and 6, is an interior tube secured within the core-barrel B, and protecting  
100



the slots and wires from mud, water, and similar obstruction, and serving, also, to keep the wires in their places.

K K, Fig. 8, show a substitute for the tube H in the form of strips of metal inserted in the inside wall of the core-barrel, so as to cover the slots F.

L is a ball which, on being dropped from the surface by the operator, closes the water-passage M, and thereby brings the full pressure of the water upon the valve and valve-bar, which are forced down, together with the wires or rods E E, which in turn force down the wedge-holder C, and its wedges I press against the core and bring the core-breaker into effective action.

N is a spiral spring which sets on the bottom of the valve receiver or holder O and fits within the bottom of the valve M. While this spring N is weak enough to accede to the pressure of the valve when the ball is dropped, it has sufficient strength to prevent the pressure of the water against the walls of the valve from forcing the valve down before the ball is dropped.

Before the wedges I are forced down they are just above the head A and are back out of the way of the core, as in Fig. 1. After they are forced down they are between the beveled walls of the drill-head and the core and firmly grip the core, so that when the rods are pulled up the core is pulled up with them.

Among the advantages of my device are that the lifting-wedges and their holder are out of the way of the core until needed and neither wear the core nor are worn by it. When it is desired to break the core, the operator can quickly and effectively force the wedges into action. The core, when brought to the surface, is easily removed and the core-breaker is quickly restored to its position of inaction.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. In an annular drill, the combination, with the drill-head A, the core-barrel B, and the intermediate shell-coupling, D, of the cylindrical holder C, provided with spring-wedges I, the rods E, bearing on said holder, and means for depressing said rods, substantially as and for the purposes set forth.

2. In an annular drill, the combination, with the drill-head A, the core-barrel B, and the intermediate coupling-shell, D, of the cylindrical holder C, provided with spring-wedges I, the rods E, bearing upon said holder, and a direct-acting valve, M, to which said rods are connected, substantially as and for the purposes set forth.

3. In an annular drill, the combination, with the drill-head A, the core-barrel B, and the intermediate coupling-shell, D, of the cylindrical holder C, provided with spring-wedges I, the rods E, bearing upon said holder, the direct-acting valve M, provided with the bar G, to which said rods are connected, and the ball L for closing said valve, substantially as and for the purposes set forth.

4. In an annular drill, the combination, with the drill-head A, the core-barrel B, and the intermediate coupling-shell, D, of the cylindrical holder C, provided with spring-wedges I, the rods E, bearing upon said holder, the direct-acting valve M, provided with the bar G, to which said rods are connected, the counterbalancing-spring N, and the ball L, substantially as and for the purposes set forth.

5. In an annular drill, the combination, with the drill-head A, beveled within its upper end, and the core-barrel B, having longitudinal grooves in its walls, of the cylindrical holder C, provided with spring-wedges I and a slot opposite each wedge, the rods E, passing through said grooves and bearing upon the holder, a protecting-cover for the grooves, and a direct-acting valve, to which the rods are connected, substantially as and for the purposes set forth.

6. In an annular drill, the combination, with the drill-head A and the longitudinally-grooved core-barrel B, of the cylindrical holder C, provided with the spring-wedges I, the rods E, the protectors for the grooves in the core-barrel, the valve-receiver O, the valve M, the spring N, and the ball L, substantially as described and shown.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT BALL.

Witnesses:

H. BELLE DUTTON,  
GEO. O. BALL.