

(No Model.)

A. H. LIGHTHALL.
Pump.

2 Sheets—Sheet 1.

No. 232,520.

Patented Sept. 21, 1880.

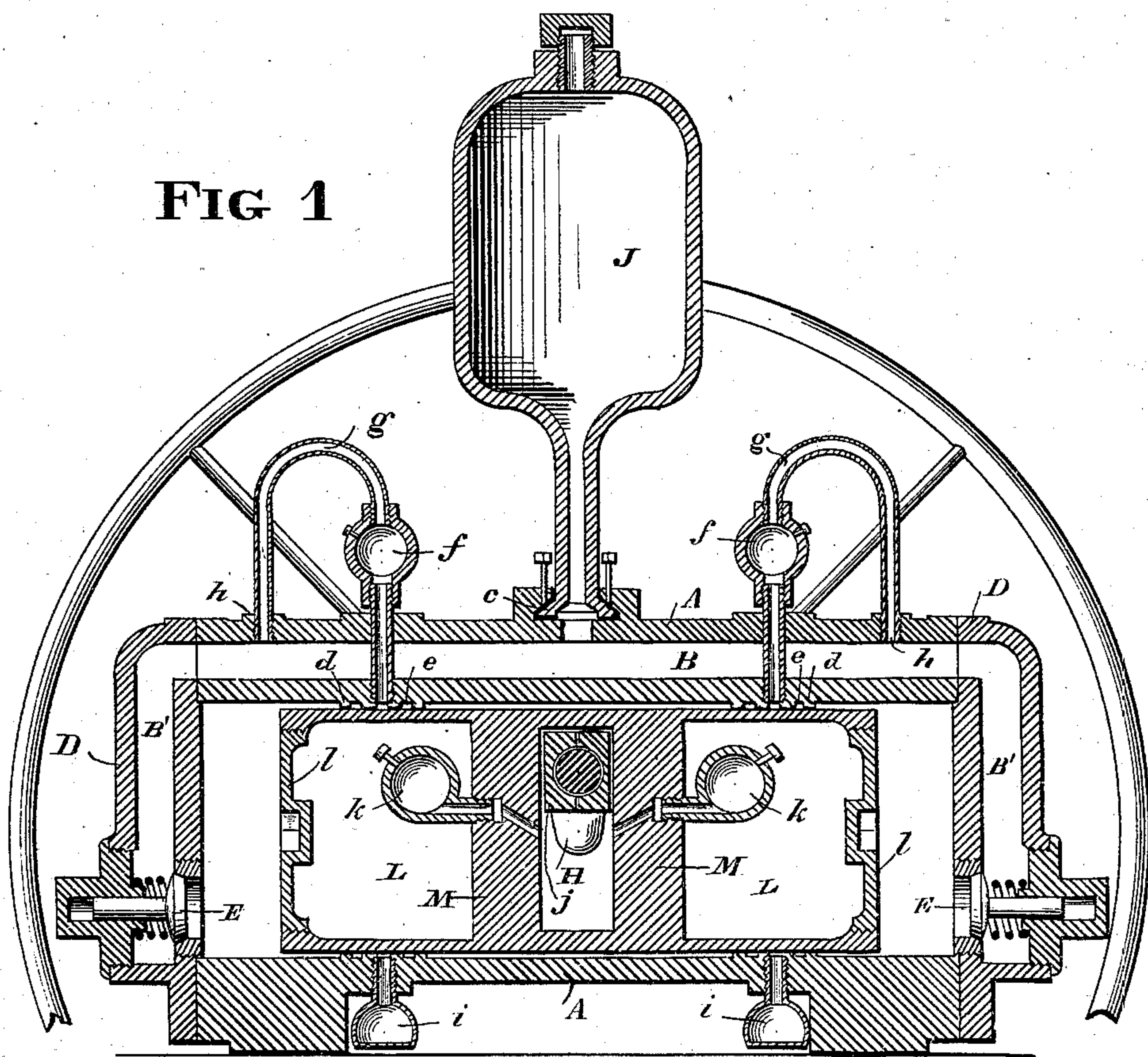


FIG 2

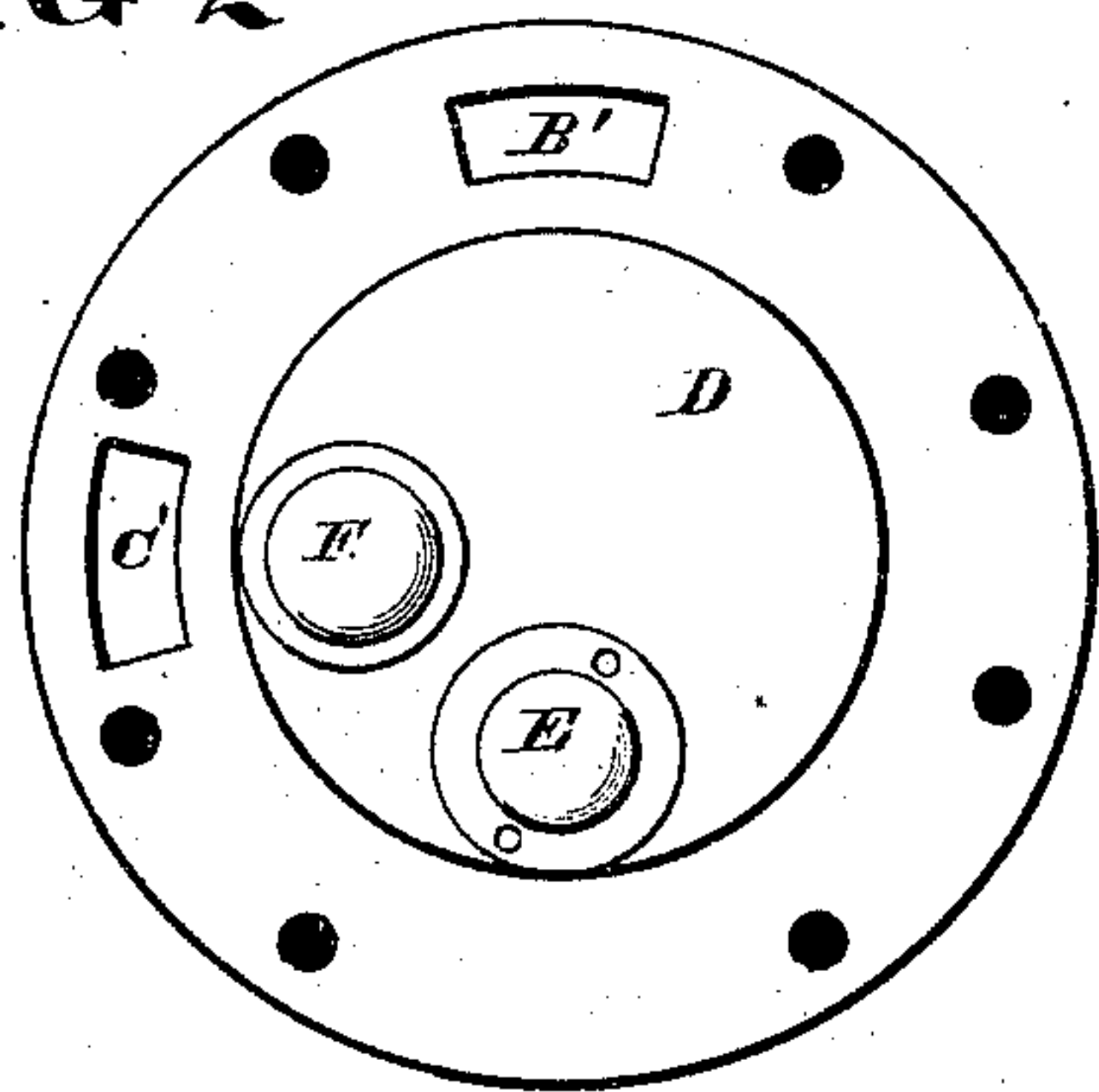
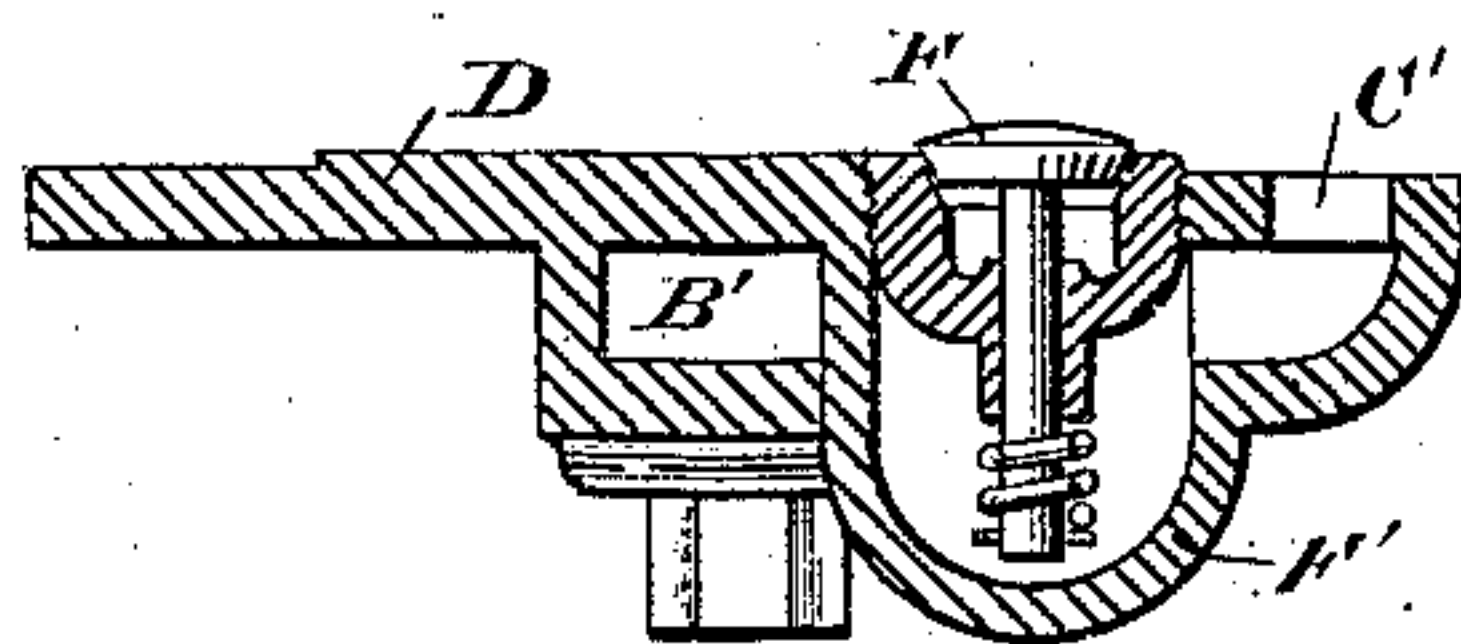


FIG 3



WITNESSES

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Edward McClain

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By E. W. Smith
Attorney

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FIG 4

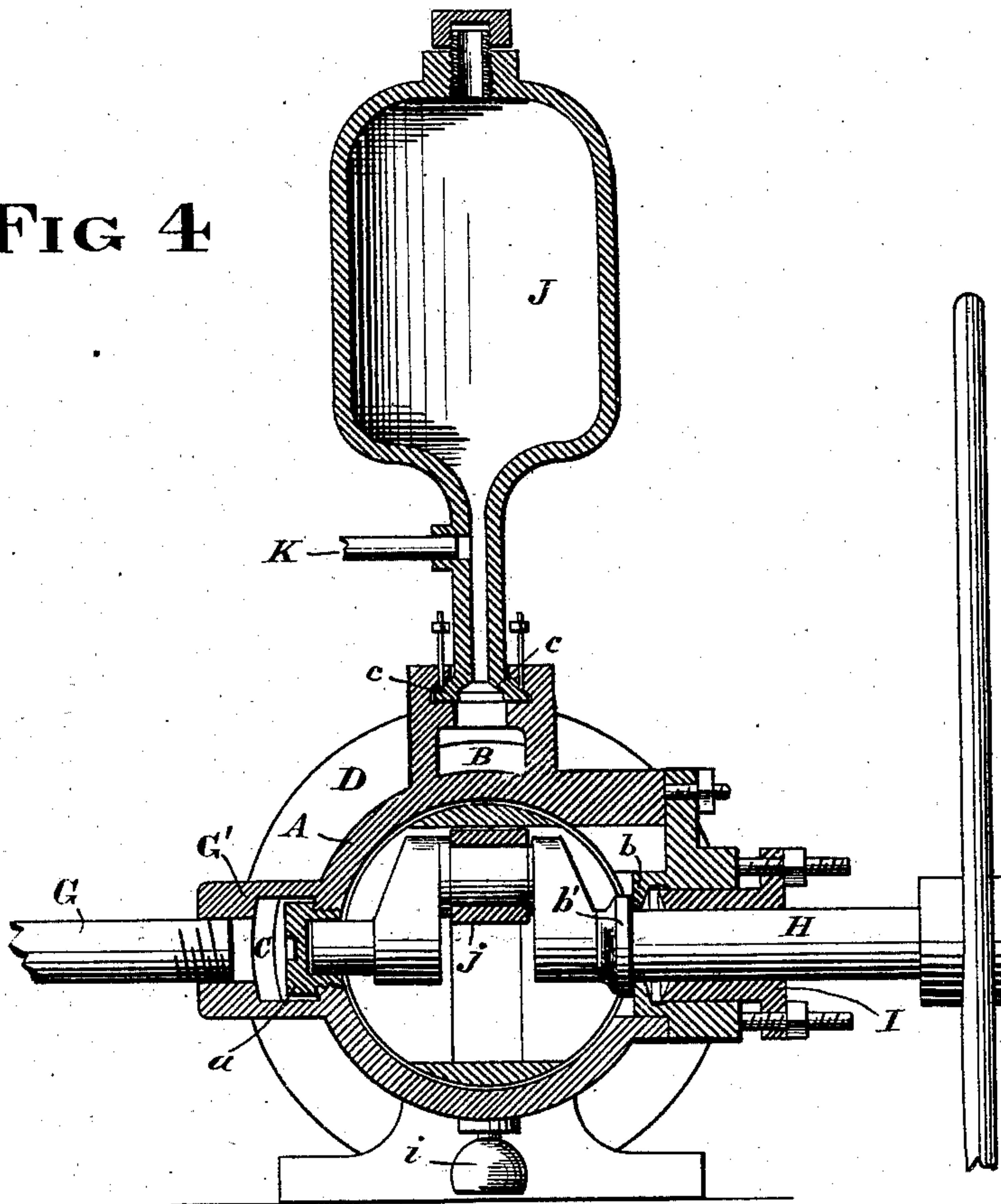
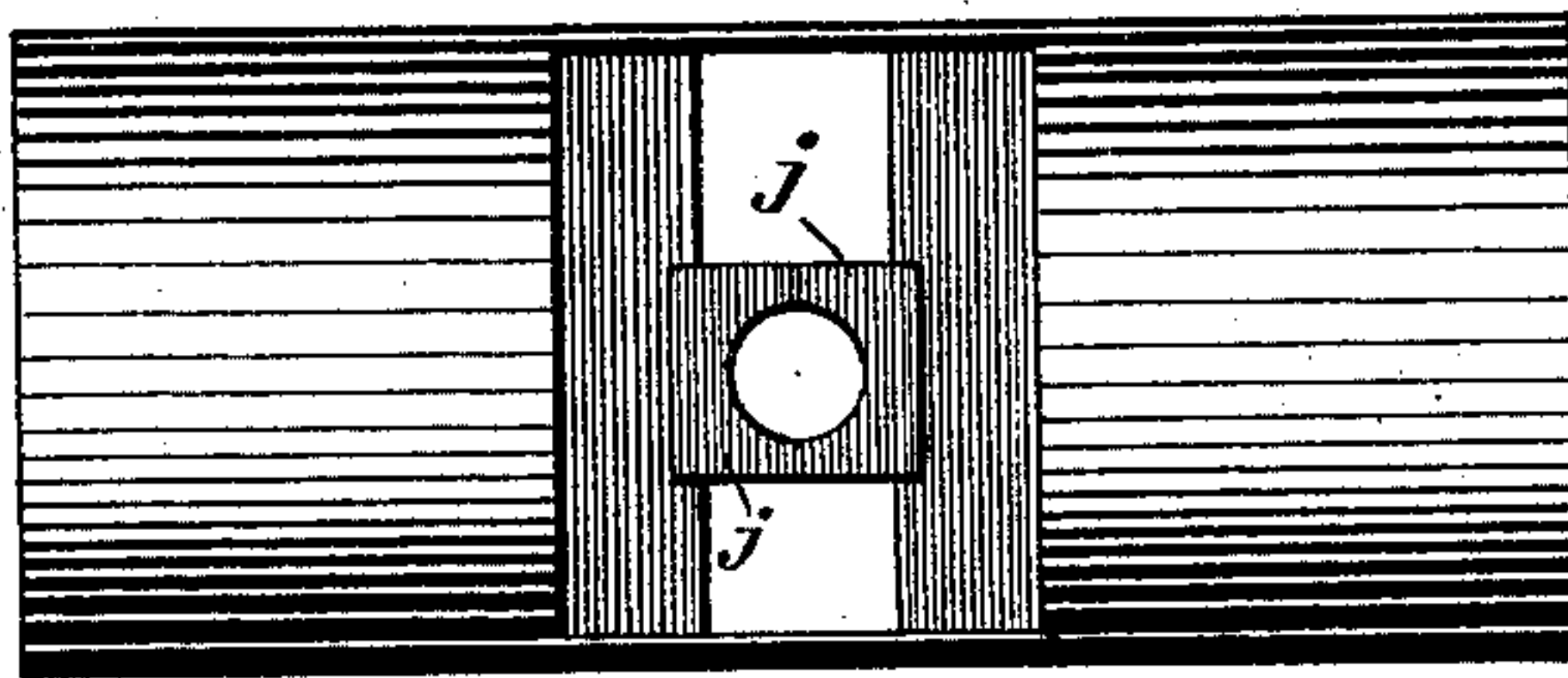


FIG 5



WITNESSES

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UNITED STATES PATENT OFFICE

ALMERIN H. LIGHTHALL, OF SAN FRANCISCO, CALIFORNIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 232,520, dated September 21, 1880.

Application filed May 3, 1880. (No model.)

To all whom it may concern:

Be it known that I, ALMERIN HUBBEL LIGHTHALL, of San Francisco, in the county of San Francisco and State of California, have invented a new and useful Double-Acting Pump, of which the following is a specification, reference being had to the accompanying drawings.

Figure 1 represents a longitudinal vertical section; Fig. 2, a plan of cylinder-head; Fig. 3, a sectional view of cylinder-head. Fig. 4 is a transverse vertical section through the center of the pump, Sheet 2; Fig. 5, a front view of plunger or piston, Sheet 2.

Similar letters refer to similar parts throughout the several views.

This invention consists in the combination, in a pump, of a hollow piston or plunger operated by a crank-shaft moving in a box upon a cross-head in the center of the piston, and in other details of construction, as hereinafter more particularly described and claimed.

I construct my cylinder A with the eduction-passage B in the top part thereof, and the induction or receiving-passage C in the side of the cylinder, about midway thereof, so that in practice my cylinder is always about one-half full of water, and will not need priming before starting up.

The heads D of the cylinder are cast in one piece, and are provided with ports B' and C', to correspond with the water-passages B and C. These heads are also provided with valves and chambers E F.

The suction-valve chambers F' are dome-shaped, and made large enough to admit of a free action of the valve and valve-stem and springs, which admits of the valves being worked with great ease and facility.

The delivery-valves E are contained in removable caps, and are secured to the seats in the head from the inside.

The sides of the cylinder are pierced for the driving-shaft, the inner end of which operates in a gun-metal box, a, secured to the cylinder by a screw-thread. The head of this box is in the water-passage C, directly in front of the induction or suction pipe G. By this construction and arrangement of the box, it provides a thrust-bearing for the end of the shaft, and by reason of its location in a direct line of the incoming water will always keep the end of the shaft and box cool.

The suction-opening G' serves for three purposes—viz., for securing the journal-box a, removing the suction-pipe, and keeping the journal-box from being overheated by delivering a constant stream of water against it; also, as a thrust-bearing for the end of the shaft through the journal-box a.

The front side of the cylinder is provided with an opening for the stuffing-box or journal-bearing of the driving-shaft H. It is cast, as shown, so that the facings and centerings may all be finished with a boring-tool in one operation, and the gland I is inserted and held in place by the two stud-bolts, as shown, and the casting or cap has a collar, b, cast on the inner side, which answers as a thrust-bearing for the collar b' of the crank-shaft, which operates the piston, and thus is formed a cap, journal-bearing, and stuffing-box, combined and united as shown.

In the top of the cylinder and so as to connect with the water-passage B, I attach the air-chamber J by means of a beveled or inclined opening or cut, to correspond with the incline or bevel c on the foot of the chamber. This foot is thrust into the inclined opening and provided with a lead or india-rubber packing to make the joint air-tight. By this construction much time and expense will be saved, and a perfectly-fitting joint is had. To the top of this chamber may be attached a suitable gage-cock, while the exit-pipe is indicated by the letter K.

The piston of my pump is constructed with a chamber, L, at each end, and a slotted cross-head, M, is constructed midway between these chambers, in which the crank-shaft H, which drives the piston or plunger, works in journals or bearings j j, the latter being cast in two parts to receive the crank-shaft.

Each chamber of the piston is provided with a lubricating-cup, k, which supplies the lubricant through channels made in each side of the cross-head.

To the ends of the plunger or piston the heads ll are secured by screw-connections, and a square recess is made in their outer faces.

By constructing my piston in this manner I obtain a casting of true proportions, and which affords ready access to the oil-cups by simply unscrewing the heads.

In order to thoroughly lubricate the piston

and prevent the lubricant from mingling with the material being pumped, I provide the inner face of the cylinder with a series of annular raised ribs *d* and corresponding annular grooves *e*. The oil-cups *f* are placed at the top of the cylinder, so that the oil-passage comes directly upon a line with the middle groove. A curved pipe, *g*, leading from these oil-cups, passes through the cylinder at *h*, as shown, and thus these cups are always under pressure when the pump is in operation. By this construction the piston is always lubricated, and the lubricant prevented from being mixed with the contents of the pump, and any surplus is caught and saved by the drip-cups *i*, beneath the cylinder.

By this construction and arrangement of parts I provide a pump having ample water-passages and valve area, which prevents all jarring or thumping when running at a high rate of speed.

The crank which plays in the slot of the piston governs the motion of the piston, causing it and the other reciprocating parts of the pump to be stopped and reversed gradually, and not by sudden impulses. It can also be reversed with great exactness at the proper point, so as to obviate much clearance in the cylinder, and no variation in the length of the stroke can be had, the movement being a uniformly accelerative motion from the beginning to the center of the stroke, and a uniformly retarding motion from the center to the end of the stroke of the piston.

My invention is well adapted for a general water-pump, feeding boilers, &c., and for such special purposes as acids and pumping and condensing ammonia for ice-machines.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. In a double-acting pump adapted to the moving of liquids, fluids, and gases, the piston or plunger having in the center thereof a vertically-slotted cross-head, on the ways of which the crank or operating shaft moves in a bearing or box, and the chambers *L L*, located at each side of the cross-head and provided with a means for lubricating said cross-head, and the screw caps or heads for closing the ends of the plunger, all constructed and arranged to operate substantially in the manner as herein set forth and specified.

2. In a double-acting pump adapted to the moving of liquids and gases, the cylinder thereof, provided with annular grooves and ribs *e d*, in combination with the lubricating-cups *f f*, having curved pipes *g g*, and connecting with said grooves, and the drip-cups *i i*, for receiving the waste lubricating material, all constructed and arranged as and for the purpose set forth.

3. In a double-acting pump, the cylinder *A*, provided with heads *D*, induction-passage *C*, eduction-passage *B*, ports *B' B' C'*, valves *E*, and chambers *F F'*, in combination with the air-chamber *J*, driving-shaft *H*, and a piston having chambers *L L*, and slotted cross-head *M*, all constructed, arranged, and operating substantially as and for the purposes shown and described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 16th day of April, 1880.

ALMERIN H. LIGHTHALL. [L. s.]

Witnesses:

C. W. M. SMITH,
HOLLAND SMITH.