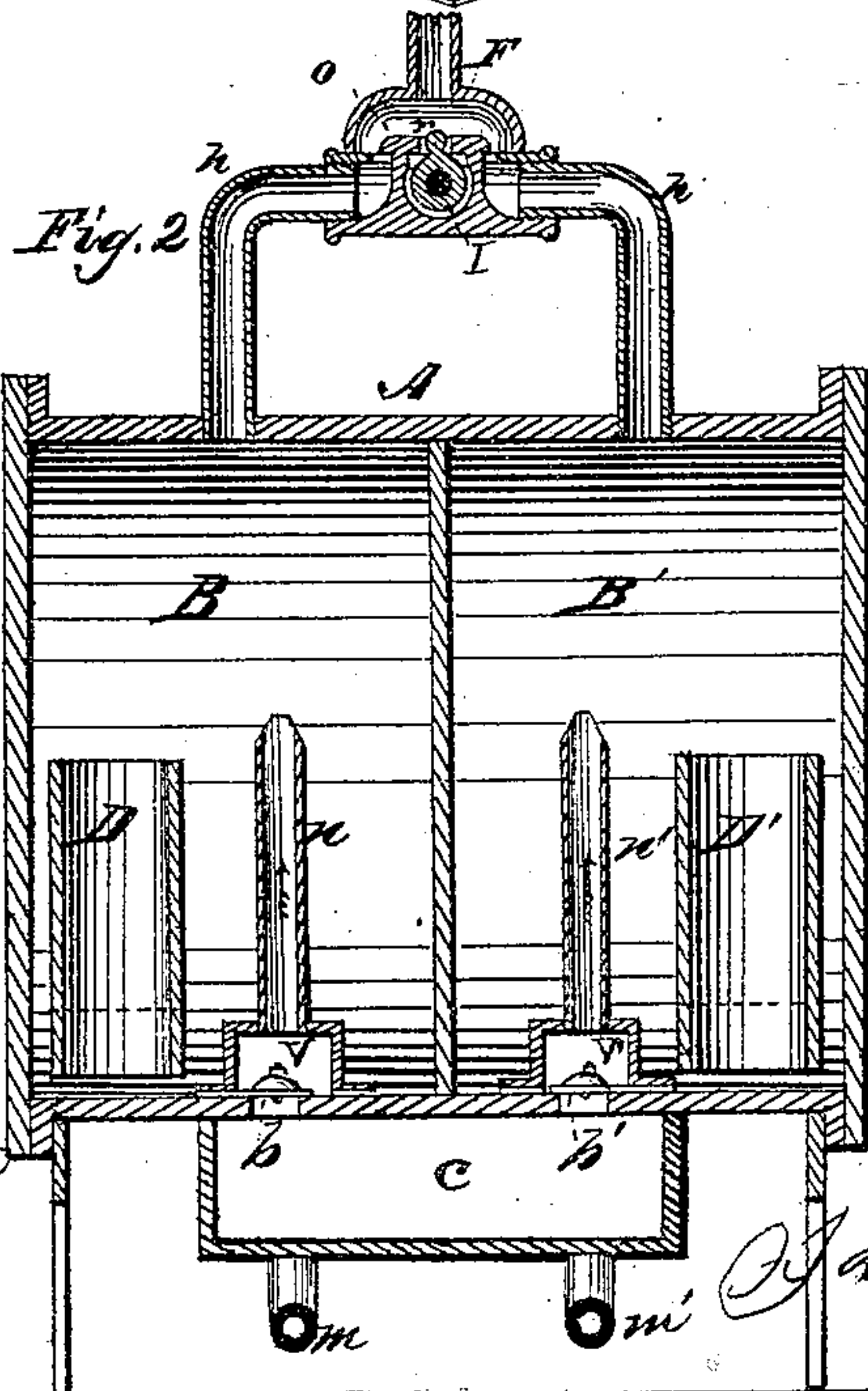
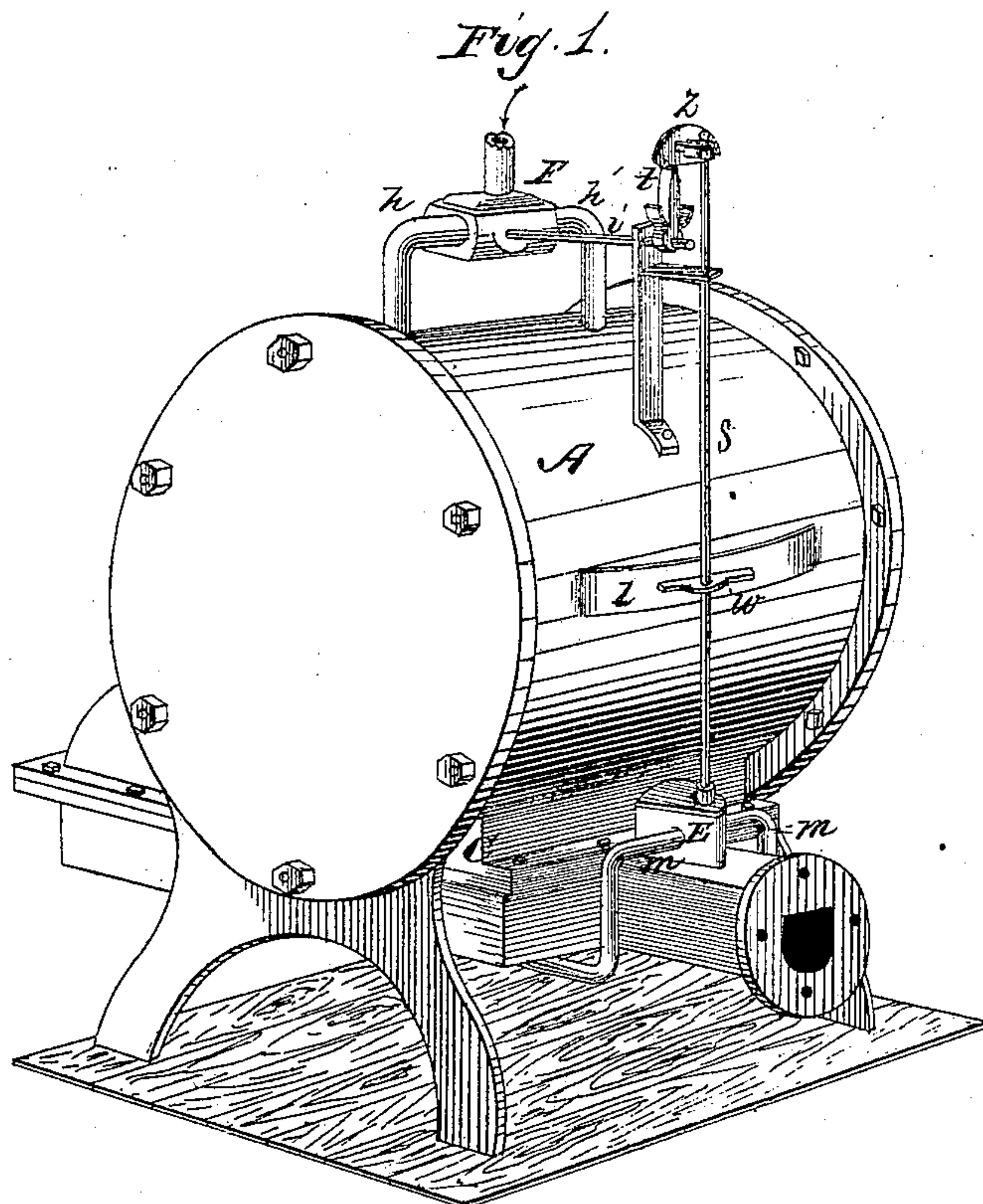


J. R. LITTLE.

Steam Vacuum-Pumps.

No. 136,441.

Patented March 4, 1873.



Attest

*By O. Hubbard
H. B. Olling*

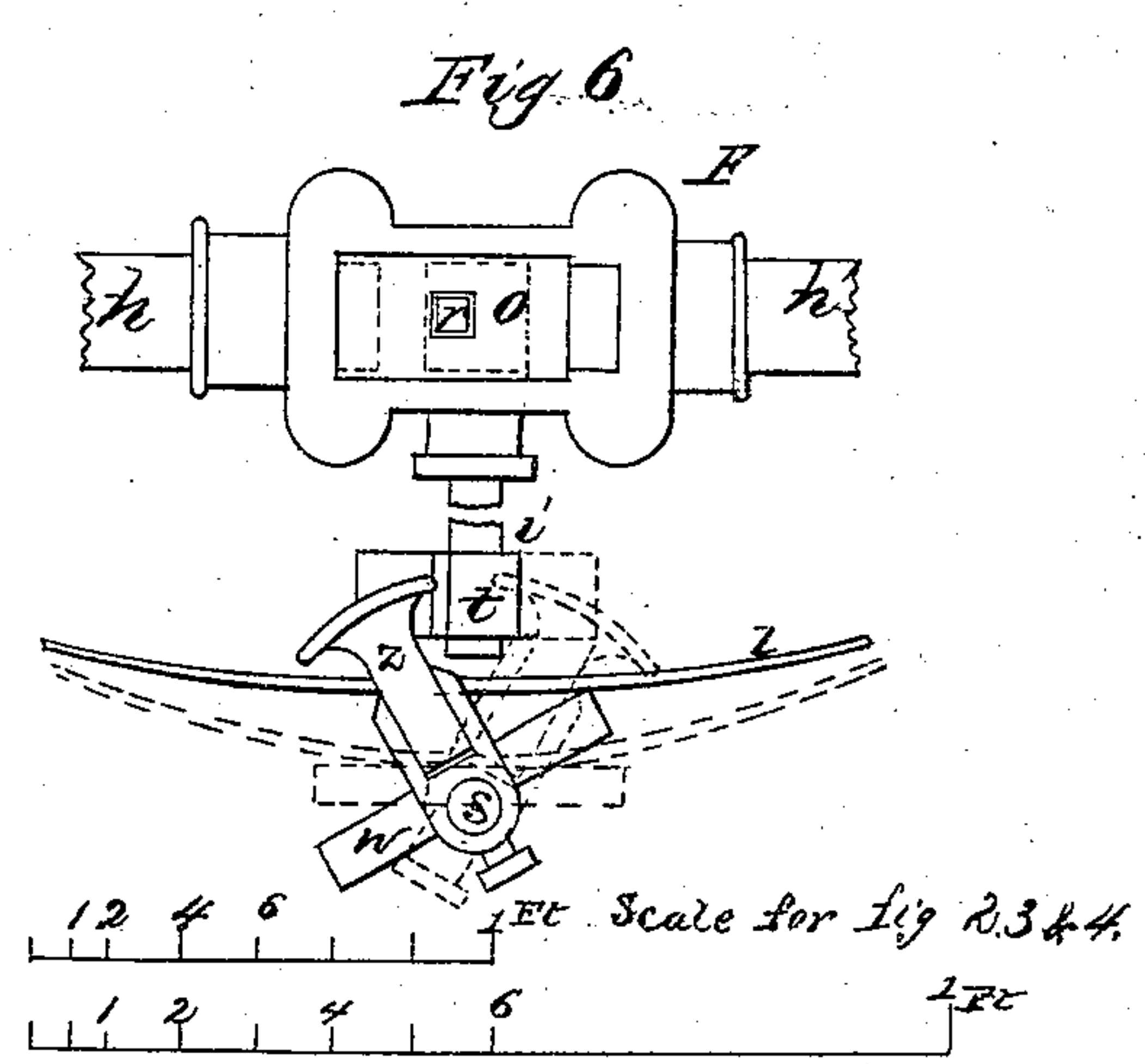
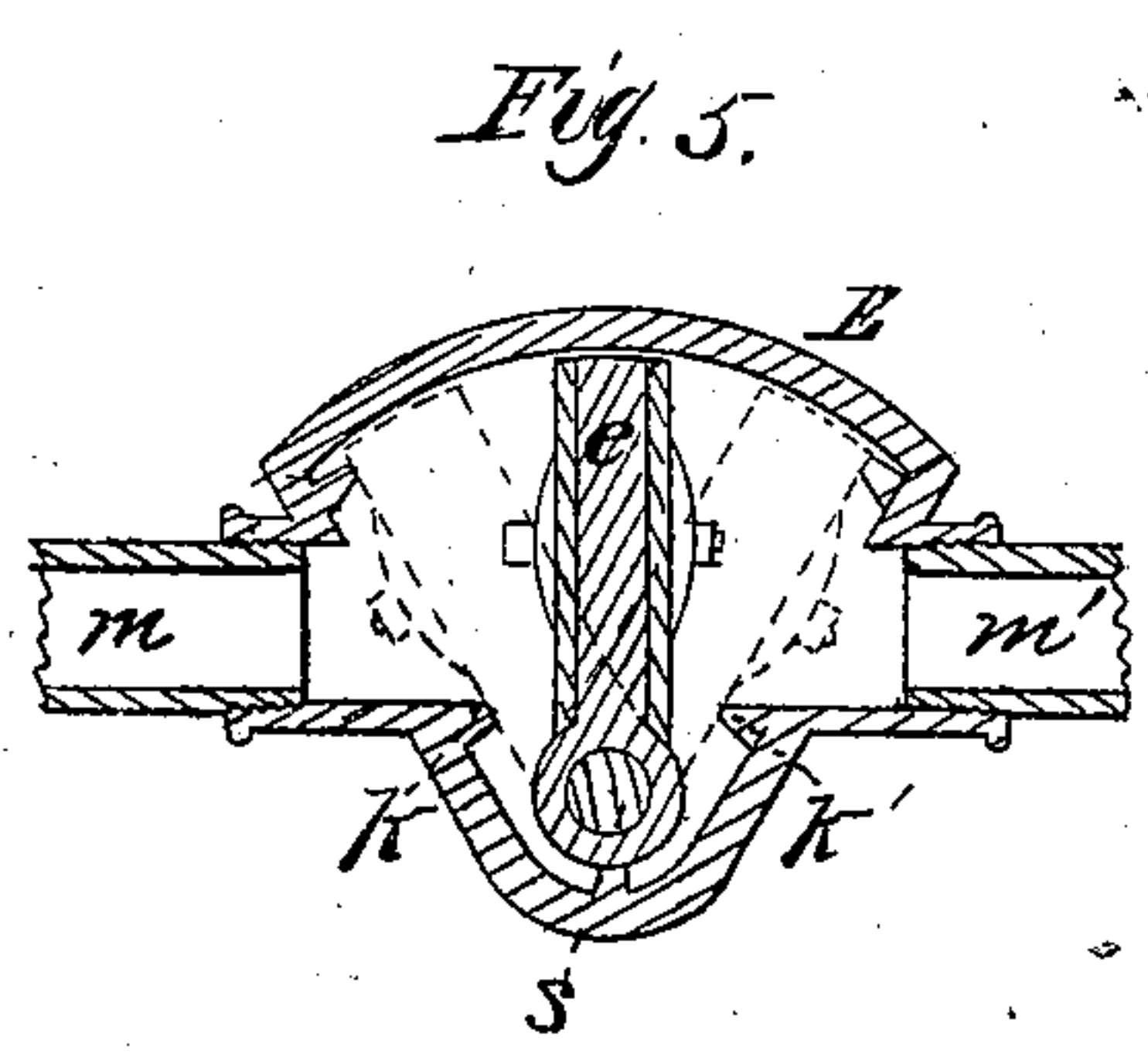
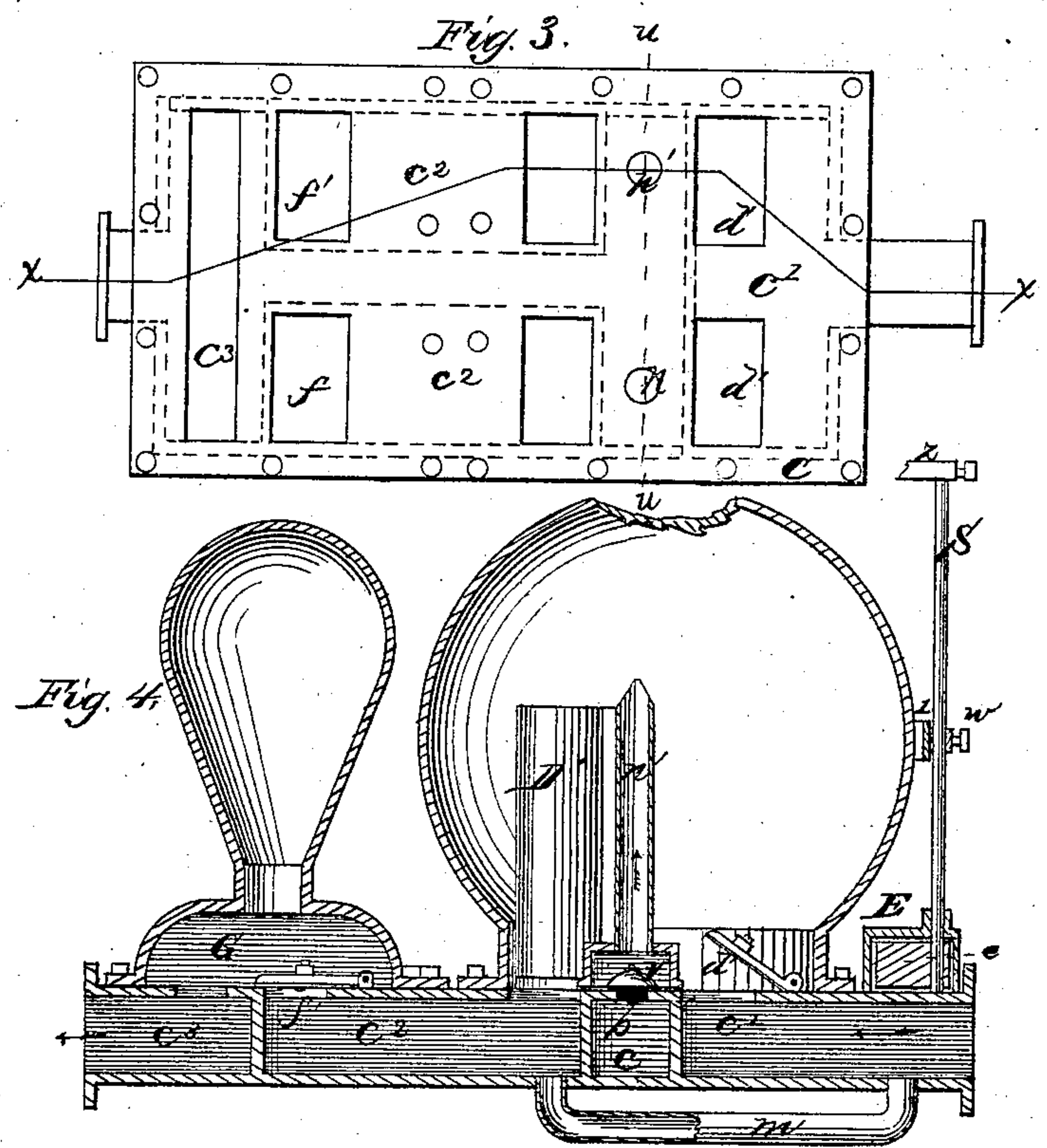
Inventor,

James R. Little

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Witnesses.

R. J. O. Hubbard
W. B. Strong

Inventor.

James R. Little

UNITED STATES PATENT OFFICE.

JAMES R. LITTLE, OF MONMOUTH, ILLINOIS, ASSIGNOR OF ONE-HALF HIS
RIGHT TO CLAUDIUS A. DUNN, OF SAME PLACE.

IMPROVEMENT IN STEAM VACUUM-PUMPS.

Specification forming part of Letters Patent No. 136,441, dated March 4, 1873.

To all whom it may concern:

Be it known that I, JAMES R. LITTLE, of Monmouth, Illinois, have invented certain Improvements in Steam Vacuum-Pumps, of which the following is a specification:

The first part of my invention relates to a peculiar arrangement of the pipes, valves, pump-chambers, &c., of a double or single acting automatic steam vacuum-pump; the object of this part of my invention being to make the machine compact, reduce the cost of manufacture, and so arrange the ports and valves as that any air that may accumulate in the pump-chambers may be readily expelled by the steam. The second part relates to a device for condensing the steam, the object being to condense the steam as rapidly as possible and at the proper time. The third part of my invention relates to a gate or swinging valve, so arranged and acted upon by a combination of forces, in a manner as hereinafter described, as to produce a reliable motion, to which machinery may be attached for the purpose of operating the steam-valve.

Figure 1 is a perspective view of a pump embodying my invention. Fig. 2 is a vertical longitudinal section, showing those parts which are at the left hand of the line *u u*, Fig. 3. Fig. 3 is a plan of the bottom C, showing the walls, partitions, water-passages (in dotted lines) ports, and valve-seats. Fig. 4 is a vertical transverse section, showing those parts which are at the right hand of the line *x x* when the drawing is turned to the right. Fig. 5 is a horizontal section of the gate-chamber E. Fig. 6 is a plan of the steam-chamber F, rod *i*, tappet-arm *t*, jointed arm *z*, spring *l*, and spring-bar *w*.

A is a horizontal cylinder with a vertical transverse partition dividing it into two chambers, B B'. C is a box, in which are arranged the necessary water-passages, as shown in Figs. 3 and 4, the top of which, being level and planed, forms a smooth surface for the reception of the chambers E, B B', G, *v v'*, valves *b b'*, *d d'*, and *f f'*. D D' are condensing-chambers with perforated bottoms. These bottoms, as shown in Fig. 2, are placed some distance from the lower end of the chambers D D'. Said chambers are placed half an inch above the bottoms of and inside of the chambers B B'. The perforations are made of such a size and number

as that when the pump is discharged there will be a portion of the water retained in the chambers D D'; and this will, streaming through the perforations, condense the steam. The steam, after the pump is discharged to the lower end of the chamber D, passes in and fills the space under the perforated bottom, thus giving a greater depth of steam to be acted upon by the water than could be obtained by placing the bottom at the lower end. E is a chamber provided with a gate, *e*, faced on both sides with rubber or otherwise, and shutting against the seats *k k'*, and is connected with the pump-chambers by the pipe *m m'*. F is the steam valve-chamber. *o* is a slide-valve alternately covering and uncovering the ports leading to the pipes *h h'*, and is operated by means of the crank *r* and rod *i*, Figs. 2 and 6. *n n'* are jet-pipes for condensing the steam, and are connected with the discharge water, as shown in Fig. 3. *v v'* are chambers, in which valves *b b'* work. *d d'* are induction-valves. *f f'* are discharge-valves. *s* is a vertical rod, the lower end of which passes into the chamber E, and is rigidly fixed to the gate *e*, the upper end having a jointed arm, *z*, with a notched cross-head so arranged as to operate the tappet-arm *t* which is attached to the rod *i*.

Suppose the pump at work, the chamber B filled with water, a vacuum formed in B', and the gate *e* against the seat *k*; the gravity of the water in B, the atmospheric pressure caused by the vacuum in B', and the force exerted by the spring *l* will move the gate *e* half stroke, as shown in Fig. 5, and the spring *l* and bar *w* will assume the position indicated by the dotted lines in Fig. 6. This movement of the gate *e* moves the valve *o* full stroke, letting the steam into the chamber B. The pressure of the steam and the gravity of the water in B, together with the atmospheric pressure caused by the vacuum in B', now unite to again compress the spring *l* and force the gate *e* against the seat *k'* and hold it there until the chamber B' is filled and B is discharged, when the same operation as just described is repeated, only that all the parts excepting the spring *l* move in the opposite directions.

I claim—

1. The cylinder A, in combination with the chamber G and bottom C, when constructed

and arranged for operation as and for the purposes specified.

2. The arrangement and combination with each other of the water-passages c c^3 c^2 c^2 , valves b b' , and jet-pipes n n' , all constructed and operating as shown and set forth.

3. The chambers D D' , in combination with pipes n n' provided with valves b , all arranged in the chambers B B' , substantially as and for the purposes set forth.

4. The combination and arrangement of the gate e , seats k k' with rods s and operative mechanism, substantially as and for the purposes specified.

5. The combination of the spring l , bar w , rods s and i , arms z and t , and crank r , when arranged as described, and for the purposes set forth.

6. The combination of the valve I and gate e with crank r and rods i and s , when constructed to operate substantially as described, and for the purposes shown.

J. R. LITTLE.

Witnesses:

B. J. O. HUBBARD,
W. B. YOUNG.