

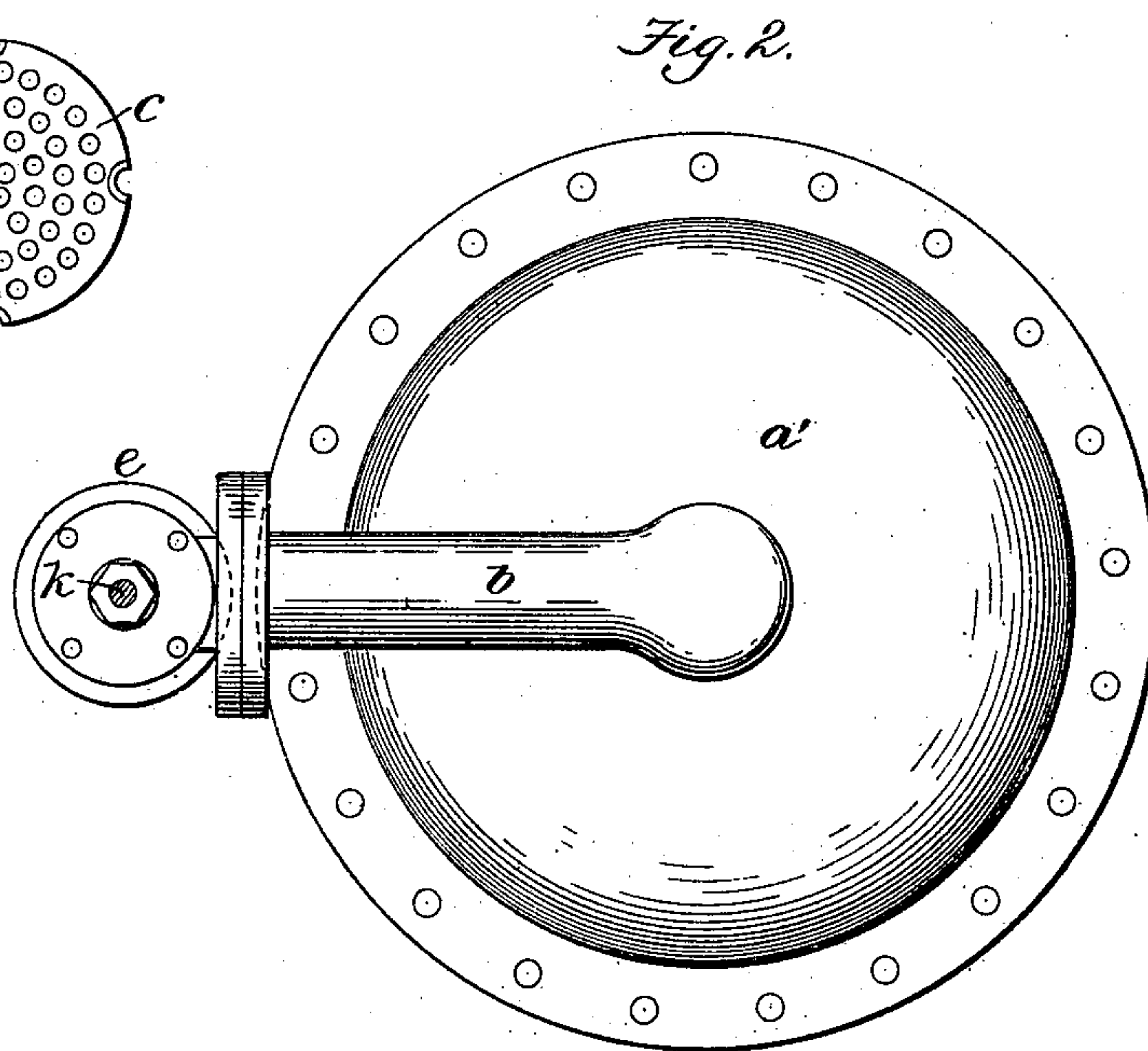
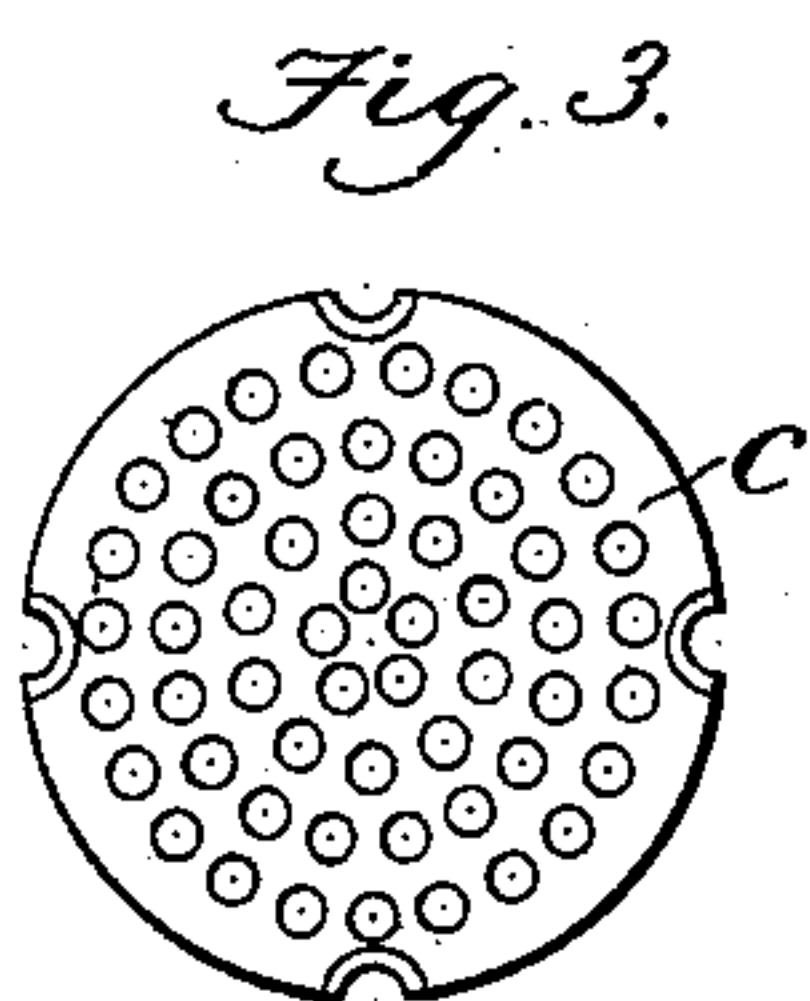
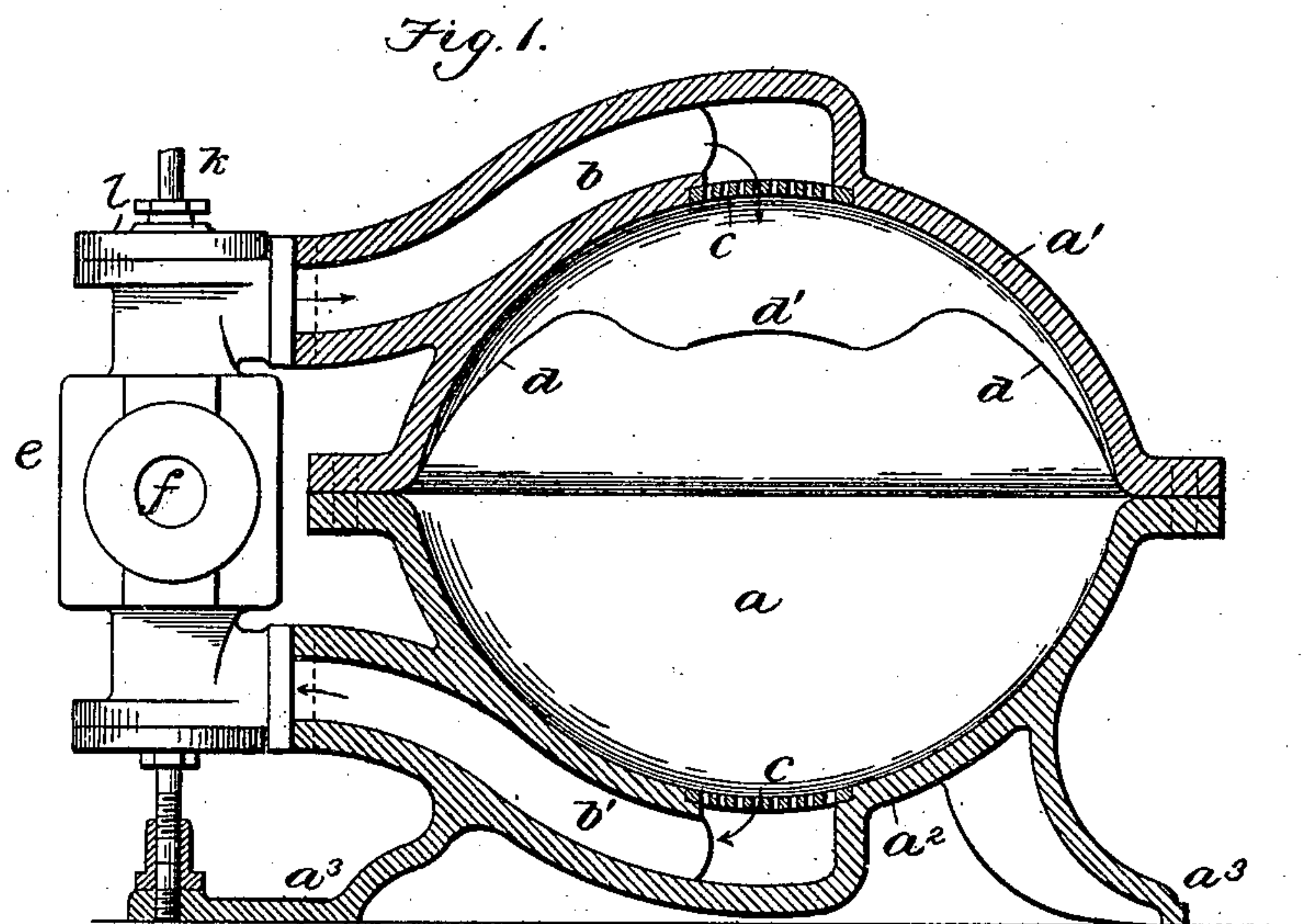
(No Model.)

2 Sheets—Sheet 1.

H. LANE.
AIR OR GAS METER.

No. 470,826.

Patented Mar. 15, 1892.



Witnesses
Howell Barth
G. M. Copenhaver

Inventor
Howard Lane
By *Johnson*
his Attorneys

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

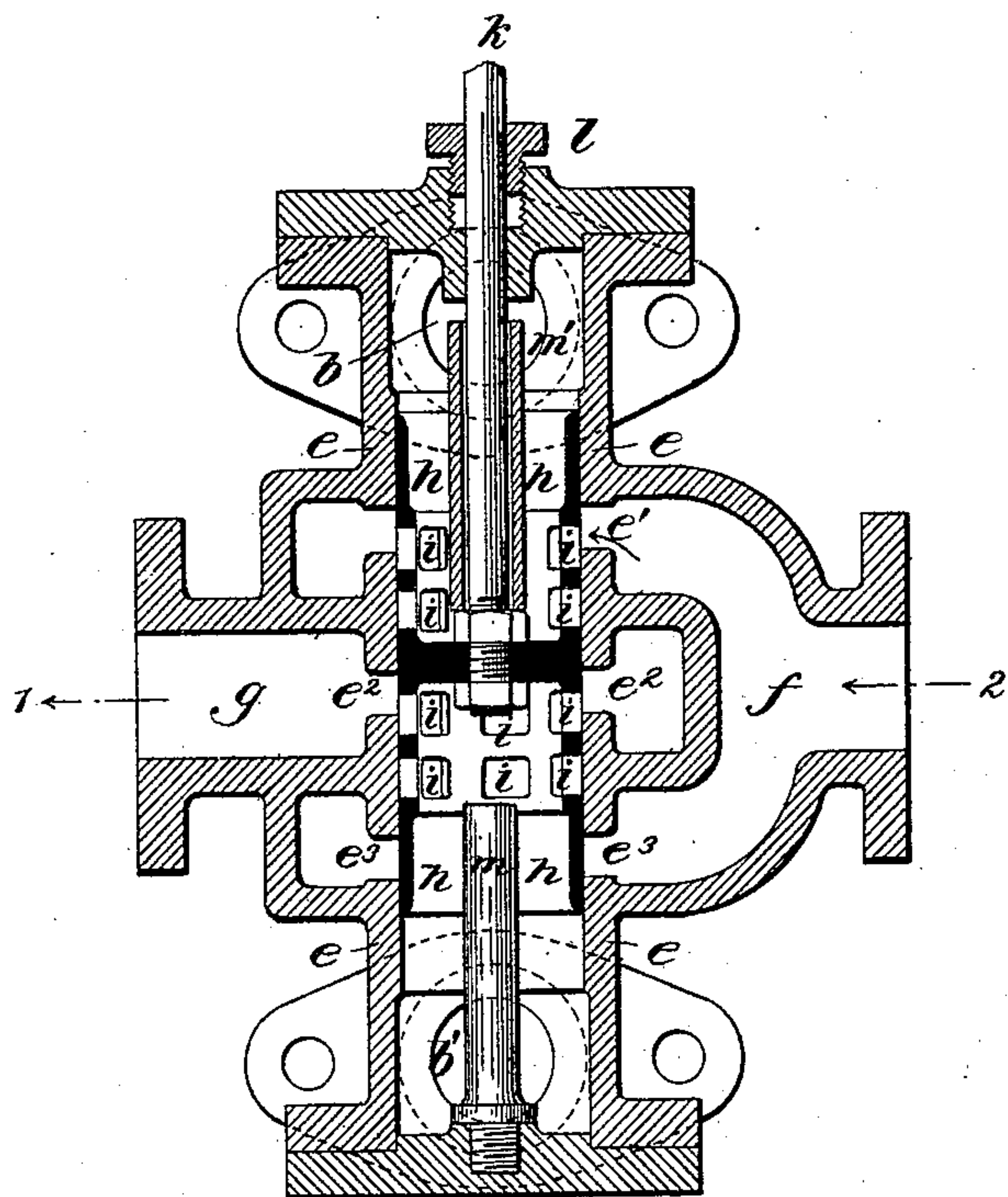


Fig. 5.

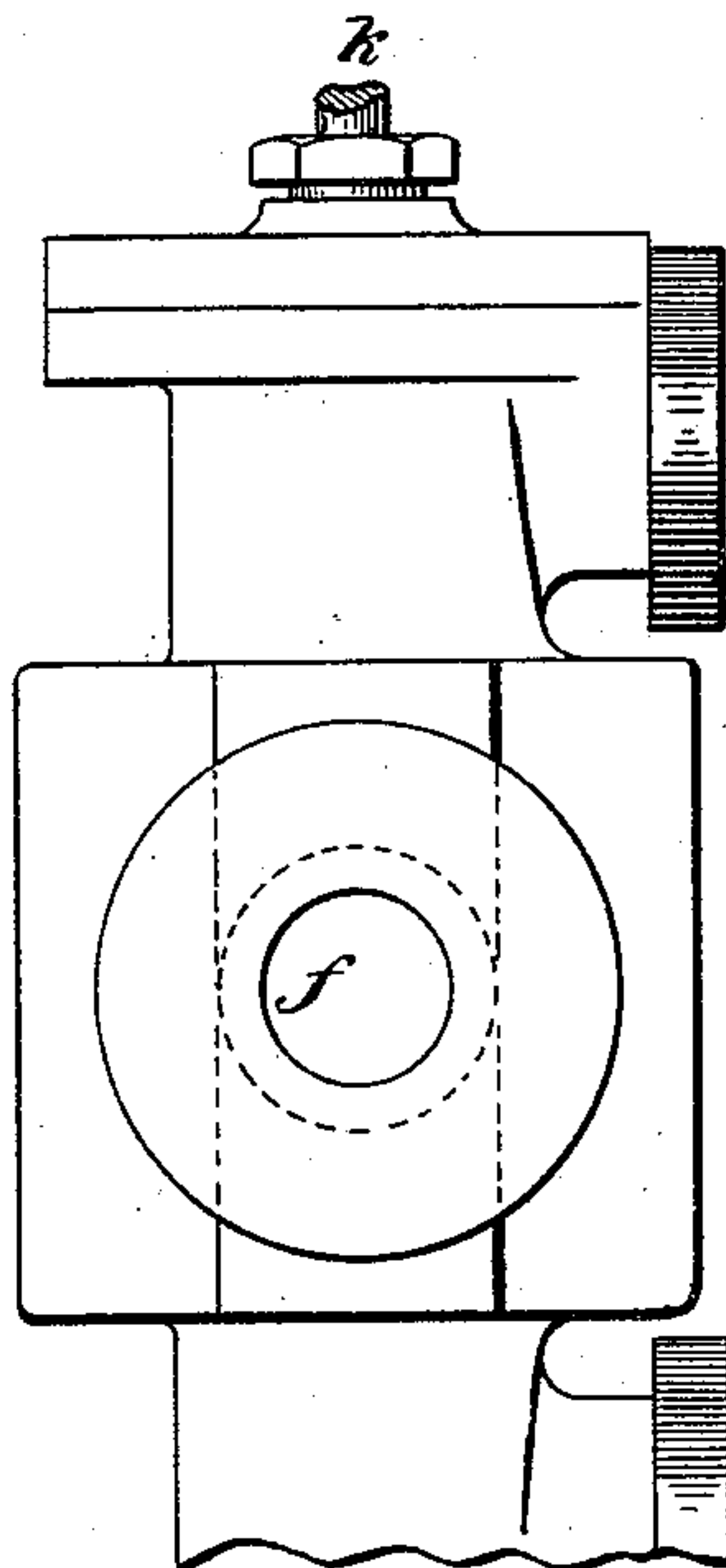


Fig. 6.

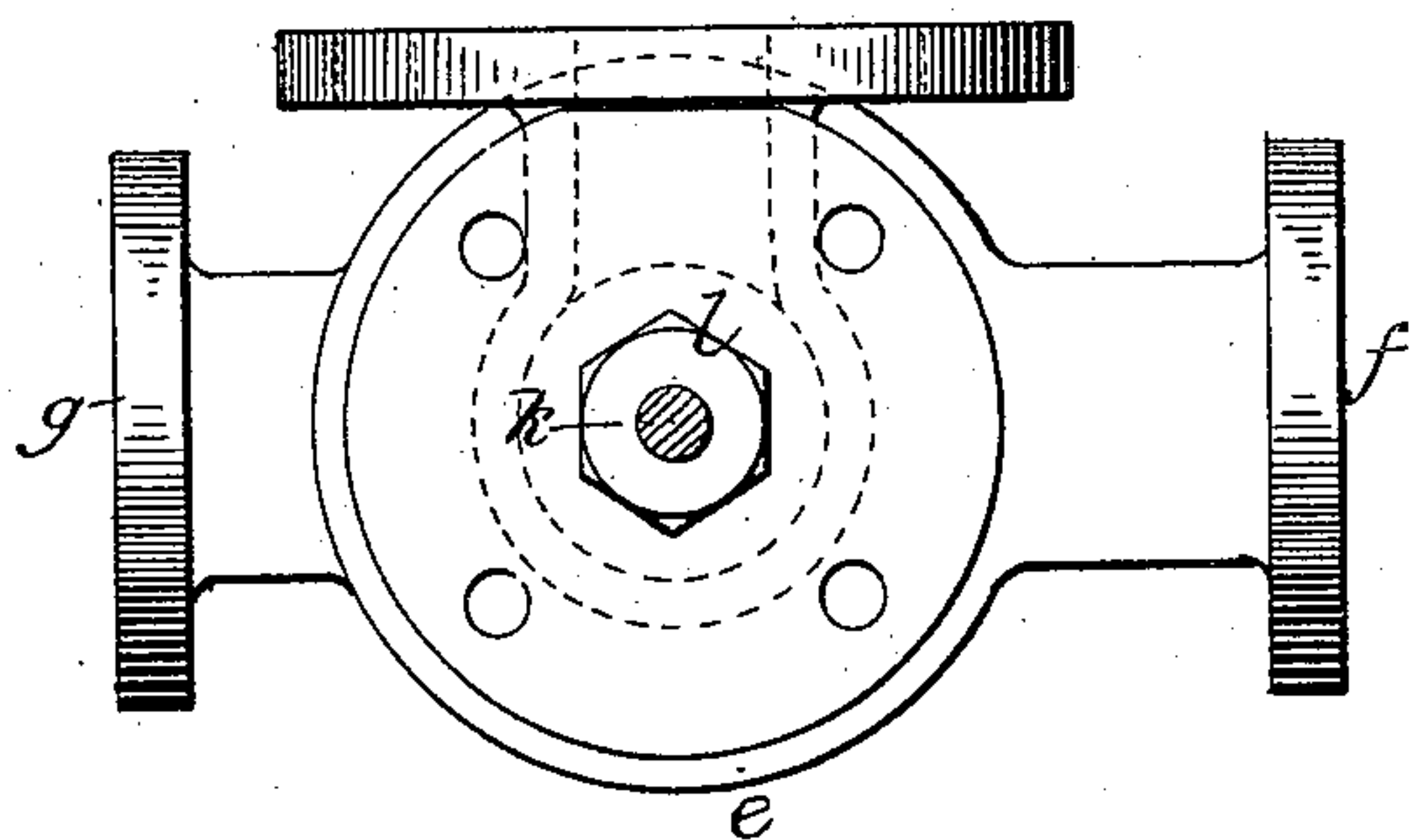
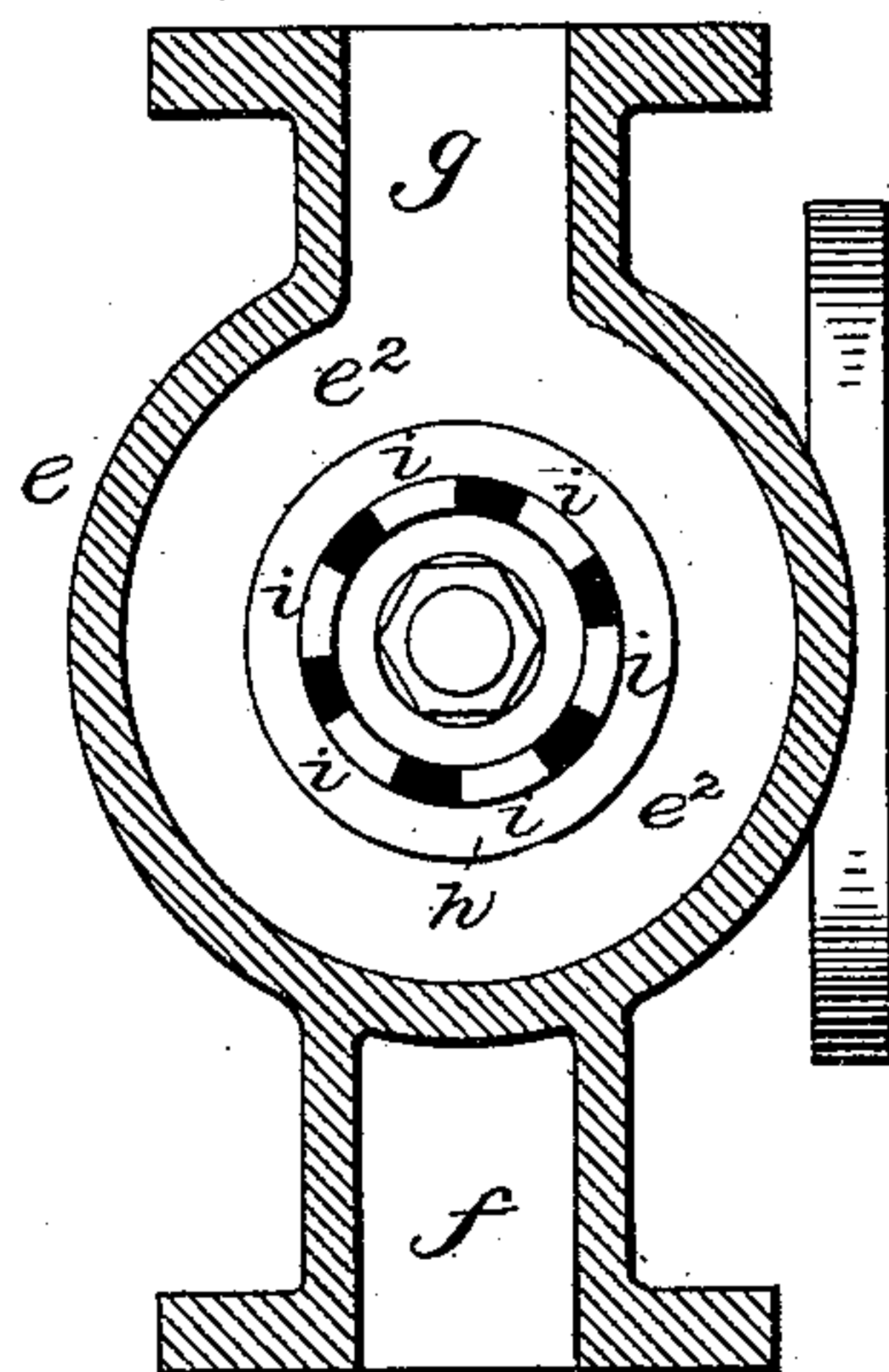


Fig. 7.



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UNITED STATES PATENT OFFICE.

HOWARD LANE, OF BIRMINGHAM, ENGLAND, ASSIGNOR OF ONE-HALF TO
JOHN WOODRUFF CULMER, OF NEW BRIGHTON, PENNSYLVANIA.

AIR OR GAS METER.

SPECIFICATION forming part of Letters Patent No. 470,826, dated March 15, 1892.

Application filed April 28, 1891. Serial No. 390,737. (No model.) Patented in England May 25, 1888, No. 7,674.

To all whom it may concern:

Be it known that I, HOWARD LANE, a subject of the Queen of England, residing at Birmingham, England, have invented new and
5 useful Improvements in Air or Gas Meters, (for which I have obtained a patent in Great Britain, No. 7,674, bearing date May 25, 1888,) of which the following is a specification.

My invention relates to that class of meters
10 in which a flexible diaphragm operates alternately as a piston to fill and displace the fluid from a measuring-chamber; and it consists of certain novel parts and combinations of parts and the operation thereof, which are particularly pointed out and designated in the claims
15 concluding this specification.

My invention provides for operating and reversing a trunk-valve by the direct pressure of the fluid upon its faces, so as to effect a
20 free registering relation of its ports with the coacting cylinder-ports at each stroke of the valve, whereby the reversing movement of the valve-piston is rendered certain, quick, and sensitive by the sudden check which is given
25 the fluid passing into the meter when the measuring-chamber is filled. This free and unrestrained movement of the valve-piston from a point at which it acts to cut off the inflow of the water into the measuring-chamber
30 is a necessity for the meter having its measuring-chamber divided by a flexible diaphragm and in which the piston-valve is operated by the action of a difference of pressure which arises between the induction and
35 the eduction of the fluid in order to obtain a continuous flow of the water, for the least retarding or hampering action of the piston-valve at the end of its stroke would render the action of the valve uncertain, intermittent, and the registering movement uncertain.
40 Nor could such sensitive automatic action of the valve-piston be obtained without such a coacting arrangement of the ports as to cause the piston-valve to act, so as to cut off and
45 open the communication with the divided chambers, so as to produce the sudden difference of pressure between the inflow and the outflow, as above stated. It is to effect this result that I produce a coacting relation of
50 the piston and the cylinder-ports with the fixed stops.

Figure 1 is a vertical elevation of the meter, showing its measuring-chamber and diaphragm. Fig. 2 is a top view of the same. Fig. 3 is one of the perforated plates of the
55 chamber. Fig. 4 is an enlarged section of the valve-box and its valve. Fig. 5 is a side view of the same. Fig. 6 is a top view of the valve-box, and Fig. 7 is a section of the same on the line 1 2 of Fig. 4.

a is the receiver or measuring-chamber, made of two parts a' a'' approximating a spherical form, each part having a flange by which they are bolted together to confine between
60 them the edge of a dividing flexible diaphragm therein. Each part is formed with an outside passage $b b'$ for the fluid, which communicates with the opposite sides of said chamber by the perforated plates $c c$.

The diaphragm d is provided at d' with a
70 shield, of rubber, leather, rubber metal, or other suitable material, for closing the passage and serving as a contact-shield for preventing injury to the diaphragm at these inflow and outflow points. The diaphragm is
75 air-proof and is so formed that it can adjust itself exactly to the contour of the inside surface of the chamber in dividing it into two chambers.

A valve-box and valve are fitted to the chamber, having passages to each half of the same,
80 and has also induction and eduction ports and connections from and to other vessels from which the fluid is drawn or received under pressure and conveyed away. The valve is
85 fitted with a rod k , which passes through a stuffing-box l and is connected in any convenient manner with counting and recording mechanism, whereby the number of times
90 that the vessel is filled with fluid is recorded and registered.

e is the cylindrical valve-box.

f is the inlet-passage, and g is the outlet-passage.

In the walls of the box are three annular
95 ports e' e'' e''' , of which e' and e''' open into the inlet-passage, while the port e'' opens into the outlet-passage, as seen in Fig. 4.

The valve h (shown) is of the piston type and has ports $i i i$ in its tubular ends which
100 project on either side of its solid head, to which the valve-rod k is secured. The valve

is practically free in its movements, as it has no connection with the diaphragm, and its piston-rod is only the means of communicating its motion to the registering mechanism.

5 It is limited in its inward stroke by a rod m , extending from one of the box-heads, and it is limited in its outward stroke by a sleeve m' , extending inward from the other box-head and through which the piston-rod passes. In

10 the position of the valve shown the gas or other fluid to be measured will enter by the passages f , e' , and i to the inside of the valve h , and thence by the passage b to the upper part of the measuring-chamber above the dia-

15 phragm. The fluid below the diaphragm will pass out by the passages b' , i , and e^2 to the outlet-passage g , the passage e^3 being closed by the valve. When the diaphragm has descended to and is pressed closely to the lower

20 chamber part a^2 in every part, the sudden check which is given to the fluid passing into the meter causes an increase of pressure. This increase of pressure acts upon the solid

25 valve-head and thereby causes its downward stroke, closing the port e' and opening the port e^3 , and thus admitting the fluid below the diaphragm and opening the eduction to the fluid above the diaphragm. These operations

30 are repeated as long as the gas flows. The trunk form of the valve therefore requires that it shall be open at both ends with a middle solid partition, so that pressure acting alternately on each side of said partition will move the valve in the way stated to control the

35 inlet and the outlet ports to render the action automatic and the flow continuous through the valve-box, and this automatic action of the valve is produced solely by the difference of pressure of the inflow of the fluid to be

40 measured, which is caused by the termination

of the range of action of the diaphragm as the chamber is filled and emptied. For this purpose the valve is in direct communication with the inlet and the outlet passages of the measuring-chamber to allow it to be reversed as a 45 free valve by the increase of pressure on one side thereof, caused by the check imparted to the induction of the fluid when the measuring-chamber is filled.

I claim as my invention—

1. In a fluid-meter, the combination, with a 50 measuring-chamber divided by a flexible diaphragm, a valve-case having ports communicating with the divided chambers, and a trunk-valve having coacting ports arranged to be 55 operated by the direct pressure of the fluid upon its faces, of stops having a fixed relation to the cylinder and arranged in such relation to said ports as to effect a free starting of said piston at the end of each stroke, sub- 60 stantially as described.

2. In a fluid-meter in which an elastic diaphragm is employed for the purpose stated, the valve-case having communication at each 65 end with the opposite sides of said diaphragm and provided with the ports e' e^2 e^3 , the stud m , and the sleeve m' , the induction and the eduction ports, and a valve having tubular walls provided with coacting ports i , separated by a solid head and having a valve-rod, sub- 70 stantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HOWARD LANE.

Witnesses:

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