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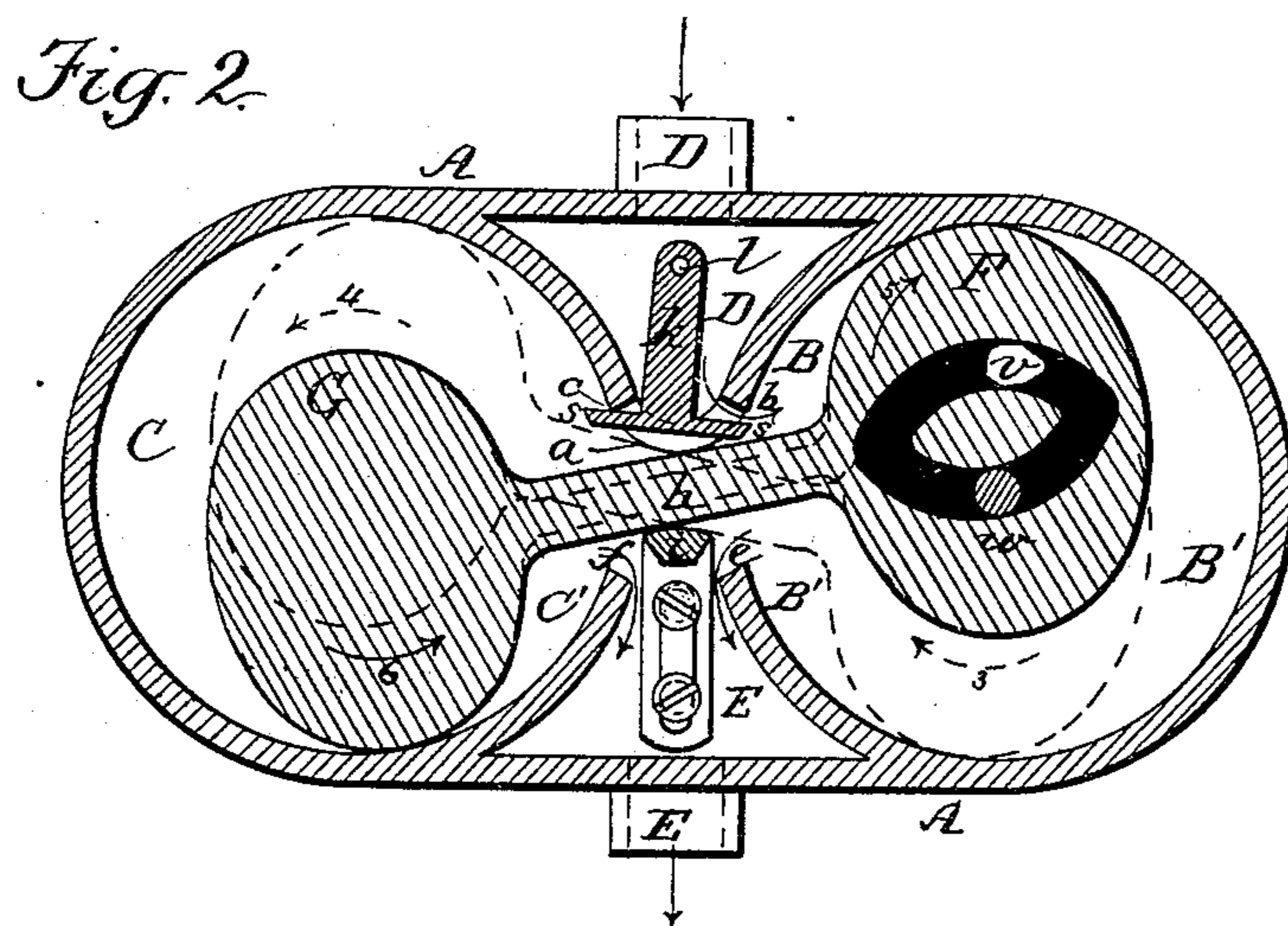
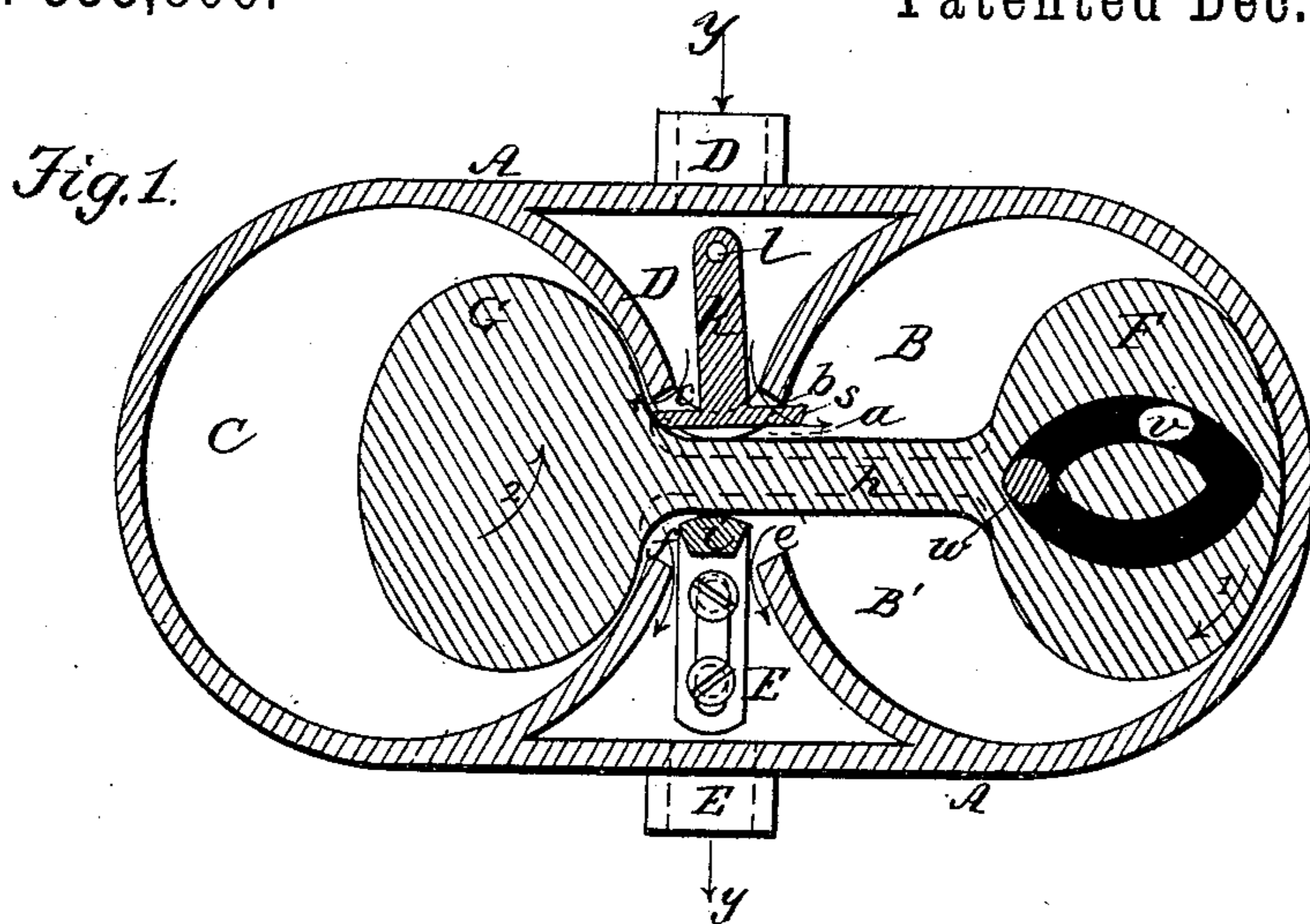
2 Sheets—Sheet 1.

L. H. NASH.

OSCILLATING WATER METER.

No. 353,806.

Patented Dec. 7, 1886.



WITNESSES

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INVENTOR

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(No Model.)

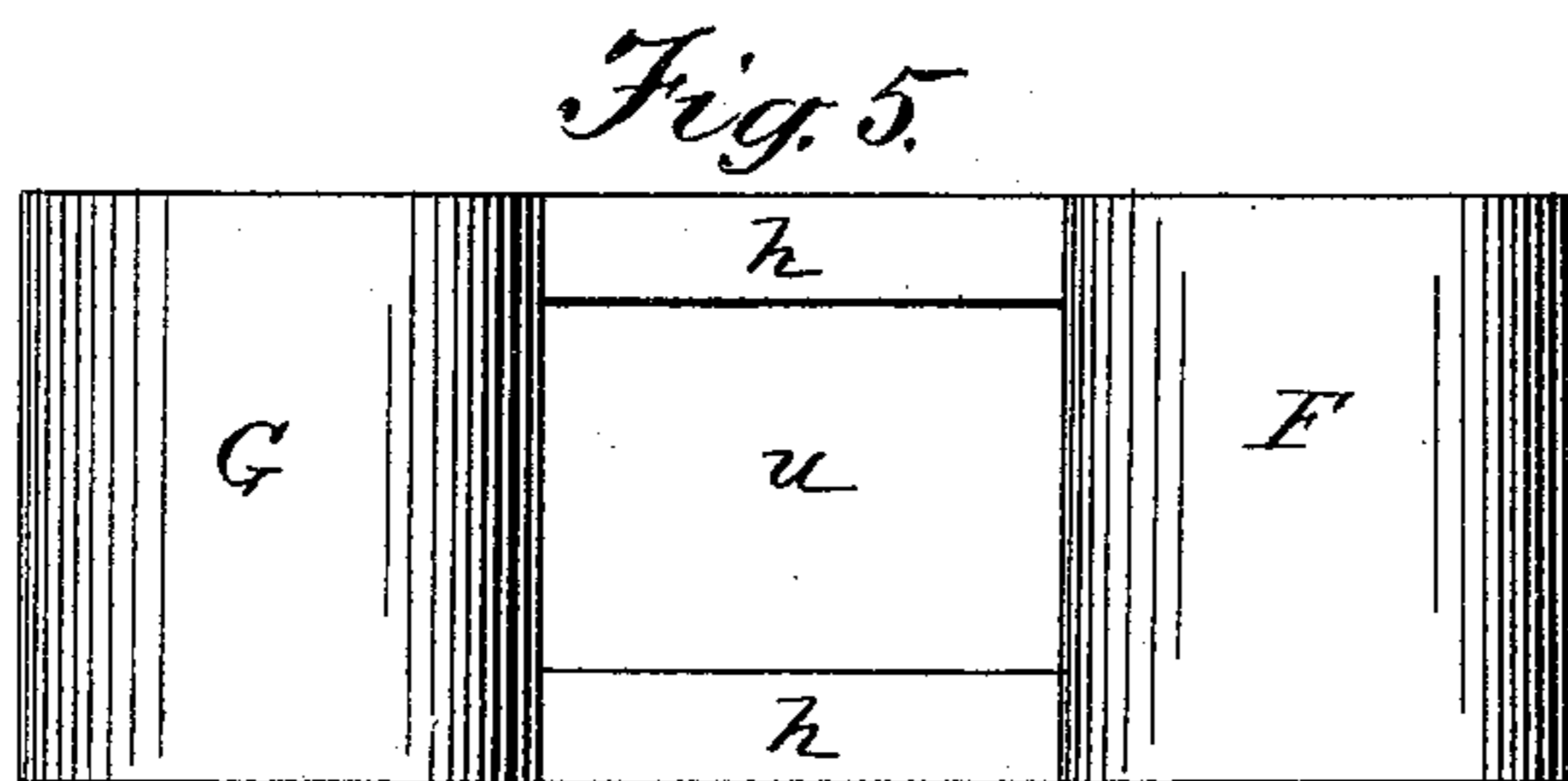
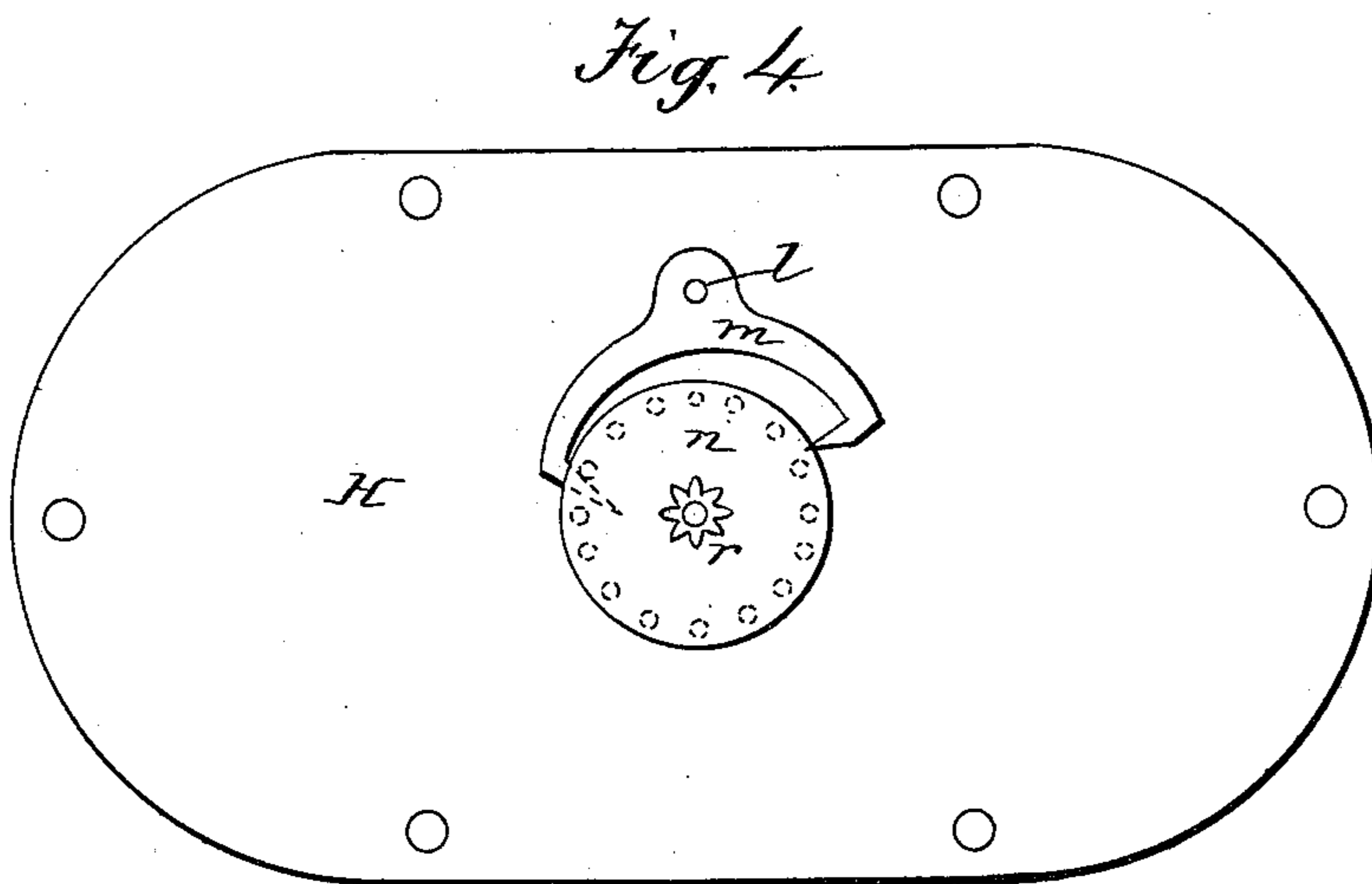
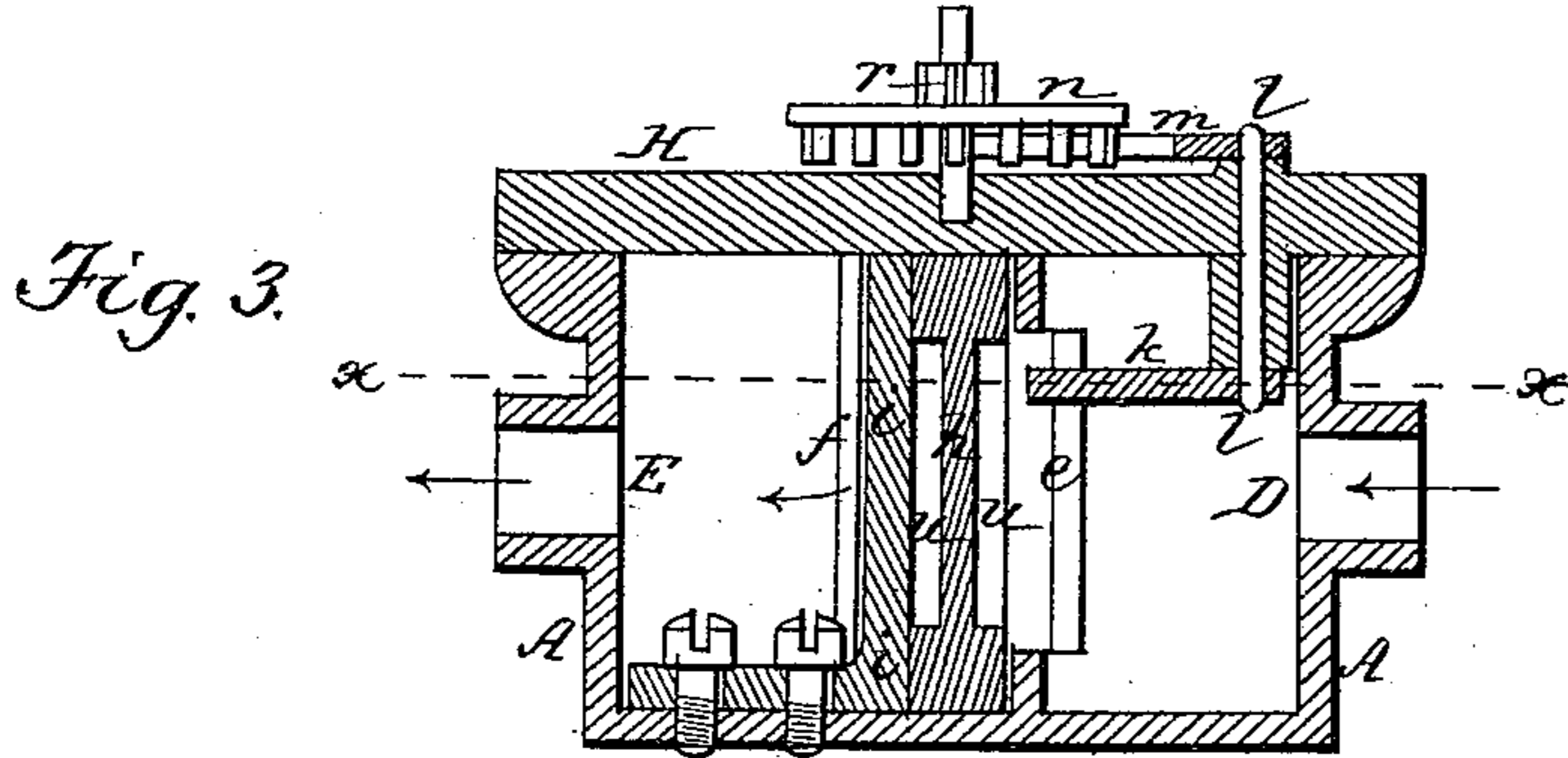
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# UNITED STATES PATENT OFFICE.

LEWIS HALLOCK NASH, OF BROOKLYN, ASSIGNOR TO THE NATIONAL METER COMPANY, OF NEW YORK, N. Y.

## OSCILLATING WATER-METER.

SPECIFICATION forming part of Letters Patent No. 353,806, dated December 7, 1886.

Application filed September 22, 1885. Serial No. 177,845. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Oscillating Water-Meters, of which the following is a specification.

My invention relates to matters of improvement in water-meters in which the case has two communicating measuring-chambers and a piston having rigidly-connected end lobes or knobs adapted to form continuous wall-joints in their respective chambers, to divide them into receiving and discharging spaces in all positions of said piston by means of a fulcrum upon which the piston-bar slides, and is supported and guided in its movements for controlling the inlet and the discharge ports, as in the patent of H. F. Gaskell, dated March 17, 1885, numbered 313,860. In connection with the fixed guide-support, over and upon which the piston-bar slides, one of the pistons has an interior guideway having the form of the path described by the movements of the piston, and the case has a fixed stud extending within said guideway, as a means for positively controlling the movements of the piston.

My invention is also directed to a novel construction of a register-operating device, operated by intermittent contact with the lobes of the piston.

An important matter of my improvement is provision for adjusting the fulcrum upon which the piston rides and is guided in its movements for the purpose of compensating for the wear of the parts.

These and other matters of improvements I will now describe in connection with the drawings.

Referring to the accompanying drawings, Figure 1 represents a horizontal section of a water-meter embracing my improvements, taken on the line *x x* of Fig. 3; Fig. 2, a similar section showing the twin pistons in different positions from that shown in Fig. 1; Fig. 3, a transverse section taken through the inlet and outlet passages on the line *y y* of Fig. 1; Fig. 4, a top view showing the register-operating connection with the registering mechanism, and Fig. 5 shows the piston in side view.

The case A is formed with two chambers,

B and C, which communicate through the passage *a* centrally at their joining sides. For convenience of manufacture, it is preferred to make the measuring-chambers of circular form; and the supply and discharge ports D and E are preferably placed in the vertical walls of the case and between the walls of the chambers at their joining sides, so as to communicate with the measuring-chambers at their communicating-passage *a* by inlet-ports *c* and *b*, and outlet-ports *e* and *f*, formed in the chamber-walls at this point on opposite sides of the connection of the piston-lobes.

The twin piston consists of two separated knobs or lobes, F and G, connected by a plate or bar, *h*, passing through the chamber-communicating opening *a*, and adapted to slide upon a fixed point, forming bearings for the twin pistons between the chambers at their joining sides. One of the walls of this bearing I prefer to make by a separate narrow adjustable piece, *i*, secured within the outlet-space, so that it may be adjusted to take up the wear of the piston-rod. The piston knobs or lobes are of such shape that in all their movements they will maintain a joint-forming contact with the inner wall of each measuring-chamber, being guided in such joint-forming action by their connecting-bar *h*, riding upon the narrow fulcrum *i*, and the lobes thereby divide the inflow from the outflowing water.

Whatever form the measuring-chambers may be the piston-lobes must be shaped to revolve therein, to form the joint upon their walls, and it is not necessary that the chambers should be circular, nor that the piston-lobes should be of the exact form shown in Fig. 1.

In the movements of the twin piston each measuring-chamber is divided by its piston-lobe into a receiving-space B and C, and a discharging-space B' and C', as shown in Fig. 2; and I provide for free communication between the corresponding spaces by means of one or more grooves or passages, *u*, formed in the opposite sides of the piston-bar, extending from lobe to lobe, whereby the pressure in the communicating spaces B C and B' C' is equalized. The piston-bar is shown in cross-section in Fig. 3, and extends from wall to wall of the case, so as to co-operate with the piston-lobes to complete the division of the chambers.

In connection with the narrow fulcrum-piece *i*, as a guiding-point, one of the piston-lobes is formed with an interior guideway, *v*, of a form corresponding to the path described by the piston, and a fixed stud, *w*, in the case extends into this guideway and co-operates to guide the piston-lobes in their joint-forming operation.

In using the narrow fixed fulcrum-bar I provide for the proper operation of the piston which I have shown, because to use a moving fulcrum-bar upon long case-bearings would practically prevent the piston from oscillating, since such construction would require the measuring-chambers to be too much separated, and hence the action of the pressure upon the piston will force it against the case and cause great friction, and prevent the operation of the piston entirely.

The registration of the flow is effected by the action of the piston-lobes upon a lever-arm, *k*, carried on the inner end of a rod, *l*, fitted in bearings in the case, as shown in Fig. 3. This lever-arm is arranged within the inlet-space *D*, supported by the shaft *l*, so that its end stands within the chamber-passage *a*, and has such form, T-shaped or otherwise, as to project within the measuring-chambers on one side of the piston-bar to form abutting-points *s*, against which the piston-lobes strike in the oscillations of the twin piston to vibrate the arm *k*, and thus rock its register-connecting-rod *l* to operate the registering mechanism.

The movements of the lever-arm are communicated by the rod *l* to an escapement *m*, which drives an escapement-wheel, *n*, which in turn operates the dial mechanism by means of the pinion *r*, as shown in Figs. 3 and 4. I may, however, use any other form of register connecting and operating mechanism.

I may use additional inlet and discharge ports placed in the chamber-heads, so as to have perpetual communication with the receiving and discharging spaces.

The meter operates as follows: The water entering from the service-pipe at *D* passes thence through the ports *b* and *c* into the receiving-spaces *B* and *C* of the measuring-chambers, and, supposing the twin pistons to be in the position shown in Fig. 1, the water flows into the chamber-space *B*, driving the piston-lobe *F* in the direction of the arrow 1, thereby forcing the water from the chamber-space *B'* and moving the piston-lobe *G* in the direction of the arrow 2, in its chamber, causing the piston-lobes to revolve in contact with their respective walls to the positions shown in dotted lines in Fig. 2. During these movements of the piston-lobes the water enters chambers *B* and *C*, filling them and continuing to drive the piston, while at the same time the water is escaping from the chamber-spaces *B'* and *C'*. The twin piston, still continuing to revolve in contact with their respective chamber-walls in the direction of the dotted arrows 3 and 4, Fig. 2, brings its

lobes into the positions shown by the full lines in Fig. 2, the direction of motion being indicated by arrows 5 and 6, from which positions the lobes continue to move to the positions shown in Fig. 1, thus completing the revolution of each lobe in its respective chamber within an orbit described by the guideway, and each lobe having a movement in opposite direction to the other during its revolution. This movement necessarily carries each piston around the walls of its chamber, and in such travel the lobe *G* is brought into contact with the lever-arm *k*, moving it in the position shown in Fig. 1, to actuate the registering mechanism, in which position the twin pistons are at the extreme of their movement from one chamber to the other. In the other extreme movement of the twin pistons the lobe *F* actuates the lever-arm in the other direction as it moves in the direction of dotted arrow 3, and so on, operating the registering mechanism.

Referring to the inlet and outlet ports or passages, it will be seen that they are formed on the side walls of the chamber-cylinders, between their adjoining sides and on opposite sides of the piston-bar. This construction gives the advantage of a very prompt and free supply and egress of the water to the receiving and from the discharging spaces of the two chambers when the piston is passing the position shown in Fig. 1, because the moment the piston-knob *G* changes its position these ports *c* and *d* open to their full capacity, and thereby avoid any suction or retarding action of the water upon the piston. While the inlet and the discharge are thus rendered free and full, the equalization of the pressure of the water in the two chambers is effected by the piston-bar passages, and thus these two things co-operate in an advantageous manner. The case is provided with a removable cover, *H*.

In an application for a patent filed of even date herewith under Serial No. 177,846 for improvements in water-meters, I have described and shown a trough-shaped piston operating a registering mechanism substantially such as is herein claimed.

I claim—

1. The combination, in a water-meter, of a piston composed of two separated lobes rigidly connected by a bar with a case having two communicating measuring-chambers placed side by side, an adjustable fulcrum for the piston-bar placed in the case between the said chambers, and suitable inlet and discharge ports, substantially as described.

2. The combination, in a water-meter, of a case having two communicating chambers with a piston formed of end knobs or lobes adapted to divide said chambers, connected by a bar having an adjustable bearing between said chambers, whereby the said knobs or lobes are caused to operate in opposite directions, as stated.

3. A water-meter having the following elements in combination, viz: two communicat-

ing measuring-chambers, a piston of two rigidly-connected knobs or lobes, one operating in each chamber, a narrow adjustable fulcrum for said piston arranged in the case between its lobes, and a lever-arm, *k*, arranged to communicate the oscillating movements of the knobs to suitable registering mechanism, substantially as described.

4. The combination, with a case having two chambers, twin pistons connected by a separating-bar, and a case-fulcrum upon which the said piston-bar has continually-changing contact from piston to piston, of means, substantially such as described, for controlling the movements of the pistons in elliptical orbits in their respective chambers.

5. The combination, in a water-meter, of a case having measuring-chambers, and a piston having a lobe or knob describing a curved orbit within each chamber with a register-operating device consisting of a pivoted vibrating lever-arm arranged to be vibrated by said piston-lobes, substantially as described.

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

LEWIS HALLOCK NASH.

Witnesses:

A. E. H. JOHNSON,

J. W. HAMILTON JOHNSON.