

(No Model.)

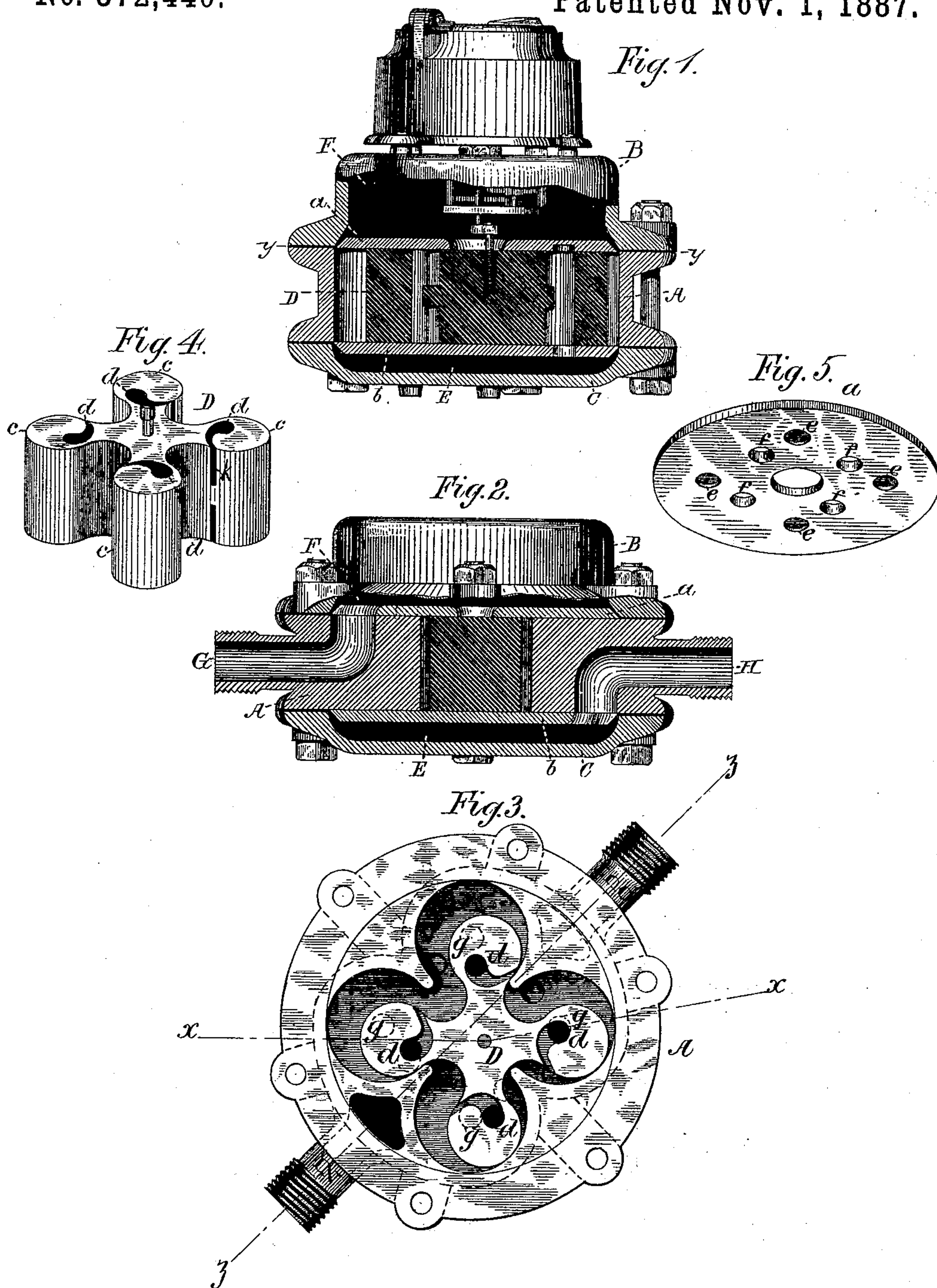
2 Sheets—Sheet 1.

J. A. TILDEN.

ROTARY WATER METER.

No. 372,440.

Patented Nov. 1, 1887.



Witnesses:
J. W. Dolan.
Fred. B. Dolan.

Inventor,
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(No Model.)

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Fig. 6.

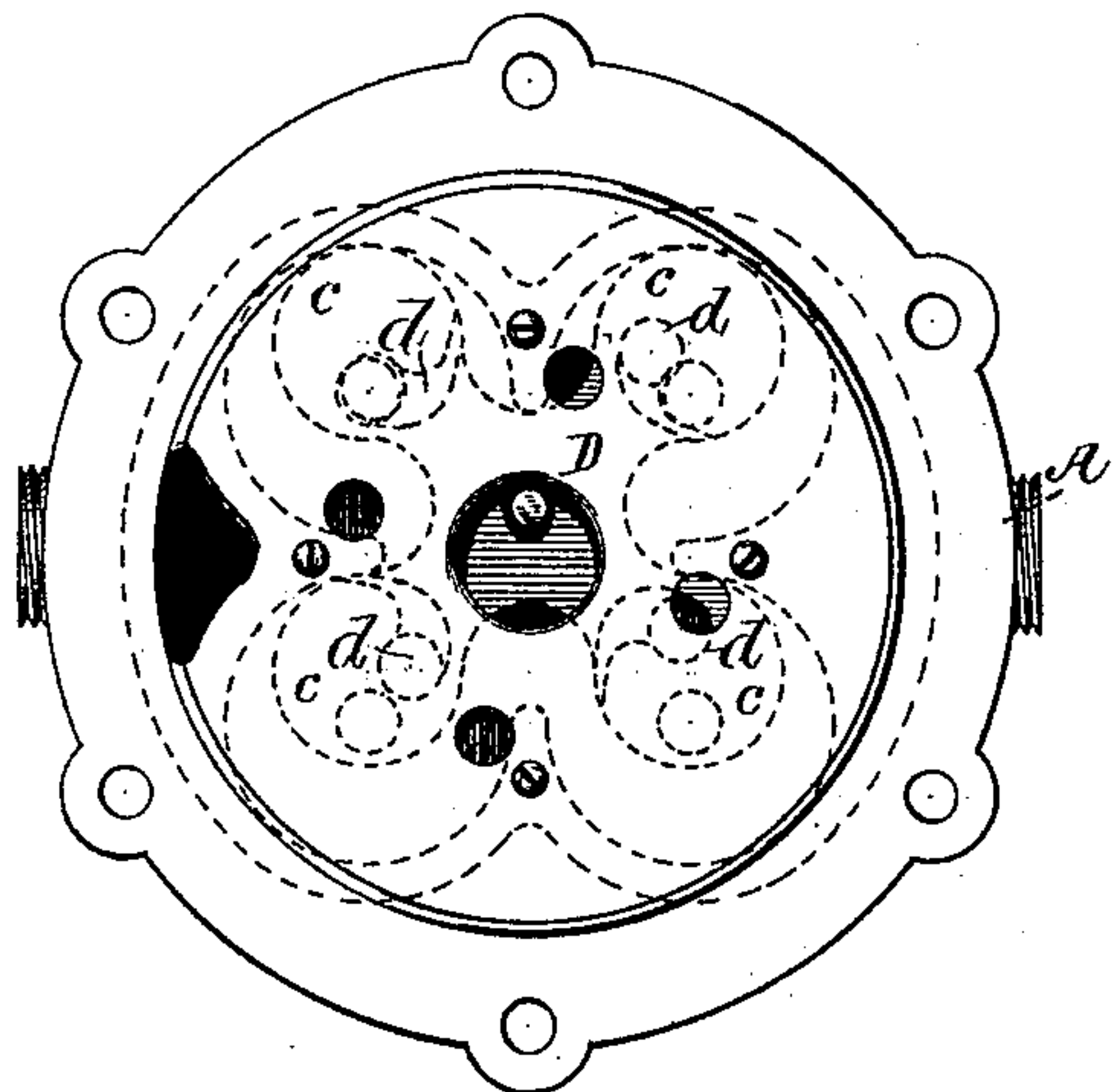


Fig. 7.

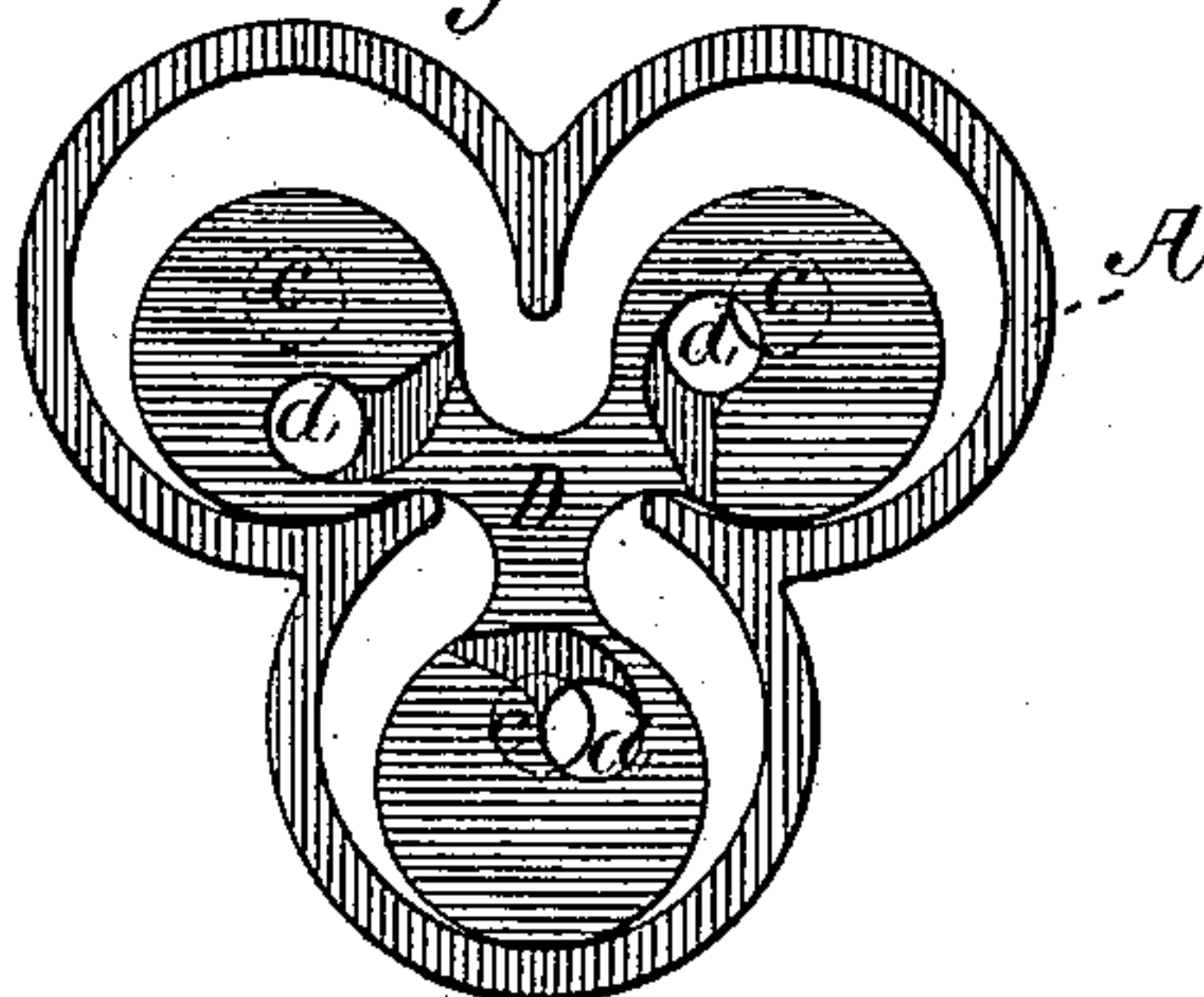
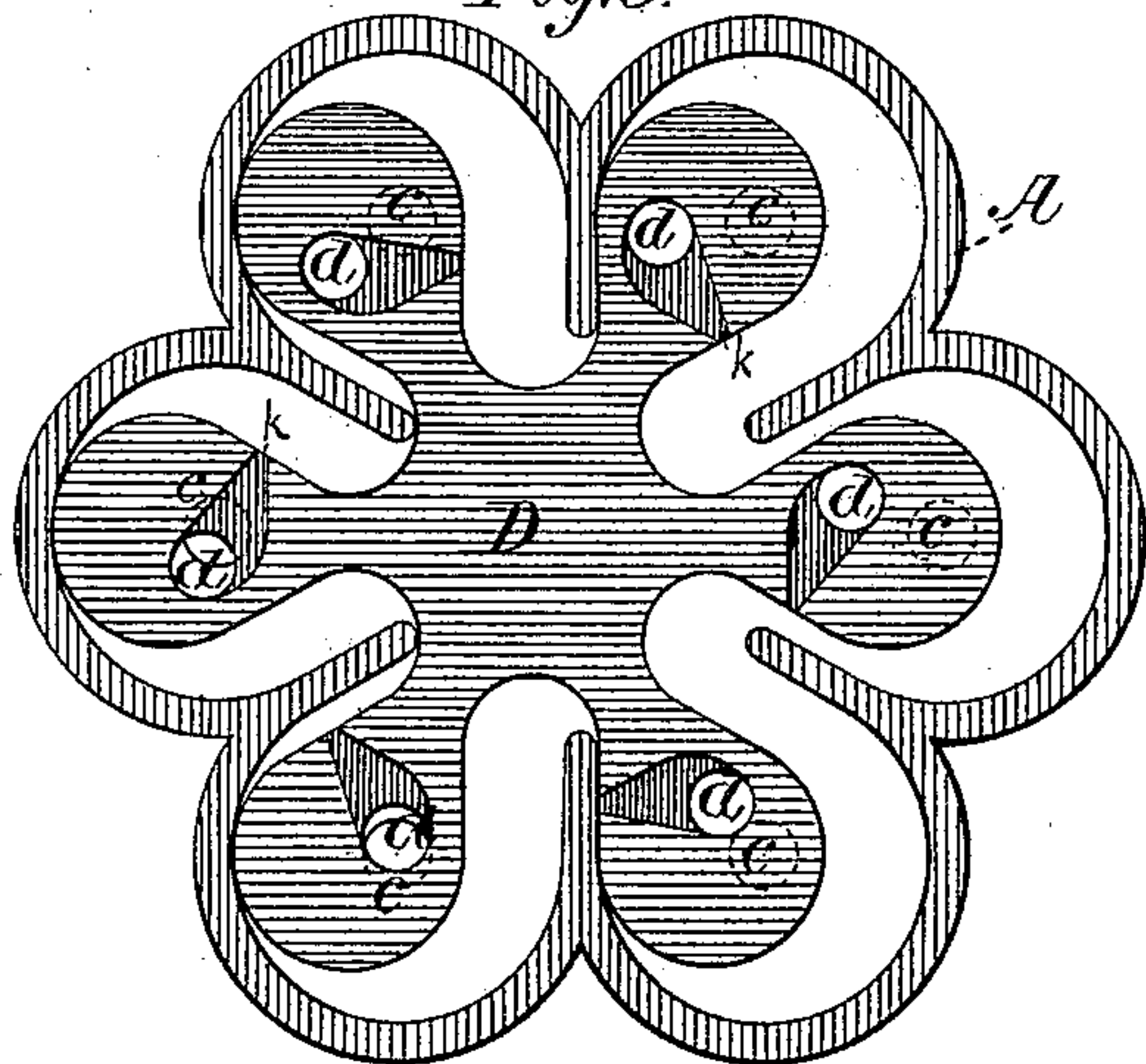


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES A. TILDEN, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO THE
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ROTARY WATER-METER.

SPECIFICATION forming part of Letters Patent No. 372,440, dated November 1, 1887.

Application filed January 20, 1887. Serial No. 224,965. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. TILDEN, of Hyde Park, in the county of Norfolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Fluid-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to the class of meters with revolving pistons, and particularly to that portion of the class which have a free piston or a piston which is confined in its path or orbit by the hydraulic action of the fluid, in contradistinction to those which are confined in a fixed path by mechanical means. An illustration of this particular type of meter will be found in my Patent No. 324,503, August 18, 1885, re-issued November 2, 1886, No. 10,778, and this specification describes an improved form of that meter.

The object of my invention is to simplify its construction and reduce the cost of manufacture.

My improvements relate, first, to a piston having the outlet-passages molded therein, whereby a simple and effective arrangement of the ports is obtained, and the ports in the plates being made by drilling only; second, to an improved case by which the smallest amount of composition or non-corrosive material may be used. This result I accomplish by a construction in which the case is divided into three parts:

First, the middle part, which contains the measuring-chamber with its spaces or recesses, substantially as illustrated in my former patent. It also has the main inlet and outlet passages. This part is made of non-corrosive composition, and is inclosed on its ends by composition heads or port-plates.

Second, the upper section, which may be of a cheaper metal, such as cast-iron. It contains the inlet distributing-chamber and the reducing-train.

Third, the lower section, which also may be of cast-iron and contains the collecting-chamber, which is connected with the main outlet. This construction provides, in addition to the advantages mentioned above, great

ease and facility in making repairs. The middle section, being independent, can be surfaced off on either or both sides. The port-plates also, being independent and separate, can be surfaced, and the piston of course can be made to accommodate itself to the distance between the plates.

In the drawings, Figure 1 represents a view of the meter, part in elevation and part in section, on the line *xx*, Fig. 3. Fig. 2 is a vertical section on the line *zz*, Fig. 3. Fig. 3 is a plan on the line *yy*, Fig. 1. Fig. 4 is a view of the piston removed from its case in perspective. Fig. 5 is a perspective view of the top plate removed; Fig. 6, a plan of the meter on the line *yy*, Fig. 1, with the upper plate in position. Figs. 7 and 8 represent modifications of the same meter and have three and six lobes or recesses, respectively.

The piston D, Fig. 4, has the projections *c*, in which are the ports or passages *d*. These may be molded in the piston having the slots *k*, which connect the vertical through-passages *d* with the periphery of the piston, and each set is connected by the circular passage in continuation of the larger part of the recess, as shown in the section, Fig. 1.

The middle section, A, contains the inlet-passage G and the outlet-passage H. Its interior surface has the recesses, three or more in number, to which the piston conforms.

The plates *a* and *b* are secured, respectively, to the upper and lower surface of the section A, and are provided with operative and balancing ports. The plate *a* has the inlet holes or ports *f*. The plate *b* has the outlet holes or ports *g*, which ports are opposed by balancing-recesses *e* in the plate *a*. The said inlets *f* are opposed by similar balancing-recesses, *h*, in the plate *b*.

The chamber F in the section B contains the reducing-train, such as is common in this class of meter, to connect the piston with the register. It also forms a distributing-chamber. Receiving the water from the main inlet G, it distributes the water through the chamber-inlets *f*.

The chamber E in the section C collects the water from the outlets *g*, and forms a collecting-chamber connecting with the outlet-passage H.

In operation the fluid enters the inlet-passage G and passes into the distribution-chamber F, thence through the inlet-ports *f* into the measuring-chamber in the section A. These 5 ports are uncontrolled, as are the same relative ports in my said patent, and the fluid entering behind the lobes in succession presses the piston in its path of revolution. The operation of discharging is different in that the 10 discharge-recesses are in the piston instead of in the plate. The fluid passes out through the slots *k* in the side of the piston into the circular passage which extends through it. Successive connection is made with the circular 15 outlet holes or ports *g* in the plate *b*. The principles of discharge are the same as previously described. These ports *g* connect with the collecting-chamber, which communicates with the outlet-passage H.

20 It will be observed that economical construction of the meter is obtained in the form illustrated, in that the smallest amount of non-corrosive material is used. Only that part of the entire machine which bounds the measuring-chamber need be of composition.

25 Economy of construction is further obtained by the molding of the ports in the piston. These ports also are so arranged that they afford an easy outlet and consequent easy action of the meter. It will also be seen that 30 both the inlet and outlet ports are opposed by recesses in the other plates of the same size and same relative location. These recesses serve to balance the piston in its valvular function in a manner well known. The recesses 35 serve to balance the piston, in that as it is moving over them the piston has an equal area of the fluid-pressure on both sides—that is to say, by opposing a recess of equal size to an 40 inlet-port the water is able to transmit an equal pressure to the opposite side of the piston as it is moving over the port.

It will be observed that by forming the escape-ports in the lobes of the piston they can 45 be more cheaply made than if formed in the port-plates, as described in my Reissue Patent No. 10,778, because they can be made by molding or in the act of forming the piston. This arrangement or location of the ports in the 50 lobes of the piston also enables me to obtain another desirable result, which relates to the location and construction of the ports in the port-plates, for by arranging the escape-ports in the lobes of the piston I am enabled to form 55 continuations of the escape-ports in the port-plates by simply forming circular holes therein so arranged in relation to each other in the plate that at the proper instant the escape-ports of the lobes shall register with them. 60 This also enables me to make the counterbalancing-recesses in each port-plate by the simple method of drilling, as round holes, cavities, or depressions only are needed. It will also be seen that by making the meter in three 65 sections I am enabled, as I have above stated, to use for the lower and upper sections cast-iron or a cheaper metal than that which it is de-

sirable to use for the middle section, and that this middle section is preferably made of brass or composition and is shaped or provided with 70 the inlet or outlet connections—that is, with the coupling ends, which are adapted to be connected with the supply and delivery pipes, of iron or other metal.

In the operation of the meter the piston 75 may wear upon its ends to some extent, and there may be other wear which may necessitate the entire removal of the middle section and the substitution of another new section there- 80 for, or the repairing of the middle section, and when the latter is the case this can very easily be accomplished by facing the ends of the meter in case the piston is worn at its ends, and the port-plates and the parts can then be assembled together as though they were new and 85 united with the old parts.

It will be observed that the sections of the escape-ports in the lobes of the piston extend longitudinally through the same and are open 90 at each end, so that the fluid contained therein bears against both the upper and lower plates, *a b*, and does not exert any pressure upon the piston to throw it either against one plate or the other, and that when the ports are dis- 95 charging there is still no pressure exerted upon the piston, the head or pressure being taken by the imperforate port-plate opposite that through which the discharge is taking place; and this feature of the invention is applica- 100 ble to other forms of piston-meters where the pressure in the piston-chamber is against the side of the meter and the escape is through or by the ends of the meter, or where the es- 105 cape-passages occur between the sliding surfaces of the piston and its case.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a meter, the piston having the discharge-passage *d*, extending vertically through the piston, and the connecting-passage *k*, and 110 the plate *b*, having the hole *g*, which passage and hole, when in line, form the controlling-passage from a measuring-space to the collecting-chamber E, substantially as described.

2. A piston for fluid-meters, having the pas- 115 sages *d*, extending vertically through the piston, and the connecting-passage *k*, and adapted to act as a valve in connection with a ported plate against which it slides, substantially as described. 120

3. A fluid-meter having the section A, containing the measuring-chamber and the inlet G and the outlet H, the section B, containing the distributing-chamber, and the section C, 125 containing the collecting-chamber, substantially as described.

4. In a meter, the section A, containing the measuring-chamber and having the inlet G, outlet H, and the independent plates *a* and *b* attached thereto, the section B, containing 130 the distributing-chamber, and the section C, containing the collecting-chamber, substantially as described.

5. In a free-piston meter, the plate *a*, hav-

ing the inlet-holes *f* and balance-depressions *e*, whereby the said piston is balanced to the pressure in its movement, substantially as described.

5 6. In a free-piston meter, the plate *b*, having the outlet-holes *g* and balance-depressions *h*, whereby the said piston is balanced to the pressure in its movement, substantially as described.

10 7. In a free-piston meter, the combination of the casing to the measuring-chamber, the piston, the plate *a*, having the inlet-holes *f* and the depressions *e*, and the plate *b*, having the outlet-holes *g* and the depression *h*,
15 whereby the said piston is balanced to the pressure in its movement, substantially as described.

20 8. The combination, in a free-piston meter, of a case having a piston-chamber with measuring-spaces opening therefrom, a piston having a lobe for each measuring space or recess,

which lobes have sections of the escape-ports arranged or formed therein, and the port-plates having the circular holes formed therein to register with the sections of the escape- 25 ports of the lobes, as and for the purposes described.

9. The combination, in a free-piston meter, of the measuring-chamber, the plates or surfaces upon which the piston slides, and a piston having one or more escape-ports extending longitudinally through the same from one plate or surface to the other plate or surface, and having side openings, whereby the pressure of the fluid is received and distributed 35 equally to said plates and the piston is balanced while the ports are discharging, substantially as described.

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