T. C. Hopper.

Dry Gas-Meter.

No 73332 Patented Jan. 14, 1868.

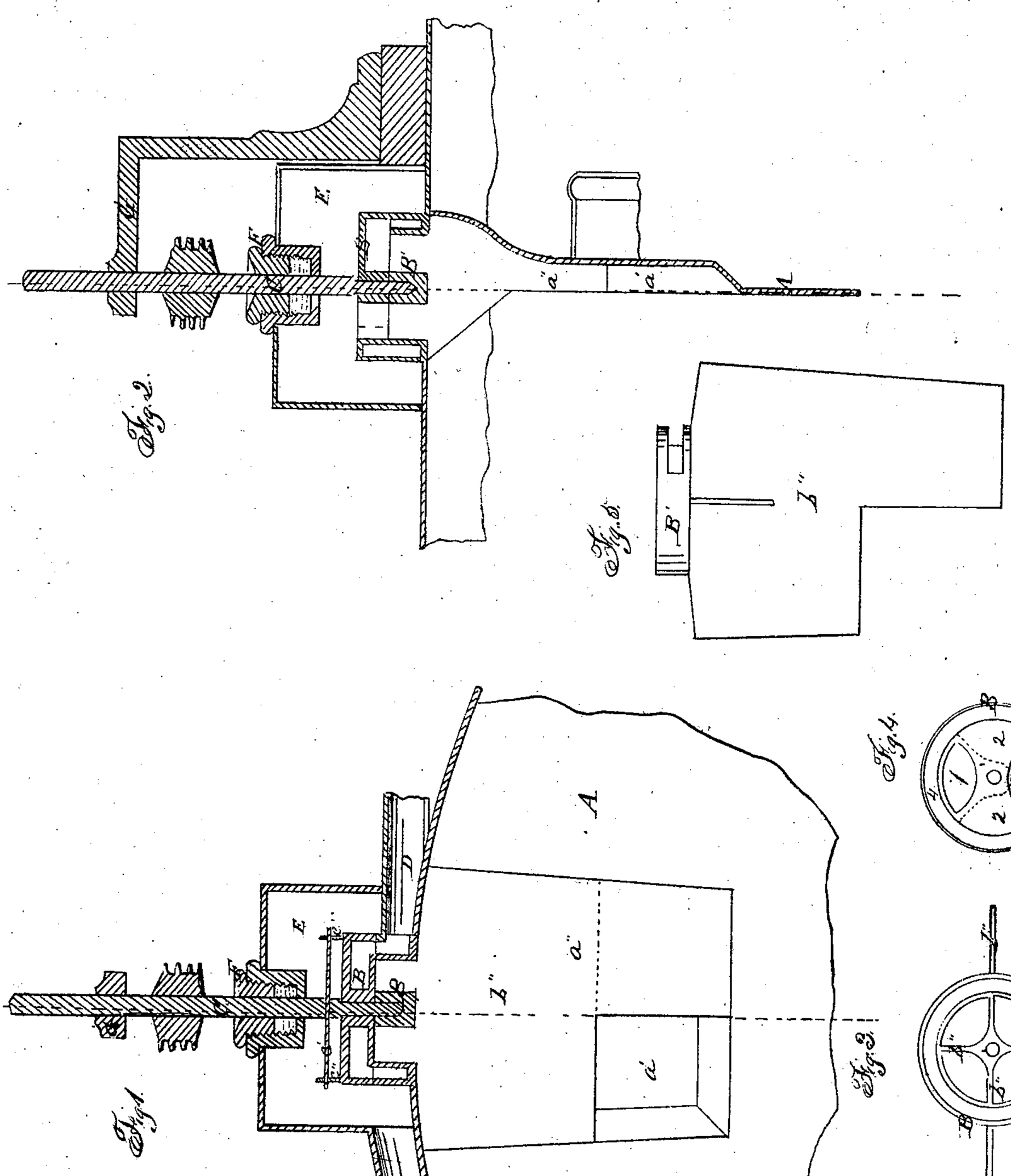

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

United States Patent Office.

THOMAS C. HOPPER, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 73,332, *dated January* 14, 1868.

IMPROVEMENT IN DRY GAS-METERS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, THOMAS C. HOPPER, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in the Dry Gas-Meter; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figures 1 and 2 are vertical central sections, at right angles to each other, of the upper portion of a dry gas-meter, having my said improvement applied thereto.

Figures 3 and 4, plane views of the face sides of the valve-disks, and

Figure 4 a side elevation of that portion of the valve which is shown by fig. 3—

Like letters of reference indicating the same parts when in the different figures.

My improvement relates especially to the two-diaphragm meters, but is also applicable to those having three diaphragms or bellows, and has for its objects the reduction of the friction of the valve, and the facilitating of the passage of the gas through the ways and channels, for the purpose of improving the registration and the general action of the meter, especially under a very low pressure, and the lessening of the cost of constructing the said ways or channels.

My invention consists, substantially as hereinafter described, in producing the ways or channels for the passage of the gas to and from the bellows entirely on one side of the partition which separates the said bellows; in dispensing with the opening heretofore required in the centre of the valve-seat disk, by making the required opening in the form of an annular channel around near its periphery; in casting the valve-seat disk with an extension, which will form, when applied, a part of the partition between the bellows, and also a part of the ways or channels leading to and from the said bellows, on one side only of the said partition; in increasing the capacity of the passages for the gas through the rotary disk of the valve, by an open space made between the two opposite sector-like faces of the disk and the top of the same, and communicating with an annular space around near its periphery; in the arrangement of the packing-box, so as to afford greater facility in repacking; and in carrying the rotary valve-disk, by means of a spindle, which passes loosely through the centre of the same, and bears in the valve-seat disk, and also has a horizontal cross-bar arranged to bear against lugs in the disk, for the purpose of rotating the latter upon the seat of the valve.

Referring to the drawings, A is the partition which separates the bellows, (not shown,) a' a'' the ways or channels leading to and from the bellows, B the rotary disk of the valve, B′ the valve-seat, and C the spindle.

The channels a' a'' are formed in the partition-plate A by pressing that part of the plate outward on one side only, (by means of a drop-press, or otherwise,) and then applying the seat B′ of the valve, which is cast with a thin partition, b'', projecting downward from the bottom of the disk, so that the said projecting portion, b'', when fitted and soldered fast, will form a continuation of the flat plane of the partition-plate A, and thus, in connection with the pressed-out portion of the plate A, produce the two ways or channels a' a'' exclusively on one side of the said partition, and so as to communicate, respectively, with the bellows on each side of the partition, and with the valve-seat above, substantially as shown in figs. 1 and 2.

The valve-seat B′ has an annular channel, b''', around near its periphery, which opens, through one side of the disk, into the outlet-pipe D of the meter, while the portion which is surrounded by the said channel b''' is divided into four openings by the crossing partitions b'' b'', thus affording the two inlet and the two outlet-openings, communicating, through the valve, with the two bellows and the outlet and inlet-ways of the meter, substantially as represented in figs. 1 and 2.

The seat B′ and the channels a' a'', connected therewith, may be cast together complete, as one piece, and then inserted or fitted in a corresponding opening cut through the partition b'' for the purpose, so as to have both of the said channels on the one side only of the partition, as described, and thus dispense with the pressing out of the partition b'' at the part, for the purpose of forming the channels on one side only of the partition; but the first-described mode of producing the said channels a' a'' is believed to be preferable, because more easily constructed.

By constructing the channels and valve-seat in either of the modes just described, there will be a saving of material, and also a saving of the labor heretofore required in punching, fitting, and soldering fast the separate

tubes or channels on opposite sides of the partition, and also a plane flat surface left on one side of the partition for fitting on the usual bellows-ring of that side; and, besides, the present improved mode of construction gives increased capacity to the channels, and a more direct course to the valve.

The dispensing with the central opening or way heretofore made in the seat of the valve, by substituting the annular channel *b'''*, (see fig. 3,) allows the bearing-edges on the face of the seat to be made much narrower, and, at the same time, giving a larger capacity for the flow of the gas through the seat, thus diminishing friction, a result of very great importance in a dry gas-meter.

The peculiarity of the rotary valve-disk B is in the outlet or discharge-opening 3, (see fig. 4.) It receives the gas at 1, which is an opening through the top, and, after the gas has passed into the bellows, it is discharged at 3. In order to have the outer ring as small as possible, to lessen friction, cast only the faces of the parts 2 2, thus leaving an open space above them, or between the same and the top of the disk, as indicated by the dotted line in fig. 4, so that the gas coming into 3 can be discharged, through the said spaces, which are above 2 2, as well as at 3 also, into the annular channel 4 of the disk B, thus giving a capacity for discharge equal to three-fourths of the length of the said annular channel 4, allowing the reducing of the outer circle, (or diameter of the disk,) and consequently the friction, without reducing the capacity of the valve-disk for passing the gas.

The spindle C is reduced considerably in its diameter, in comparison with the old spindle, being only about one-eighth or three-sixteenths of an inch, and passes loosely, through the centre of the rotary disk B, into the centre of the seat B', which latter serves as its bearing. The disk B is rotated around, with the spindle C as its centre, by means of a cross-bar, *c'*, which is fixed horizontally through the spindle at a point a little above the disk B, and bears against vertical studs, *c'' c''*, fixed or cast on the disk, when the spindle is rotated. This construction prevents any lateral motion of the disk B, and yet holds it perfectly concentric to the spindle, and without binding, and also admits of the thinnest possible bars and rings in both the rotary disk and the seat, giving a perfectly gas-tight face, larger gas-ways, and the least possible amount of friction.

The two disks B B' of the valve are enclosed by a circular box, E, on the top of which is a packing-box, F, surrounding the spindle C, which extends down through the same to a bearing in the seat B', and upward through the usual worm-wheel, and through the usual king-post, G, (see fig. 2,) so as to give ample space between the worm wheel and the packing-box F for raising the packing-screw or nut in repacking without removing the king-post for the purpose, and thus facilitating the operation of repacking.

Having thus fully described my improvement in the dry gas-meter, what I claim as new therein of my invention, and desire to secure by Letters Patent is confined to the following, viz:

1. I claim producing both of the channels *a' a''* on the same side of the partition A, substantially as and for the purposes described.

2. I claim, in the valve-seat B', the annular channel *b'''*, in combination with the closed centre, and narrow-faced dividing-partitions *b'' b''* of the four openings, which are surrounded by the said annular channel *b³*, substantially as and for the purposes described.

3. I claim casting the seat B' of the valve and the projecting portion *b''* thereof in one piece, so that both of the channels *a' a''* can thereby be produced exclusively on one side of the partition A, substantially as described, and for the purposes specified.

4. I claim, in the rotary disk B of a gas-meter, the outlet 3, in combination with the space above the faces 2 2, and the annular channel 4, arranged substantially in the manner described and shown, for the purposes specified.

5. I claim passing the spindle C loosely through the rotary disk B, and giving it a bearing in the seat B', substantially as and for the purpose described.

6. I claim giving rotary motion to the disk B upon the seat B', by means of the cross-bar *c'*, fixed in the spindle C, in combination with the studs *c'' c''*, fixed in the said disk B, when the spindle C passes loosely through B', substantially as and for the purpose described.

7. I also claim arranging the packing-box F of the spindle C in the top of the valve-cover E, in the position shown as below the worm-wheel, for the purpose of admitting of the "repacking," as occasion may require, without removing the king-post G, as described.

Witnesses:
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