

May 4, 1926.

1,583,203

H. F. TOLHURST

GAS METER

Filed June 3, 1921

2 Sheets-Sheet 1

FIG. 1.

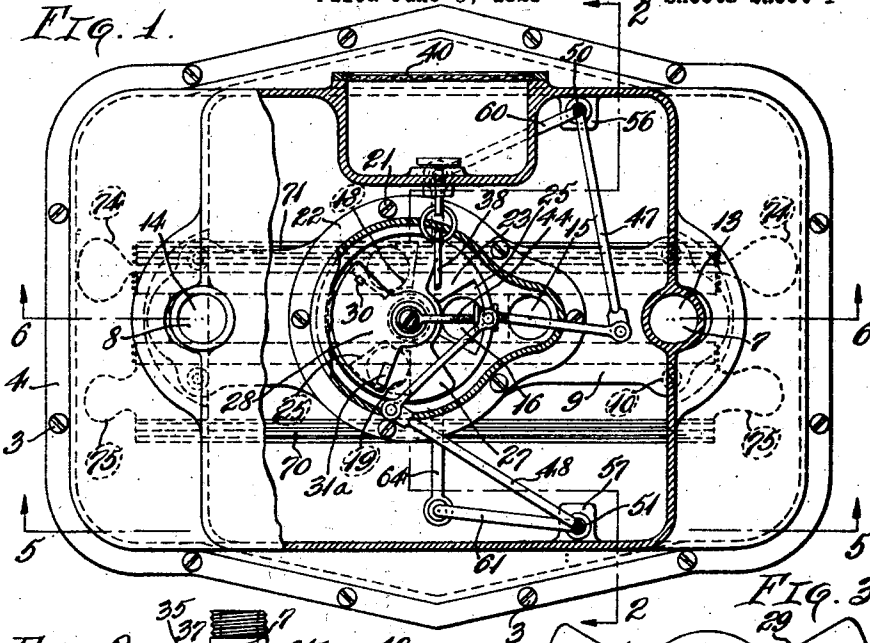


FIG. 2.

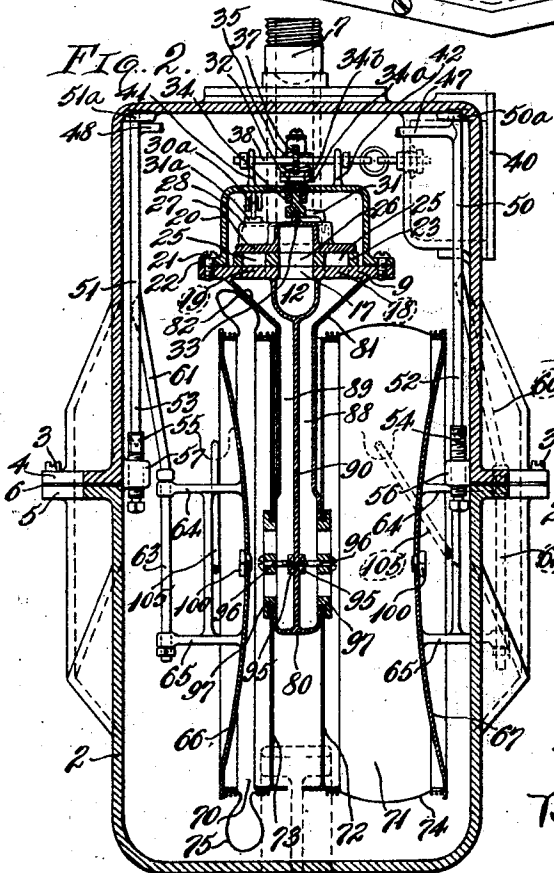


FIG. 3.

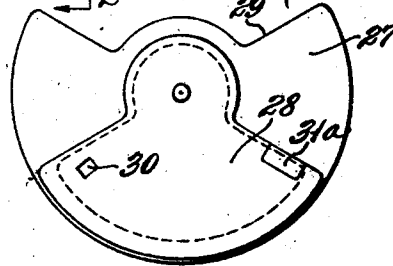
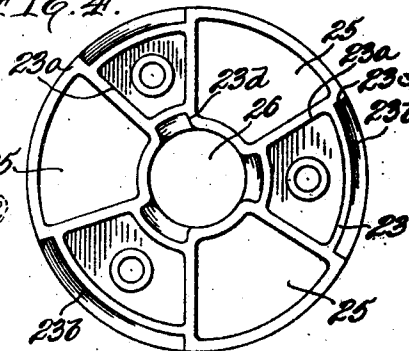


FIG. 4.



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FIG. 6.

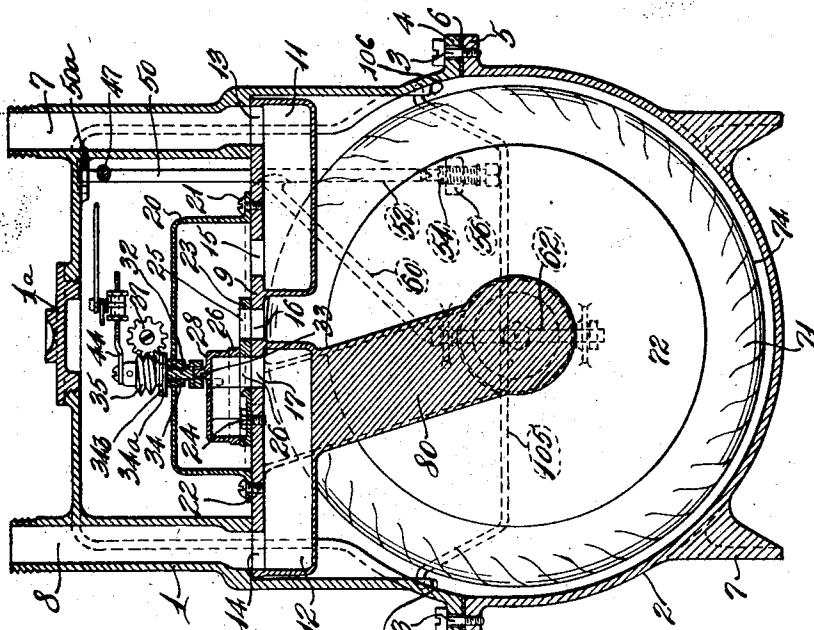
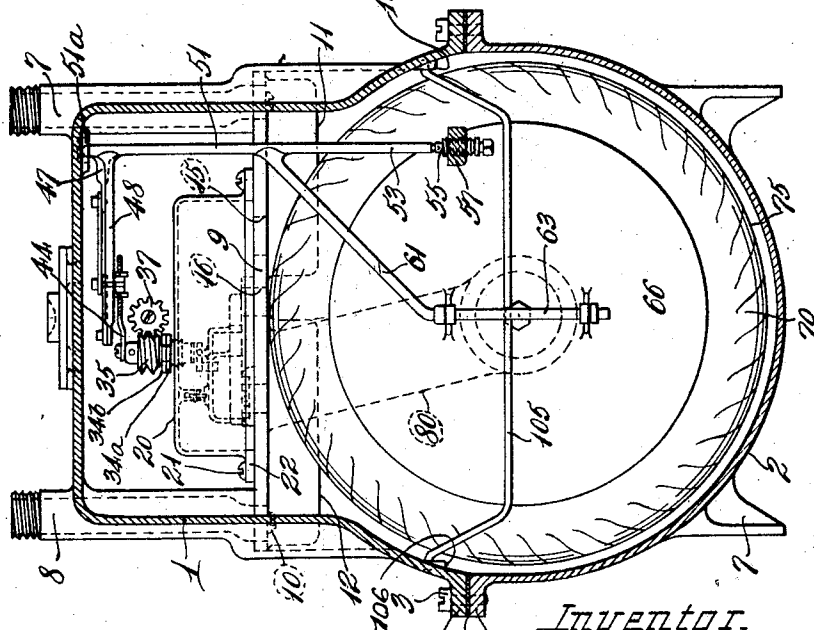


FIG. 5.



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UNITED STATES PATENT OFFICE.

HERBERT F. TOLHURST, OF CLEVELAND, OHIO.

GAS METER.

Application filed June 3, 1921. Serial No. 474,673.

To all whom it may concern:

Be it known that I, HERBERT F. TOLHURST, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Gas Meters, of which the following is a specification.

This invention relates to improvements in gas meters.

The objects of this invention are to improve and simplify the general construction of the gas meter by providing one in which all of the inner working parts are supported entirely by one of the casing members and to which access can be had by removal of the other casing member; to provide a meter in which the valve is self-cleaning and in which the structure of valve and fluid conduits is simple and yet efficient and dependable; to provide a reversible cross-plate for supporting the bellows and valve mechanism so that the direction of flow of the gas or other fluid through the meter can be reversed without changing the position of the meter casing; and to improve the construction and arrangement of the flag wires.

Other objects of this invention will appear from the following description and claims when considered together with the accompanying drawings.

Fig. 1 is a plan view of my invention with parts broken away; Fig. 2 is a vertical section on line 2—2, Fig. 1 with the bellows in different condition; Fig. 3 is a plan view of the valve; Fig. 4 is a plan view of the disk underlying the valve; Fig. 5 is taken on line 5—5, Fig. 1; and Fig. 6 is taken on line 6—6, Fig. 1.

The casing of my improved gas meter comprises the upper and lower sections 1 and 2 which are secured together by means of the screw bolts 3 extending through the overlapping flanges 4 and 5 provided upon the casing members and between which there is also provided a suitable sealing gasket 6. Legs 7 are provided upon the lower member 2 and a removable cap 1^a is provided to permit adjustment of the parts. Both of the members 1 and 2 are formed of cast metal and the upper member is provided with the inlet connection 7 and the outlet connection 8. A cross plate 9 upon which are supported the inner working parts of the meter, extends across the interior of the upper casing member and is secured to inwardly extend-

ing flanges thereon by means of the screw bolts 10 or in any other suitable manner so as to permit the removal and reversal of the cross-plate whenever desired. This cross-plate may extend entirely across the casing and may be cast integral therewith, but is here shown as a separate part and as of less width than the casing body member through the same horizontal plane. The cross-plate 9 is of cast metal and has formed integrally therewith the conduits 11 and 12 extending lengthwise and depending from the underside thereof. The outer ends of the conduits 11 and 12 are provided with ports 13 and 14 as means of communication with the inlet and outlet connections 7 and 8, respectively. The cross-plate is also provided with ports 15, 16, 17, 18 and 19. The conduit 20 which is secured to the upper side of the cross-plate 9 by means of screw bolts 21 or the like, extending through the peripheral flange 22 thereof, has smaller and larger portions, as clearly indicated in Fig. 1 and extends over the ports 15 to 19 inclusive. Should the cross-plate 9 extend entirely across the casing, the conduit would be omitted. A disc 23 is fixedly mounted upon the upper face of the cross-plate 9 by means of screw bolts 24 or the like and is provided with three sector shaped ports 25. A center port 26 is also provided in the disc 23 and registers with the port 17, while the ports 25 register with the ports 16, 18 and 19, respectively. A rotatable valve member is provided for controlling the flow of gas through the meter and consists of a cast metal member having plain portions 27 and a raised hollow portion 28. The portion 28 is substantially fan shaped with a circular portion provided at the center of the valve member. As will be seen also from Fig. 3, the valve member is cut away at one side as indicated at 29. This valve member is arranged concentrically with respect to the disc 23 and is adapted to rotate thereover. The ports 25 each extend about 61 degrees about the disc and are unequally spaced apart so as to prevent a "dead spot" in the operation of the valve for successively filling and discharging the three measuring compartments. These ports are here shown as being spaced apart approximately 45, 62 and 70 degrees, respectively. The portions between the ports are countersunk so as to provide the edges 23^a for scraping any deposit off of the valve member as it rotates in

contact with the disc. The peripheral portions of the disc corresponding to the countersunk portions are also cut back as indicated at 23^b so as to provide the edges 23^c for the same purpose. Likewise the marginal portions of the central port 26 opposite the countersunk portions are cut back to provide the straight edges 23^d for the same purpose. The vertical depending walls about the hollow discharge portion are sufficiently thick to effect proper sealing engagement with all peripheral portions of the disc. Any such deposit removed from the valve member can be cleaned out whenever necessary. Thus my valve mechanism is self-cleaning and consequently will always be in proper condition for operation without sticking.

The valve member is provided with a recess 30, which is engaged by the depending finger 31 extending from the lower end of the rotating stem 32, whereby a rotatable driving connection is established for rotation of the valve member. The finger 31 will engage the other wall of recess 30 for operation of the valve, when the cross-plate is reversed. Over-running of the valve is prevented by engagement of the rear or inactive wall of the recess with the finger 31. The lower end of the rotating member 32 is recessed to receive the upwardly extending lug 33 on the valve member for centering purposes. The rotating stem 32 extends through a stuffing box 34 which is screw threaded in the top of the conduit 20 and which is operated by means of the hexagonal nut portion 34^a. The nut cap 34^b screws into the stuffing box and serves as a cover for the same. The pinion 37 meshes with and is driven by the worm 35 for actuation of the horizontally disposed rod 38 which extends through the inset portion of the side wall of the casing for the operation of an indicator enclosed within the inset portion by means of a sealed window 40. The rod 38 is suitably mounted in the brackets 41 and 42 upon the top of the conduit 20. A thief catcher is indicated in a general way at 30^a and 31^a to prevent stealing of gas.

The rod 44 which is fixedly attached at its one end to the upper end of the rotating stem 32 has pivotal connection at its other end with the two connecting rods 47 and 48, respectively. The outer ends of the connecting rods 47 and 48 are connected to the upper end portion of the vertically disposed flag wires 50 and 51 which have depending lower end portion 52 and 53, respectively, for pivotal mounting in the sockets provided in the upper ends of the adjustable supports 54 and 55, respectively. The upper ends of flag wires 50 and 51 are pivotally mounted at 50^a and 51^a in the top of the casing. As indicated in the drawing, the extreme lower ends of the flag wires 52 and 53 are given a conical shape for pivotal movement in the

correspondingly formed sockets in the upper ends of their supports. These supports 54 and 55, are adjustable by means of screw threaded engagement in the brackets 56 and 57 which are formed integrally upon the inner wall of the upper casing member 1. With this arrangement it is possible to raise the supports 54 and 55 from time to time so as to take up any small degree of wear on the lower ends of the wires 52 and 53. The angularly extending arms 60 and 61 of the flag wires terminate in vertically disposed portions 62 and 63 which have pivotal connection with the bracket arms 64 and 65 extending from the center portions of the side walls 66 and 67 of the bellows 70 and 71. The inner walls of the bellows are indicated at 72 and 73, respectively, and are connected to the outer walls of the bellows by means of the extensible leather walls 74 and 75. The bellows are supported upon opposite sides of the lower end portion of the downwardly extending conduit 80 which provides fluid delivery connection between the bellows and the several ports already referred to. This conduit 80 is cast integrally with the cross-plate 9. As indicated in the drawing, the walls 81 and 82 are inclined downwardly and inwardly and are spaced from the conduit member 12. The conduit member 80 is divided into two channels 88 and 89 by means of the wall 90, which is formed as an integral extension from the under face of the conduit 12. Channels 88 and 89 communicate with ports 18 and 19, respectively, as indicated on the drawing. Near the lower end and on opposite sides of the wall 90 there are provided screw threaded bosses 95 for the reception of the screw threaded ends of the bolts 96 which extend through spiders 97 engaging across the center apertures through the inner walls of the bellows. These spiders, as will be seen from the drawing, engage the marginal portions of the apertures through the bellows and afford a means of supporting the bellows in position without interfering with the flow of gas between the conduit and the bellows. These joints are suitably sealed with packing. Apertures are also provided in the center portion of the outer wall of each of the bellows for access to the screw bolts 96 in assembling the parts. When the parts have been assembled these apertures are closed and sealed against unauthorized tampering as indicated at 100. As shown in Fig. 2 of the drawing, the outer walls of the conduit 80 are provided with suitable registering apertures near the lower end for the reception of the attaching means including the spiders, as just now referred to. The bails 105 are mounted at 106 in the upper casing member so as to prevent any improper movement of the bellows about a vertical axis. The alternate distending and contracting of the

bellows cause a synchronous operation of the valve as well as the indicator through the flag wire connections.

From the above it will be seen that I have provided a meter with three separate measuring compartments, namely the two bellows and the unoccupied space within the casing body; and that these several compartments are in turn filled with gas through the inlet 7, the conduit 11, and the port 15, and discharged upon operation of the rotating valve through the hollow portion 28 of the valve, the port 26, the conduit 12 and finally out through the discharge connection 8. Referring, for example, to the position of the valve as indicated in Fig. 1, the bellows 71 in this particular position is empty, having just been discharged, while the bellows 70 has been approximately half discharged, and the other measuring compartment around the two bellows is filling through the ports 15 and 16. Bellows 71 discharges through the channel 88, a port 25 of the disc 23, conduit portion 28 of the valve, center port 26 of the disc 23, port 17, conduit 12 and finally to discharge connection 8. By virtue of the rotation of the valve member, the conduit portion 28 of the valve member is in turn brought into communication with each of the three openings 25 so as to permit the fluid contents of the several measuring compartments to be discharged out through the connections just now described. For instance, following out the operation of the valve as illustrated in Fig. 1, the valve turning in a counter clockwise direction, the bellows 71 will next be filled while the bellows 70 will be discharging, and the other measuring compartment, having already been filled, will be ready to discharge. Then upon further operation of the valve, the bellows 71 will be ready to discharge while the bellows 70 will be filling and the other measuring compartment will have been almost completely discharged.

Among the several advantages flowing from this invention are the following. First, all of the operating parts are supported within the upper casing member of the meter so that access can be readily had thereto by simply removing the lower casing member or by removing the cap 1^a. The automatic means for keeping the valve mechanism clean prevents sticking. With this device, it is also possible to disconnect the cross-plate with the working parts carried thereby and to reverse the same end for end so as to enable the meter to be used either as a right hand or a left hand meter according to existing conditions. In this way it is possible to have the one meter meet all conditions as to location of the same.

Other advantages flowing from this invention will be apparent to those who are skilled in the art to which it relates.

What I claim is:

1. A fluid meter, comprising a casing having two body members provided with meeting faces, a supporting member extending across the interior of one of said members and of less width than said casing through the same plane whereby the interior of said casing may serve as a measuring compartment, two bellows both exposed in said casing and each having a measuring compartment therein, a valve seat on said supporting member provided with three ports, one communicating with each of said three measuring compartments, and a valve working on said seat controlling the flow of fluid to said three compartments.

2. A fluid meter, comprising a casing, a cross member therein, two bellows both exposed in said casing, a valve seat on said cross member provided with circularly arranged ports, fluid directing means between said ports and the middle parts of the walls of said bellows, a rotatable valve mounted on said cross member for controlling the flow of fluid through said fluid directing means to said bellows.

3. A fluid meter, comprising a casing, a cross member therein, fluid measuring bellows carried by said member, inlet and outlet connections for said bellows, said cross member being reversible end for end so as to reverse the direction of flow of the fluid through the meter.

4. A fluid meter, comprising a casing, fluid measuring bellows within said casing, inlet and outlet connections for said bellows, valve mechanism for controlling the flow of fluid to and from said bellows, means operatively connecting said bellows and valve mechanism including flag wires, said flag wires having vertically disposed uninterrupted portions pivotally supported only at the top and bottom parts of said casing.

5. A fluid meter, comprising a casing, fluid measuring compartments within said casing, rotatable valve mechanism for controlling the flow of fluid into and out of said compartments, and means including radially extending cooperating edges for preventing sticking of said valve mechanism.

6. In a fluid meter, a valve mechanism comprising a disc with a plurality of ports therethrough, and a rotatable member for co-operation with said disc, said valve mechanism being provided with means for automatically removing deposit from said rotatable member including radially extending marginal edges along said ports for co-operation with said rotatable member.

7. In a fluid meter, a valve mechanism comprising a disc with a plurality of ports therethrough, and a rotatable member for co-operation with said disc, said ports and rotatable member being provided with cooperating radially extending marginal edges

for automatically cleaning the valve member.

8. In a fluid meter, a valve mechanism comprising a disc with a plurality of parts therethrough, and a rotatable valve member for co-operation with said disc, the portions of the disc between said openings being countersunk with radially extending cleaning edges.

9. In a fluid meter, a valve mechanism comprising a disc with a plurality of unequally spaced ports therethrough, and a rotatable valve member for co-operation with said disc in the control of fluid therethrough.

10. In a fluid meter, a valve mechanism comprising a centrally apertured disc with

a plurality of circularly arranged ports therethrough, and a rotatable valve member for co-operation with said disc, the marginal portions of the inner and outer peripheries of said disc having cut-away portions so as to form radially extending cleaning edges.

11. In a fluid meter, a valve mechanism comprising a disc with a plurality of unequally spaced ports therethrough, and a rotatable valve member having a conduit portion for co-operation progressively with said ports so as to control the flow of fluid therethrough.

In testimony whereof I hereby affix my signature.

HERBERT F. TOLHURST.