(No Model.)

2 Sheets—Sheet 1.

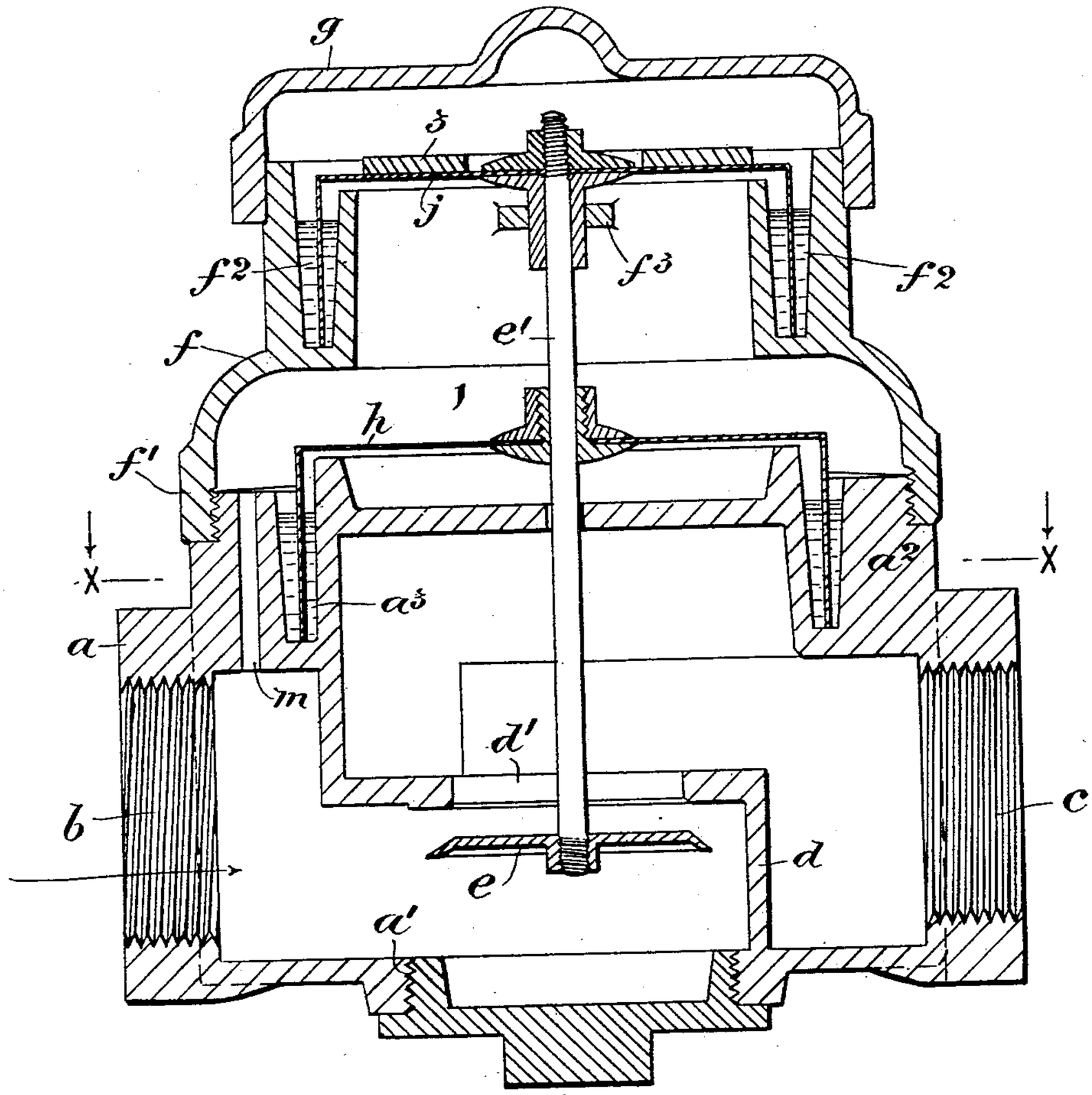
J. G. SMITH.

GAS GOVERNOR.

No. 541,127.

Patented June 18, 1895.

— Fig. 1 —



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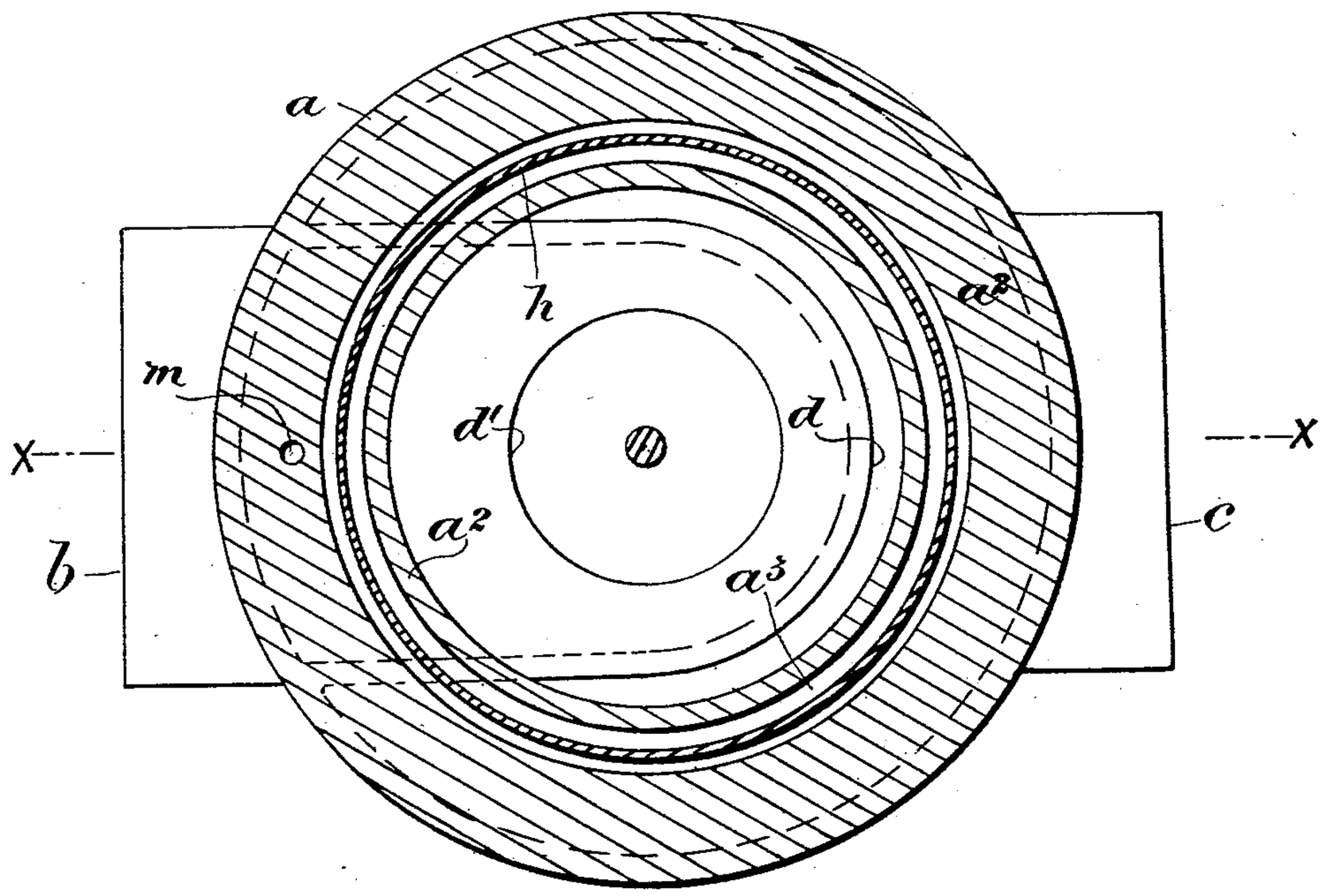
(No Model.) 2 Sheets—Sheet 2.

J. G. SMITH.

GAS GOVERNOR.

No. 541,127. Patented June 18, 1895.

— Fig. 2 —



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UNITED STATES PATENT OFFICE.

JOHN GEORGE SMITH, OF MONTREAL, CANADA.

GAS-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 541,127, dated June 18, 1895.

Application filed November 20, 1894. Serial No. 529,417. (No model.) Patented in Canada July 9, 1894, No. 46,530.

To all whom it may concern:

Be it known that I, JOHN GEORGE SMITH, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Gas-Governors, (for which I have obtained Letters Patent of the Dominion of Canada, under No. 46,530, granted July 9, 1894;) and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to gas governors having inverted cup shaped floats with their edges dipping into sealing fluid and carried by the inlet valve stem, the object being to secure a governor the inlet-valve of which will be balanced or held practically in equilibrium by the gas pressure and consequently be more responsive in its action to slight changes in the pressure or quantity of gas used.

The invention consists of a gas governor constructed and arranged to allow of the introduction of the initial body of gas between two floats differing in area for the purpose of controlling the inlet valve, and for full comprehension thereof, reference must be had to the annexed drawings, forming a part of this specification, in which like symbols indicate corresponding parts, and wherein—

Figure 1 is a vertical section of the governor, and Fig. 2 a horizontal section thereof, each section being taken respectively on a line $x\ x$ in the other figure.

I have ascertained by experiment that for the valve to work properly and upon the slightest fluctuation of pressure, it is necessary to balance it in some way or hold it in equilibrium upon such flexible cushions as the gas itself can furnish and to this end I use a pair of floats attached at different heights to the valve stem and introduce a body of gas between them.

Any suitable form of casing can be used provided two gas chambers are furnished each of which has a float above it and I prefer to use the form of construction of casing and parts shown in the accompanying drawings and which I will now describe in detail.

a is an annular hollow casing or section having inlet opening b and outlet opening c in opposite sides, separated by a partition d having a horizontal and a vertical portion, and the horizontal portion containing an inlet aperture d' controlled by the usual valve e, the bottom of the casting having a suitably covered aperture a' through which the valve e can be reached when desired, and the upper portion a^2 of the casting having an annular trough a^3 for sealing fluid and being perforated for the passage through it of the valve stem e'.

f is a second annular casting or ring having a downwardly projecting flange f', screw threaded interiorly to take onto the screw threaded upper edge of the casting a so that it will be located above this latter, also having a trough f^2 similar to the one a^3 for containing a second body of sealing fluid, and further having a bar f^3 perforated to act as an upper guide for the valve stem e'. Resting on this second casting or section is any suitable top or cover piece g.

h is a float of the usual inverted cup type secured in the usual way to the valve stem e' at such a point that its edges will play in the sealing fluid in the lower trough a^3, and j is a second float of a similar form also carried at a higher point by the stem e' so that its edge will dip in the sealing fluid of the upper trough f^2 and on which the usual interchangeable weight 3 is placed.

The space inclosed by the casting a and the lower float h constitutes on the inlet side of the partition d a lower main gas chamber and on the opposite or outlet side of the partition a delivery chamber, while the space between the top of float h and the under side of float j constitutes an upper or secondary gas chamber l and the dividing wall of the casting a between the main and secondary chambers is pierced near the main inlet b to afford a passage m through which gas can reach the chamber l.

The operation of the governor is as follows: When a large call or drain is made upon the governor the incoming gas rushes as it were, into a void and expanding itself reduces the pressure on the under side of the lower float h, thereby offering less resistance to the depressing weight 3. This causes float and valve e to descend (which being in equilibrium it easily does) and so lets in gas according to the requirement. When less gas is

called for, the pressure increases at the governor and acting on the under side of float *h*, causes valve *e* to rise and close off the initial gas until an equilibrium is established between the weight 3 and the pressure on the under side of float *h*.

In this governor there are two opposing forces, both in equilibrium and when one is disturbed it balances itself without any disturbance to the other, the high pressure gas maintaining one equilibrium and the low pressure the other.

The low pressure equilibrium is formed by the weight 3 on top of float *j* acting proportionately downward, to the upward pressure on the under side of bottom float *h*.

The high pressure equilibrium is formed by the incoming gas entering the secondary chamber and acting between the two floats *h* and *j*, the difference of whose areas is equal to the area of the valve *e*. This differential area through the medium of the initial gas maintains a downward pressure on the top of the float *h* equal to the upward pressure on the under side of valve *e*. Thus there are two equilibriums established, each acting independent of the other.

From the foregoing it will be readily apparent that the body of gas in the upper chamber entering from a point close to the main inlet is at a higher pressure than the body of gas in the delivery chamber on the outlet side of the partition *d* owing to the passing of large quantities of the latter body through the outlet *c* but at the same pressure as the body of gas in the main chamber beneath the valve, and consequently I find it desirable to establish a difference in the comparative areas of the two floats making the upper float less in area preferably by diminishing the diameter thereof, in order to secure a downward pressure upon the valve through the gas in the secondary chamber bearing upon the upper surface of the lower float, equal to the upward pressure of the gas in the main chamber beneath the valve.

What I claim is as follows:

1. A gas governor of the class described having a main gas chamber or passage leading to the delivery outlet, a valve controlling the inlet to said main chamber, and a secondary gas chamber, the latter in communication with the main gas supply so as to contain a body of gas adapted to exert a pressure upon a pair of valve operating floats, one acted upon upwardly and the other downwardly, equal to the pressure upward of the main or initial body of gas beneath the valve and upon the under side of the lower float on the lower pressure side, for the purpose set forth.

2. A gas governor of the class described having a main gas chamber or passage leading to the delivery outlet and a secondary gas chamber, the latter to contain a body of gas of the same pressure as that of the main body of gas, and the valve operating parts of which, comprising a stem and pair of sealed floats, are acted upon by the gas in said secondary chamber so as to be depressed by same, for the purpose set forth.

3. A gas governor having a main gas chamber or passage and a secondary gas chamber, the latter to contain a body of gas of the same pressure as the main body of gas, a valve to regulate the flow of gas from said main chamber, an operating stem for said valve with a pair of floats secured to said stem and constituting the bottom and top of said secondary gas chamber and suitable sealing troughs for said floats.

4. A gas governor having a casing with inlet and outlet and communicating passage between, a valve to regulate the flow of gas from such main chamber, a stem carrying such valve, a pair of floats also carried by said stem and a secondary gas chamber with suitable inlet to allow of the introduction of a body of gas of the same pressure as the main body thereof between said floats for the purpose set forth.

5. A gas governor of the class described having a main gas chamber or passage and a secondary gas chamber in communication with each other, the latter to contain a body of gas of the same pressure as that of the main body of gas and the valve operating parts of which, comprising a stem and pair of sealed floats differing in area, are acted upon by the gas in said secondary chamber for the purpose set forth.

6. A gas governor of the class described having a main gas chamber, a delivery chamber and a secondary gas chamber the latter in communication with the main chamber and adapted to contain a body of gas of equal pressure to the gas in the main chamber, a valve to regulate the flow of gas from such main chamber, and operating parts for said valve comprising a stem and pair of sealed floats, one of which latter forms the top to said delivery chamber and the other of which forms the top of said secondary chamber, the body of gas in said secondary chamber occupying the space between said floats for the purpose set forth.

7. In a gas governor, the combination of the main section having inlet and outlet openings and a partition between, a valve aperture in said partition, a covered aperture in the bottom of said casting, an annular trough containing sealing fluid, formed in the upper portion of the section; a second section located above and secured to the main section, a second trough containing sealing fluid formed in its upper surface, and a guide integral with such second section for the upper end of the valve stem, a valve for controlling the flow of gas through said valve aperture, a valve stem carrying said valve and a pair of floats carried by said stem and having their edges dipping in said sealing troughs, the upper wall

of said main section being perforated at one or more points near the main inlet, for the purpose set forth.

8. In a gas governor, the combination with a suitable casing providing a main chamber, a delivery chamber and a secondary chamber, the main gas chamber having an inlet and the delivery chamber, an outlet, with a communicating passage between such main chamber and delivery chamber, and a secondary inlet from said main chamber to said secondary gas chamber, of a valve to regulate the flow of gas through said communicating passage, such valve being carried by a suitable stem, floats also carried by said stem and constituting the tops respectively of said secondary and delivery chamber and sealing troughs for such floats.

9. A gas governor of the class described having an inclosing casing and a valve affixed to a spindle upon which two floats or inverted diaphragms are attached, the floats being of different area and one acted upon upwardly and the other downwardly by gas of the initial pressure in such a manner that through the medium of said floats and the initial pressure of gas, the controlling valve is held in equilibrium.

10. In a gas governor of the class described having a valve affixed to a spindle and a pair of floats differing in area carried by such spindle, an inclosing casing affording chambers and passages for the introduction of the initial body of gas between said floats for the purpose of controlling the inlet valve.

JOHN GEORGE SMITH.

Witnesses:
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