

(No Model.)

2 Sheets—Sheet 1.

J. S. CONNELLY.

GAS GOVERNOR.

No. 297,113.

Patented Apr. 22, 1884.

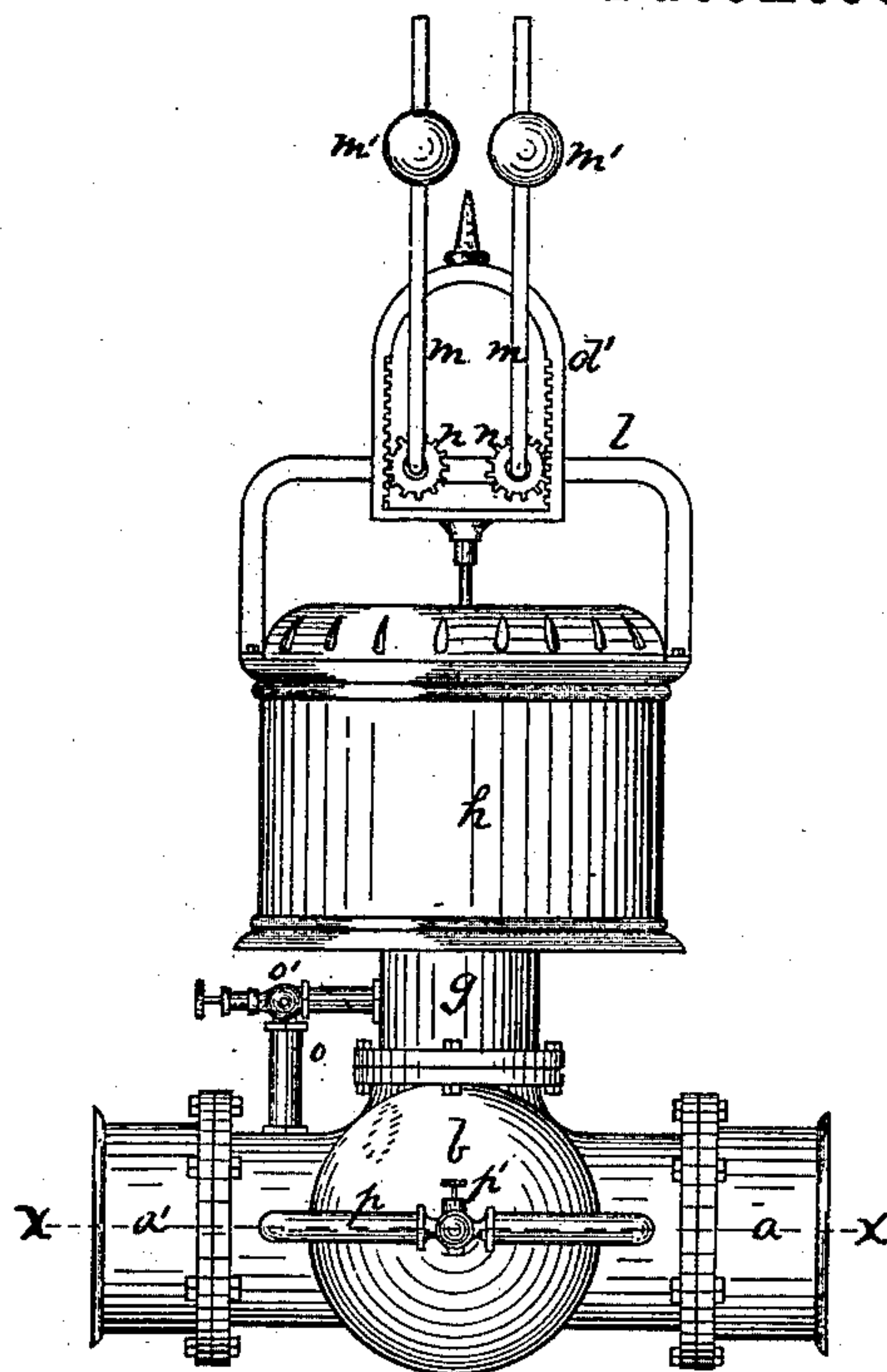


Fig. 1.

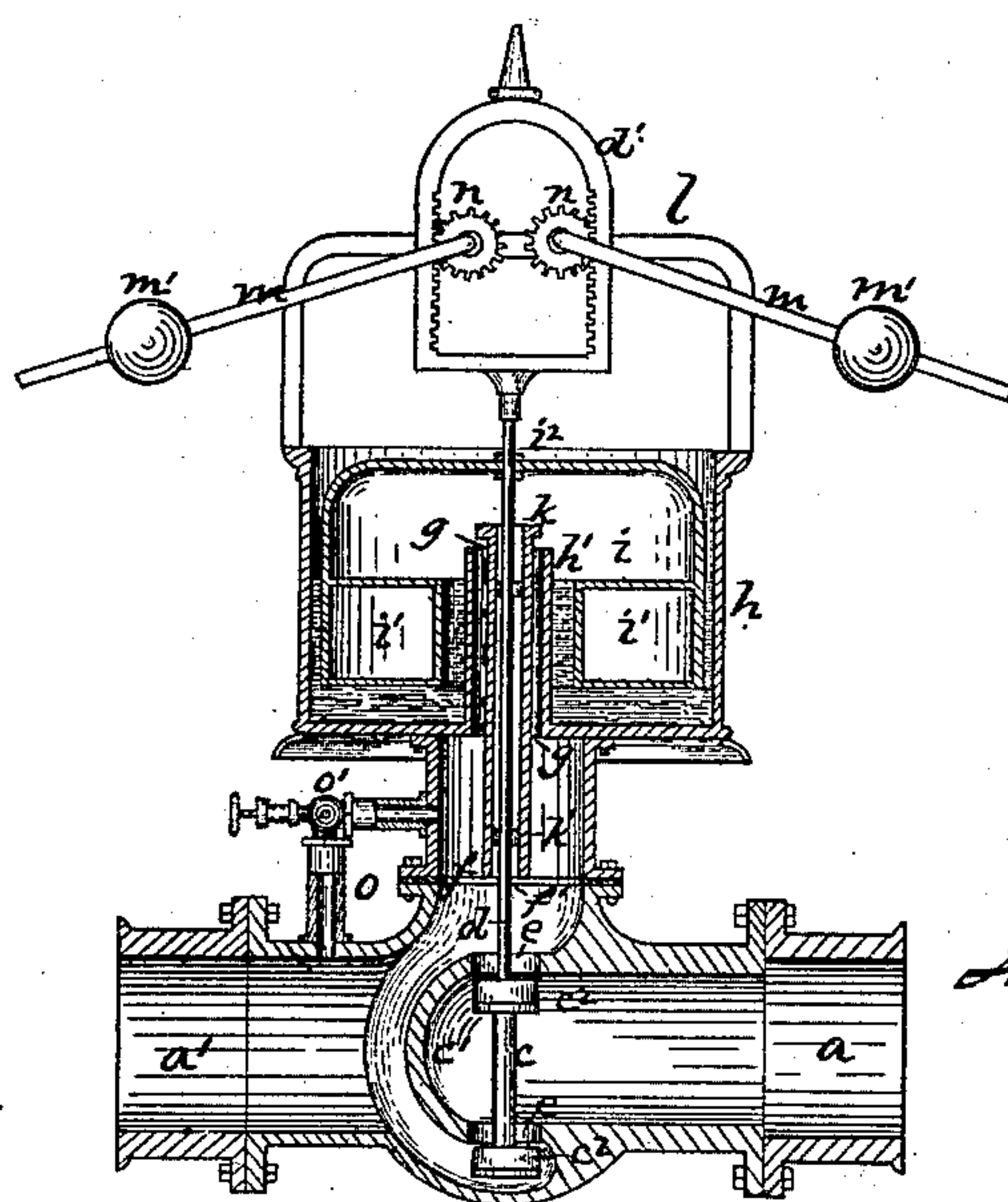


Fig. 2.

Witnesses

John K. Smith  
W. B. Corwin

Inventor

John S. Connelly  
by his attys  
Bakewell & Kern

(No Model.)

2 Sheets—Sheet 2.

J. S. CONNELLY.

GAS GOVERNOR.

No. 297,113.

Patented Apr. 22, 1884.

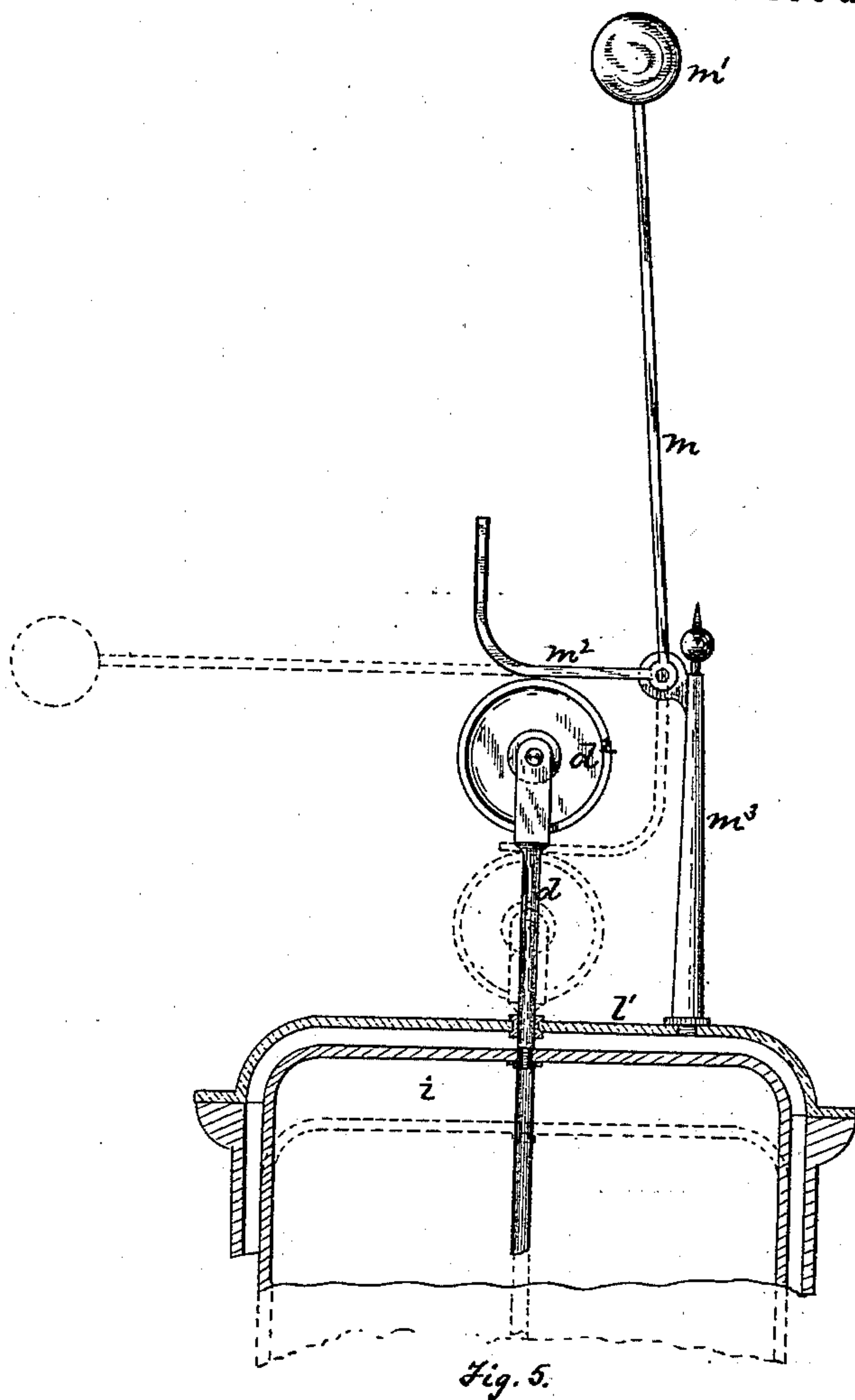


Fig. 5.

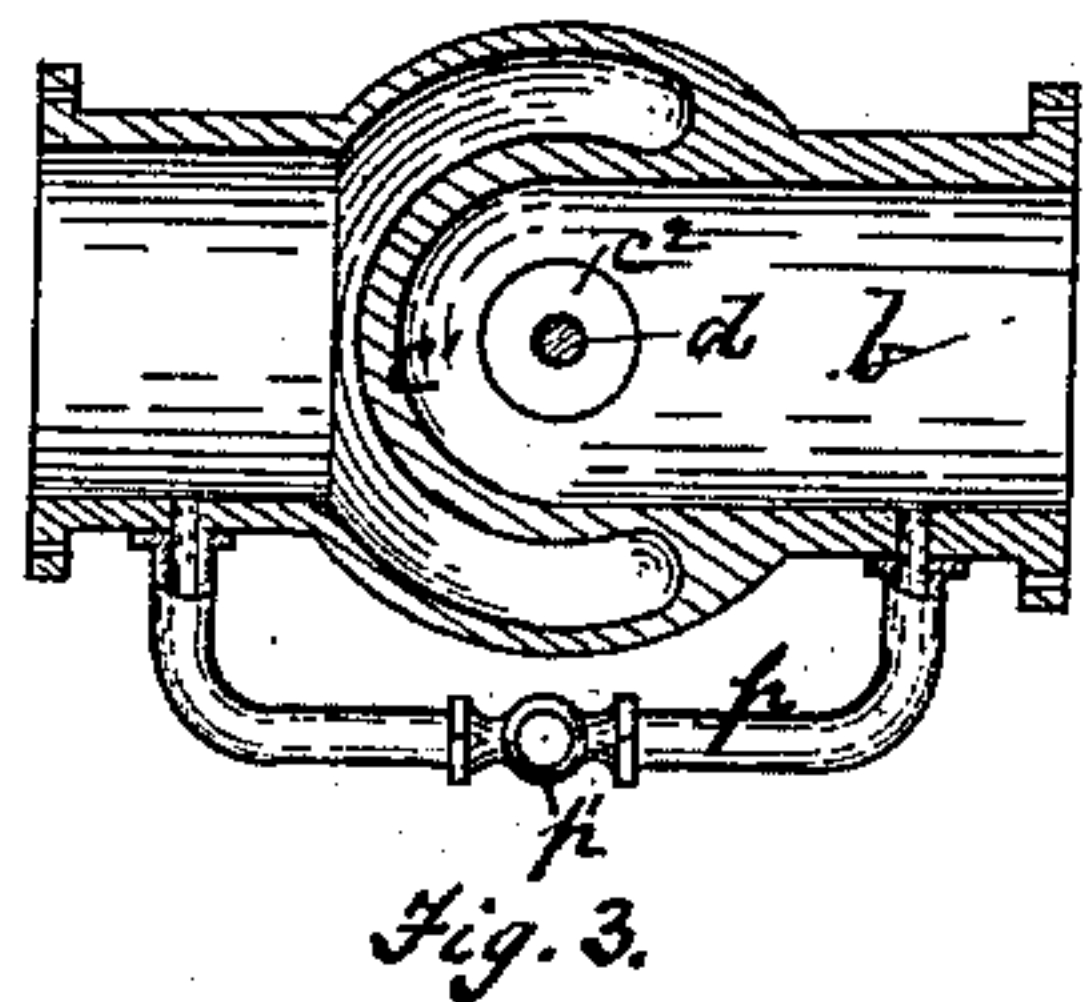


Fig. 3.

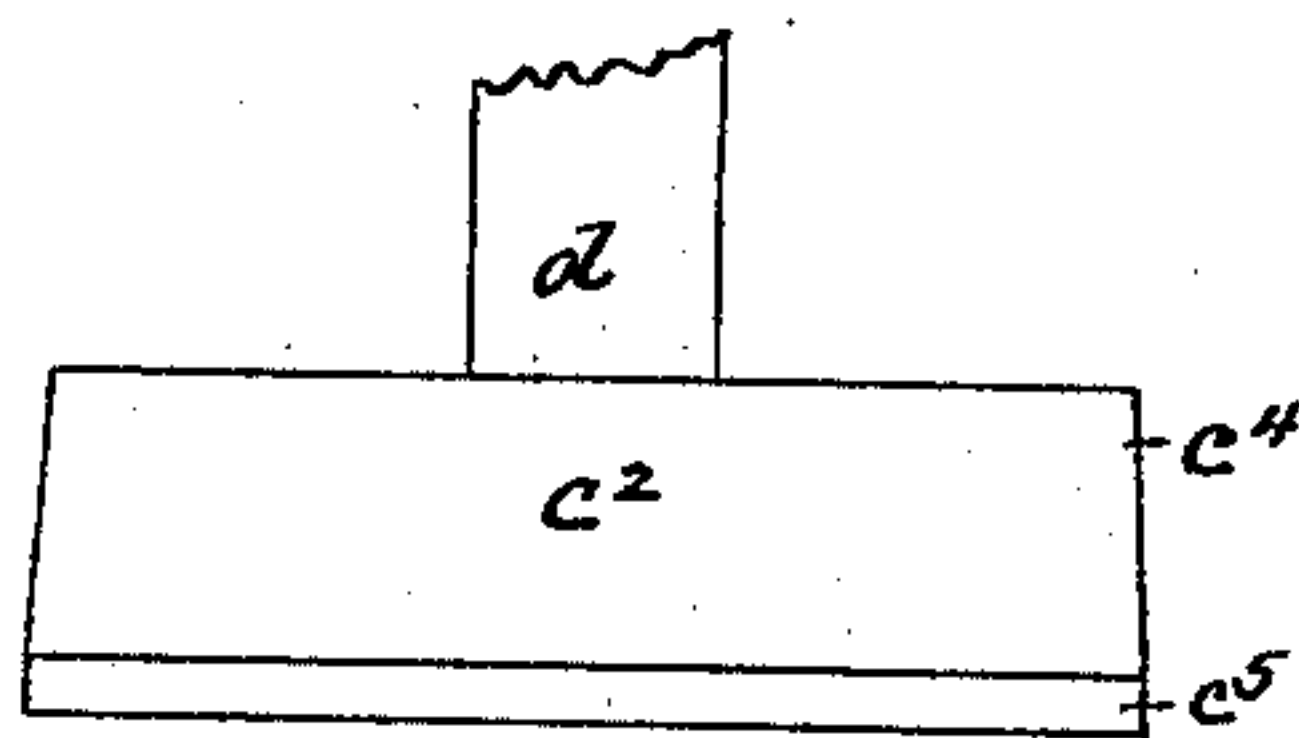


Fig. 4.

Witnesses.

Wm. K. Smith

W. B. Conner

INVENTOR

John S. Connelly

By his attys

Bakewell & King



# UNITED STATES PATENT OFFICE.

JOHN S. CONNELLY, OF PITTSBURG, PENNSYLVANIA.

## GAS-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 297,113, dated April 22, 1884.

Application filed November 3, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. CONNELLY, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Governors; and I do hereby declare the following to be a full, clear, and exact description thereof.

Heretofore the regulator for gas-governors has been operated by means of a weighted lever bearing on the valve-stem, and adjusted to suit the pressure required by the addition of weights, which were removed from time to time as the pressure required grew less. Thus, during the early evening hours, it has been customary to have the full number of weights on the lever, and at or toward midnight these weights are removed, one by one, until the degree of pressure necessary for the supply during the early morning hours and day-time was obtained. The objection to this device has been that the attendant, to avoid the trouble of going to the governor, which is generally situated at some distance from the engine-house or other place of his usual duties, permitted the entire pressure to be on the mains until midnight, or such time as the pressure needed to be reduced to the daylight standard, and thus during the advancing hours of the evening the whole pressure of the gasometer was on the mains, and caused excessive loss from leakage, which loss, of course, would be reduced as the pressure was reduced. Another objection has been that the removal of the weights caused a noticeable pulsation in the lights supplied from the main.

My invention is designed to make a gradual reduction of pressure by gradually relieving the valve of the weight on the stem.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved regulator. Fig. 2 is a vertical section of the same. Fig. 3 is a section on the line *xx* of Fig. 1. Fig. 4 is a side view of one of the valve-disks, and Fig. 5 is a view of a modified form.

Like letters of reference indicate like parts in each.

In the drawings, *a* indicates the main lead-

ing from the gasometer; *a'*, the service-main, and *b* the valve-chamber of the governor.

In the valve-chamber *b* is a diaphragm, *c'*, in which is a valve, *c*, composed of two disks, *c*<sup>1</sup>, *c*<sup>2</sup>, mounted on a stem or rod, *d*, controlling the valve-openings *e*.

Fastened by flanges and bolts or otherwise to the upper end of the valve-chamber *b* is a tubular casing, *g*, which sustains a float-chamber, *h*, containing water or other liquid, and fitting loosely in it, so as to rise therein, is a float, *i*, provided with an air chamber or chambers, *i'*, which give buoyancy to the float. A central tube, *h'*, extends from the bottom of the chamber *h* up to above the water-level therein.

Secured between the flanges of the valve-chamber *b* and the casing *g* is a plate or disk, *f*, from which a tube, *k*, rises. A hole, *f'*, is made through the plate or disk *f*, and the valve-rod *d* extends upward through this hole and through the tube *k* and the top of the float *i*, and is fastened to the latter by nuts *i'* or in any other suitable way. The hole *f'* is made as tight as possible without interfering with the working of the valve-rod, and the tube *k* is provided with guide-rings *k'*, which guide the rod *d* and valves *c*<sup>2</sup>.

Surmounting the chamber *h* is a yoke or bail, *l*, on which are journaled two weighted crank arms or levers, *m*, each provided with a pinion, *n*, mounted thereon at or near the yoke.

On the upper end of the valve-rod *d* is a toothed rack, *d'*, the teeth of which engage those of the pinions. The arms *m* are so arranged with reference to the valve-rod, rack, and float that when the latter falls the arms fall from a vertical toward a horizontal position, and as the power of the weights *m'* increases with the increased leverage thus obtained, the force applied by means of the weights, to aid in depressing the float, increases rapidly as the weights fall. This construction is designed to effect the automatic application of increased pressure on the float and the removal of the same when the necessity therefor has passed.

Connected to the valve-chamber *b* at a point beyond the valve *c* is a pipe, *o*, controlled by a valve, *o'*, which pipe extends upward and



enters the side of the part *g*. An annular or other opening, *g'*, extends from the chamber *e* up between the tubes *h* and *k*, and opens into the chamber *i*<sup>2</sup> of the float *i*. The disks *c*<sup>2</sup> are made with a tapering part, *c*<sup>4</sup>, and a straight part, *c*<sup>5</sup>, the latter of which effects the complete closing, being much narrower than the former, so that the valves have a considerable range of movement in their openings *e*, before being fully opened, whereby a very gradual increase of supply of gas is obtained during the first movement of the valves, and a like gradual throttling of the supply after the valves have entered their openings. This feature is of importance in regulating the position of the arms *m*, so as to cause the application of their pressure to be properly graduated to secure exactly the movement of the valve necessary to admit the required supply of gas.

Extending around the diaphragm *c'*, and connecting the opposite ends of the chamber *b*, is a pipe, port, or by-pass, *p*, controlled by a valve or cock, *p'*. This pipe is designed to permit the amount of gas necessary to compensate for leakage in the service-main to pass from the main *a* without going through the valves. There is always a certain amount of leakage. Without the pipe *p* this loss would have to be supplied through the valves *c*. This was the case with the old construction.

The operation is as follows, viz: The weight of the float is so adjusted as to cause the valves to admit sufficient gas to supply the few burners needed in day-time. When the pressure in the outlet-main *a'* has become reduced by leakage, the float will descend, because it is sustained by the pressure in the main *a'*, acting through pipe *o*. The descent will be just sufficient to admit enough gas into the main *a'* to replace the loss and restore the pressure therein. The float can never, however, beset at a point which will cause the valve to close when all the lights are extinguished.

It is necessary to the application of my improved automatic method of gradually weighting and relieving the valve that the loss from leakage be ascertained and supplied through some other way than through the valves, and it is also necessary that the valves should have a considerable movement in their seats without materially increasing the gas-supply, in order that the weights may move far enough to have their full effect on the float after the valves are fully open, but not until then. Usually but few lights are needed during the day-time, and the number increases but slowly at first when evening approaches, and then, within a very short time, the entire pressure and full capacity of the mains are required to meet the demand. The same is true also when the pressure is reduced. The vastly greater number of lights is extinguished shortly before midnight, and the pressure acting on the float causes the valves to rise into the mouths of the valve-openings. After this the continued upward movement of the valves makes a very

slow contraction of the valve-openings, and consequently a very slight reduction of the quantity of gas passing through. The long movement given to the valves by their thick tapered form causes the arms *m* to rise nearly to their vertical position when the daylight pressure is reached. If, however, the small amount of gas needed for the few burners used in day-time is supplied through the pipe *p*, then the levers will rise to their vertical position when the daylight standard is reached.

By the use of the pipe *p* my improved regulator is applicable to plants having different degrees of pressure and leakage, for the reason that thereby the regulator can be adjusted relatively to suit any amount of pressure and leakage.

My improvement is used as follows: The valves are closed and the exact quantity of leakage in the supply-main is discovered by the use of suitable instruments, and then the cock *p'* is set to permit the necessary amount of gas to supply this leakage to be always passing through the pipe *p*. Then the float *i* is adjusted so that when no lights are burning the valve *c* will be closed and the arms *m* be in a vertical position. If, then, a few jets are lighted, the pressure on the main *a'* being reduced, the float will fall and open the valves sufficiently to admit the proper amount of gas to supply the demand. The outward fall of the weight *w'* will cause a little more weight to be applied to depress the float; but this pressure is not great, as the arms move through the first part of their arc. It, however, increases as more jets are lighted, and attains its full pressure when the valves are fully opened.

In Fig. 5 I show a modified construction. Here a single lever or arm, *m*, is used. It is pivoted to a standard, *m*<sup>3</sup>, sustained on a cap, *l'*, said cap being substituted for the yoke or bail *l*, shown in the first construction, in so far as the function of supporting the lever *m* is concerned. The lever *m* has a short curved arm, *m*<sup>2</sup>, projecting laterally over the upper end of the valve-stem *d*, which, for the purpose of relieving friction, is provided with a friction-roller, *d*<sup>2</sup>. The lower position of the weighted lever *m* is shown by broken lines. This construction has the advantage over the first of being less expensive and liable to get out of order, and of working with less friction.

My invention is simple in construction, easily cared for, and requires no skill to operate it. It effects the gradual and automatic reduction of the pressure in the main, and thus saves a great loss heretofore occasioned by the carelessness of attendants. It also effects an even reduction of the pressure, so that it is not noticeable at the gas-burners. It is cheap in construction, and may be applied to existing governors.

What I claim for my invention, and desire to secure by Letters Patent, is—

1. The combination, in a gas-governor, of a float and valve, with a valve-stem connected to said float and having a friction-roller at its



upper end, and a pivoted weight-lever having a curved arm extending at an angle therefrom, or from the journal thereof, which curved arm bears on the said roller, so as to cause the pressure of the lever to be always exerted in the direct vertical plane of the valve-stem as it falls and rises, substantially as and for the purposes described.

2. The combination, in a gas-governor, of a valve-stem, float, and a disk-valve having the part which first enters the seat tapered slightly and the part below the taper cylindrical, the tapered part being very long relatively to the cylindrical part, with a cylindrical valve-seat, so that the valve shall have a long run in its seat before closing or fully opening, substantially as and for the purposes described.

3. The combination, in a gas-governor, of a valve for regulating the flow of gas from the

supply to the service main, with a pipe or by-pass extending around the valve and communicating with the valve-chamber on opposite sides of the valve-seat, for the purpose of enabling the valve to be adjusted, so as to be affected by a very slight change of pressure in the service-main, substantially as and for the purposes described.

4. The combination, in a gas-governor, of the valve-stem  $d$ , having a friction-roller,  $d^2$ , pivoted weighted lever  $m$ , and bent arm  $m^2$ , substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 30th day of October, A. D. 1883.

JOHN S. CONNELLY.

Witnesses:

W. B. CORWIN,  
THOMAS B. KERR.