(No Model.)

T. E. CONNELLY.

AUTOMATIC GAS GOVERNOR.

No. 345,368. Patented July 13, 1886.

Fig. 1.

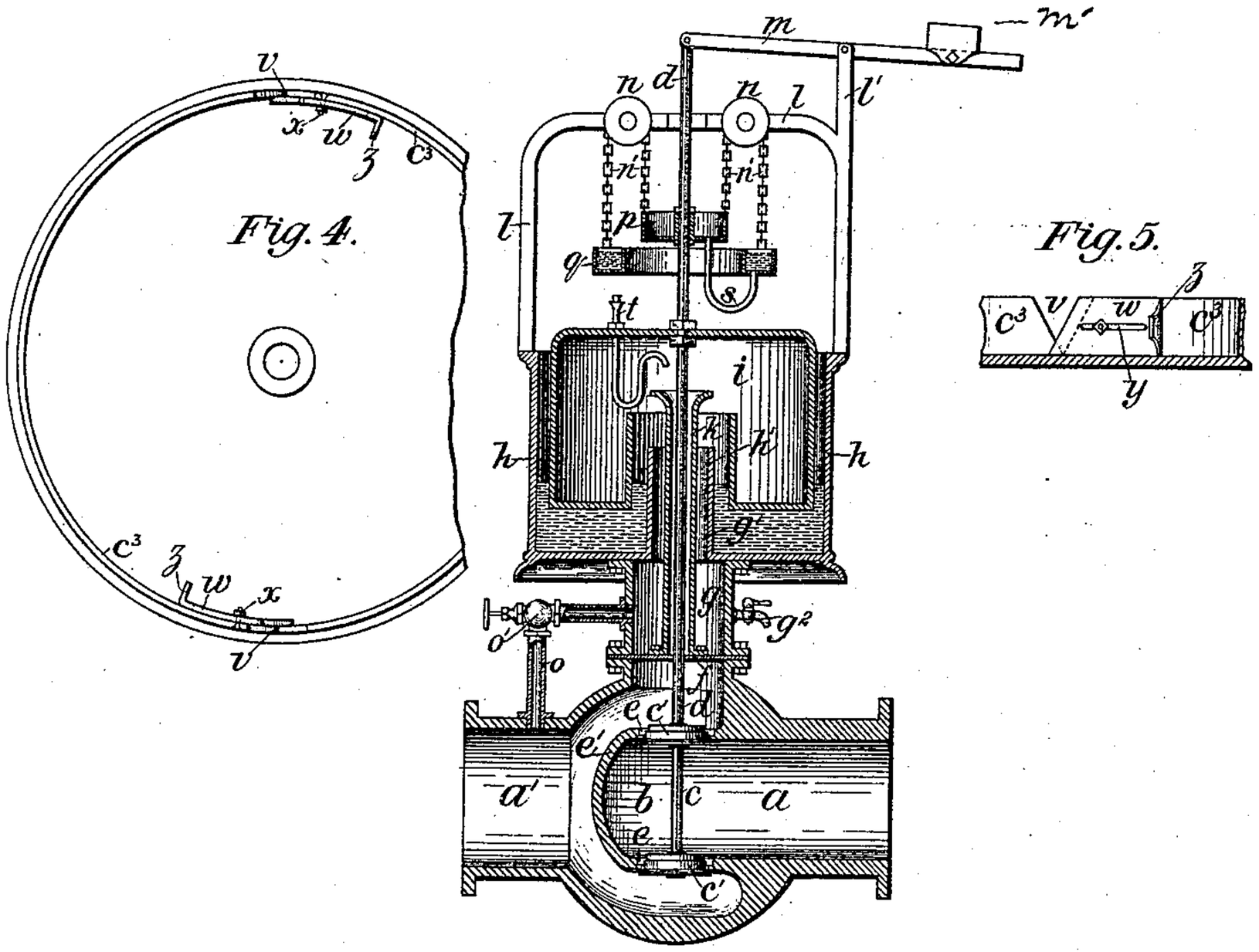


Fig. 4.

Fig. 5.

Fig. 2.

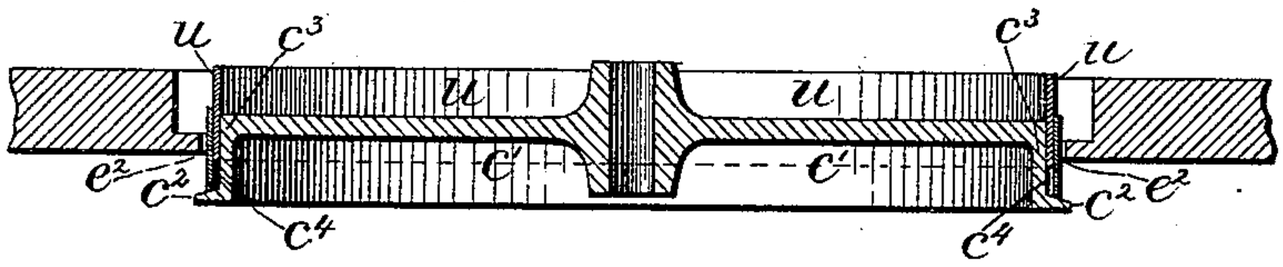
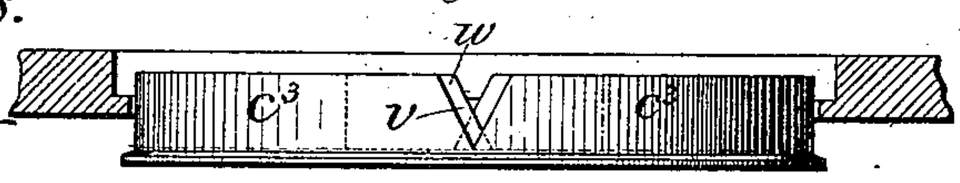


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS E. CONNELLY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JOHN S. CONNELLY, OF NEW YORK, N. Y.

AUTOMATIC GAS-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 345,368, dated July 13, 1886.

Application filed November 21, 1885. Serial No. 183,530. (No model.)

To all whom it may concern:

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

My present invention relates more particularly to improvements in the automatic gas-governor patented to John S. Connelly in Letters Patent No. 316,945, dated May 5, 1885, but may be applied to any automatic gas-governors. In the said patent the valve is actuated by a float which is caused to rise and fall, and thereby close and open the valve by the pressure in the service-main, and the valve is so constructed as to have a movement of considerable length in its seat without greatly increasing or diminishing the supply between the points at which the day pressure and the night pressure are admitted. This provision is made in order that when the change from day to night pressure is being made time may be allowed for a weight to be automatically thrown on the valve to hold it open against the increased pressure in the service-main, which weight is automatically removed when the decreased pressure in the service-main again permits the valve to enter its seat. The objection to this construction is that the length of the stroke of the valve is arbitrary, and the valve cannot be controlled beyond the length of the stroke, so that in case the initial pressure and the pressure in the mains are nearly equal, the valve, when the consumption is great, is apt to run down beyond the point necessary to admit the full pressure and requires a large diminution of consumption before the float can rise far enough to cause a transfer of the weight and reduce the pressure. During this time there is an excess of pressure on the main which causes leakage. By my improvement this difficulty is obviated and the pressure is equalized.

Experience has demonstrated that no two automatic governors can be placed in use under the same conditions, owing to different elevations, capacity of mains, initial pressure at the gas-holders, and consumption of gas. To illustrate: At a gas-works passing seventy thousand cubic feet of gas per hour through a sixteen-inch governor holding a pressure of $\frac{22}{10}$ inches at the outlet, with an initial pressure of $\frac{24}{10}$ inches, the valve will drop two inches from its seat. With the same governor under the same conditions, except that the initial pressure is $\frac{49}{10}$ inches, the valve will drop one-half an inch from its seat. Thus a governor, which, under the circumstances of one use, will secure the necessary increase of pressure, will not do so in another, and consequently no rule can be established for the manufacture of governors, but usually they needed to be especially constructed for the particular use for which they were intended. In each of the supposed cases it may be desired to adjust the governor to hold $\frac{10}{10}$ day pressure and $\frac{22}{10}$ night pressure. It is quite clear that the greater the excess of pressure on the inlet side of the governor the less the valve will open to pass a given volume of gas. It is therefore essential to increase or diminish the capacity of the valve, and thus compel it to travel far enough or make the desired stroke to secure the proper influence on the float or bell to give the required pressure.

In all automatic governors known to me the weighting of the float or valve and consequent increase of pressure is determined by the stroke or opening of the valve. If the area of the bell or float is such that it must drop one inch to receive the weight to give the desired maximum pressure on the mains during the maximum consumption, and the consumption or flow of gas should only be sufficient to open the valve but one-half an inch and allow the bell or float to fall that distance, only one-half the required weight would be received, and only half the required increase of pressure obtained. This is not an uncommon occurrence in the use of the automatic governors heretofore known to me.

My improvement is designed to overcome these difficulties and to render an automatic governor readily adjustable to correspond with any conditions under which it may be required to operate; and it consists in combining an adjustable valve with the governor.

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 vertical sectional view of my improved governor. Fig. 2 is an enlarged sectional view of one of the valve-disks and its seat. Fig. 3 is a side view of a modified form of valve. Fig. 4 is a plan view of Fig. 3. Fig. 5 is an inside view of a part of the flange of the valve.

Like letters of reference indicate like parts in each.

In the drawings, *a* indicates the main leading from the gas-holder; *a'*, the service-main; *b*, the valve-chamber; *c*, the valve composed of two disks, *c' c'*; *d*, the valve-stem; *e*, the valve seats or openings made in the diaphragm *e'*; *f*, a plate or disk closing the upper end of the valve-chamber *b*; *g*, a tubular chamber supporting the float-chamber *h*, which contains a float, *i*; *h'*, a central tube, which extends from the bottom of the chamber *h* to a point above the level of the liquid therein; *k*, a tube which extends from the plate *f* up through the tube *h'*; *l*, a yoke surmounting the chamber *h* and provided with friction-pulleys *n*; *m*, a counterweighted lever pivoted on a standard, *l'*, and pivotally connected with the valve-stem *d*; *o*, a pipe connecting the service-main *a'* with the chamber *g* and controlled by a cock, *o'*; *p q*, fluid-weight vessels suspended by chains *n'* on the pulleys *n* and connected by a flexible tube, *s*; *t*, an oiling-tube; *g'*, an annular passage between the chamber *g* and the interior of the float *i*, and g^2 a drain-cock. The valve-stem *d* is suspended from the float *i*, and the vessel or cup *p* is fastened to the stem.

The construction thus described is the same as that shown in the Patent No. 316,945, before referred to. Its operation is as follows: The movement of the valve is effected by the float, which is acted on by the pressure of the service-main through the pipe *o*, chamber *g*, and passage *g'*. In Fig. 1 the parts are shown as in position for day service, a minimum quantity of gas passing the valves. The cup *q*, being below the cup *p*, contains all the weight-fluid and contributes to the counter-weight *m'* in sustaining the valve in this position. A reduction of pressure in the service-main, produced by an increased demand thereon, causes the float to descend. But little increase of pressure will be obtained until the valves *c' c'* are about to pass out of the seats *e*, when the cups *p* and *q* will be at the same level and the weight-fluid evenly divided between them. The further descent of the float causes the valve to clear the openings and throw the night pressure on the service-main. It also causes the entire quantity of weight-fluid to be transferred to the cup *p*, so as to weight the valve and hold it open. When the demand on the service-main diminishes by the turning off of the lights, the float gradually raises the valve to its normal position and the weight-fluid is transferred back to the cup *q*, when its weight aids in sustaining instead of depressing the valve. In this construction, without the use, which I am about to describe, of an adjustable valve, there is no certainty of obtaining the maximum weighting of the valve at the time when the maximum consumption is reached, without which it is impossible to make the pressure vary correspondingly with the consumption. To accomplish this end I make use of an adjustable valve, a suitable form of which I will now describe by reference to Fig. 2, in which the disk or valve *c'* is provided with a tapering bead, c^2, around its lower edge, of such diameter that when the valve is closed the inclined surface of the bead shall strike the edge or corner e^2 of the seat and there shall be no friction between the parts. The valve also has a wide flange, c^3, in which is an annular groove, c^4, provided to receive an adjustable annulus or ring, *u*, of any desired width. This ring or annulus is adjustable to increase or diminish the height of the valve. It may be sprung in place, so as to hug the valve and remain in any position to which it is moved, or it may be adjusted by screws or other suitable devices. If in using this valve it is found that the movement of the valve which gives the required pressure is not great enough to effect a transfer of the weight, the ring is raised to increase the height of the valve and compel it to make a longer run before such pressure is obtained, and thereby effect the necessary transfer of weight. If, on the other hand, it is found that the movement is greater than is necessary, the ring *u* is moved back into its groove to the proper point to secure exact correspondence between the movement of the valve and the transfer of the weight, which will secure a variation of pressure in exact proportion to the consumption.

In Figs. 3, 4, and 5 I show another construction of adjustable valve. Here a notch or opening, *v*, preferably of V-form, is made in the flange c^3 at one, two, or more points. A slide, *w*, is provided to close each opening, said slide being secured on the inside of the flange by a headed pin, *x*, extending from the flange through a slot, *y*, in the slide. The slide has a thumb-piece, *z*, by which it may be moved. In this instance the flange c^2 is made quite wide—ordinarily two and one-half inches—and it is better that there should be several openings, *v*, of various angles in each valve, in order that a nicer adjustment may be obtained. The movement of the valve is regulated by opening or closing the slides *w* more or less. By fixing the slides at the proper point the valve is compelled to move the proper distance to secure the maximum weighting and pressure when the maximum consumption is reached and the pressure to vary correspondingly with the consumption. Access is had to the interior of the valve-chamber by means of a hand hole or holes in the side of the casting for the purpose of ad-

justing the valves. This governor can be adjusted not only to suit the present conditions of any plant, but also any changes in the construction of the same, such as the erection of a heavier holder or any increase in the capacity of the mains.

While I have described two forms of valves, I do not limit myself thereto, because the form and construction of the valve may be varied without departing from the spirit of my invention so long as the valve is adjustable to increase or diminish its stroke or motion.

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

The combination of an automatic gas-governor so constructed as to automatically increase or diminish the pressure at its outlet in proportion to the volume of gas passing through it, and an adjustable valve so constructed and arranged as to be capable of adjustment to pass different volumes of gas without changing the length or stroke of travel, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 11th day of November, A. D. 1885.

THOMAS E. CONNELLY.

Witnesses:
W. B. CORWIN,
THOMAS B. KERR.