THOMAS B. FOGARTY.

2 Sheets--Sheet 1.

Improvement in Gas-Machines.

No. 115,597.

Patented June 6, 1871.

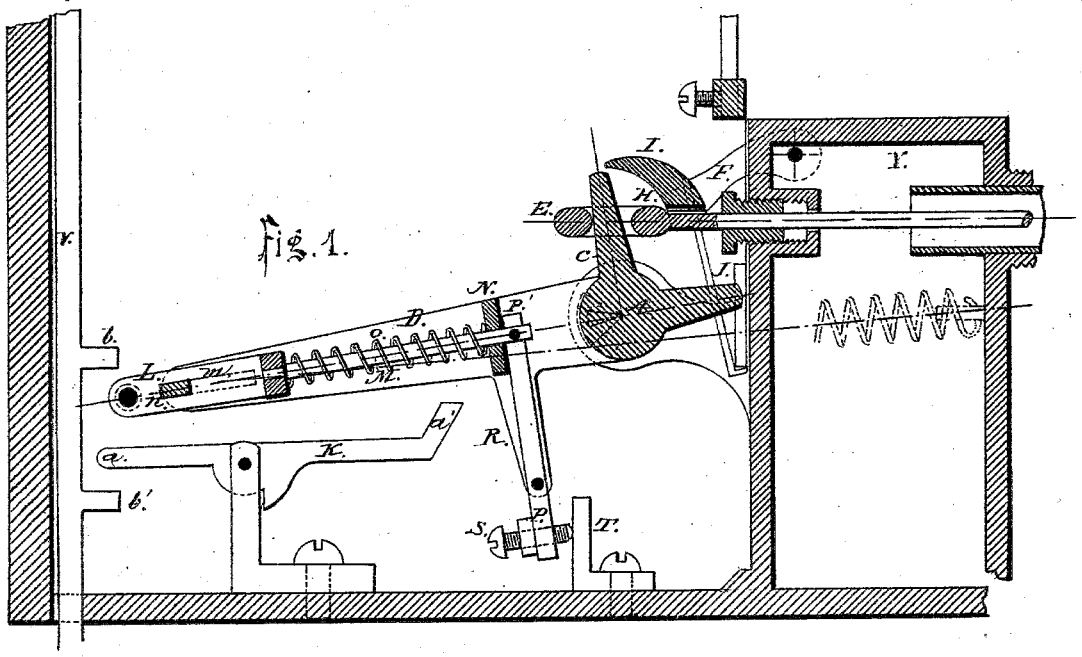

Fig. 1.

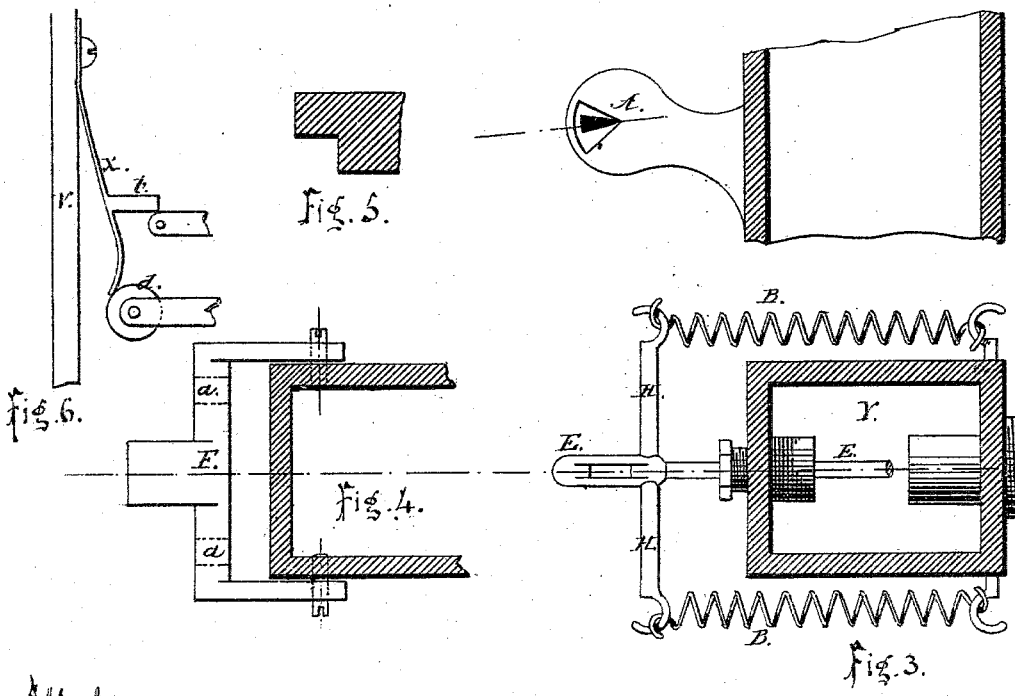

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Attest;

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Thomas A. Mitchell

Inventor;

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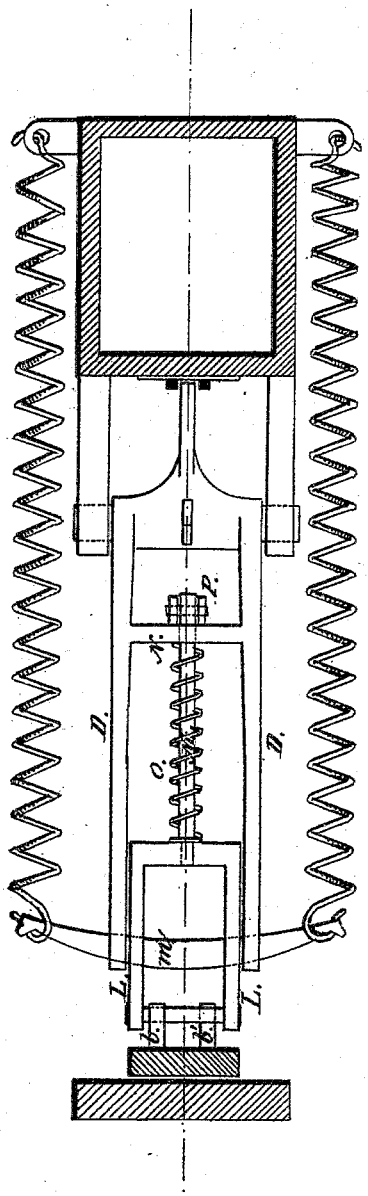

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Inventor:
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UNITED STATES PATENT OFFICE.

THOMAS B. FOGARTY, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN GAS-MACHINES.

Specification forming part of Letters Patent No. 115,597, dated June 6, 1871.

I, THOMAS B. FOGARTY, of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Gas-Machines, of which the following is a specification:

Nature and Objects of the Invention.

My invention relates to that class of gas-machines in which a supply of air is induced by the escaping force of the gas itself, and in which the manufacture and supply of gas are regulated by the rising and falling of a holder or flexible diaphragm, as already described in the specifications of Maxim and Radley, and in my own specifications (cases 1 and 2) filed on or about April 6, 1871; but it refers more particularly to that part of such machines known as the valve-gear, or the apparatus by which the opening and shutting of the vapor-valve are effected.

Description of Accompanying Drawing.

Figure 1 is an elevation of the improved valve-gear. Fig. 2 is a section showing the compound lever and actuating springs and devices. Fig. 3 is a section showing the stem of the vapor-valve, with yoke and actuating springs. Fig. 4 is a section of the clutch, showing the mode of its attachment and the position of its points. Fig. 5 shows the shape of the end of the lever K, which is cut off at one side, so that the pin *b'* can pass it without touching, but *b* will engage in it and actuate it. Fig. 6 shows a method of effecting the same purpose by withdrawing the pin *b* from over the end of the lever D.

In all the figures the same letters refer to the same parts.

General Description.

As hitherto constructed, the valve-gear of these machines is very defective, and very uncertain and unreliable in its action. The valve-gear used is, in one form or the other, that described by Maxim in the specification of his patent No. 81,922, the essential feature of which consists in two levers supported by a common bracket and working into one another so as to form a kind of toggle-joint, and in attaching springs to the further ends of the levers, and connecting them thereby, so that as soon as one lever is moved out of a straight line with the other, so as to form an angle with it, the contractile force of the springs will move the other to the side at which the angle is formed with a sudden snap-motion, so that by connecting one lever with the valve of a gas-machine and moving the other to either side of the center line the valve would open and close with a snap-motion. This plan has been variously modified, both by Maxim and others; but, in all cases, recourse has been had to the two levers and the toggle-joint described and claimed by Maxim. In practical use this arrangement has been found extremely defective, and principally for the reason that the movement was not positive enough—was not decided enough. A moment's consideration will show that as the springs pass the center there is a dead-point, or a point at which they exert no force upon either side; and it must be remembered, too, and in connection with this, that the tension of the springs is the power by which the vapor-valve is closed and kept closed against the pressure of the vapor in the retort—often twenty, twenty-five, thirty, or even forty pounds to the square inch. Now, the practical experience has been that when a large number of lights is being burned the springs are carried over the center so quickly that no injurious effect is experienced; but when the number of lights is reduced to one or two the diaphragm or holder falls very slowly, and the springs pass very slowly over the center. Meanwhile all outside pressure is removed from the vapor-valve, and the pressure of the vapor in the retort causes it to leak enough for one or two lights, and so the machine hangs upon the center, the holder or diaphragm neither rising nor falling, but remaining stationary. The vapor which now supplies the lights is a leak. It merely oozes out and does not issue from the jet with any velocity. Consequently, it has no power to lift the heavy air-valve, or even to induce a current of air against the mere pressure of the holder. Consequently the gas burned is pure vapor and the lights smoke badly.

One part of my invention is intended to remedy the above defect by making the movement positive, certain, and decided in its action; and this I effect in the following man-

ner: first, I simplify the movement by dispensing with one lever; secondly, instead of working my lever upon a round gudgeon, as has hitherto been done, and which has caused much trouble from the gudgeon getting gummed up and working with too much friction, I substitute a knife-edge, A, as shown in the drawing, thereby removing all friction and making it almost impossible for the machine to hang upon the center. In addition to this, and to make assurance doubly sure, I use a second set of springs, B B, by which the valve is held firmly against its seat until the lever has passed the center sufficiently to open it with a quick and absolutely-certain movement, the valve being opened by the arm C of the lever D engaging in the valve-stem E so as to move it quickly with a tappet movement, so that when the valve is closed it cannot open at all until it opens fully; nor can it close until it closes altogether and at once; for as soon as it has opened to its full extent the points *a a* of the clutch F fall behind the yoke H of the valve-stem E so as to prevent the valve from closing or moving at all until the clutch F is thrown up by the action of the arm C upon the cam I, Figs. 1 and 2, which cannot happen until the lever D has passed the center sufficiently to allow the valve to close with a snap-motion; and by the same movement a bent wire, J, inserted in the clutch F, engages in and locks or releases the mechanical air-valve described by me in the specification of case No. 3, filed May 3, 1871, in such a manner that the movements of the vapor and air valve must be in absolute and perfect union, thus rendering the movements of both absolutely positive and certain.

A second defect in these machines, and one which I propose to remedy, is this: As now constructed, there is no absolutely certain or reliable method of regulating the heat under the retort, or of providing against accident in case of the burner by which it is heated going out altogether or being inadequate to supply heat sufficient for the generation of the amount of vapor required, in either of which cases pure liquid would issue from the jet instead of vapor. Now, the proportions of air and vapor usually employed are about six volumes of the former to one of the latter, and the supply of this large quantity of air is dependent on the inductive power of the vapor, which again depends in a very great measure upon the velocity with which it issues from the jet. It has been shown in my specification, case No. 3, before referred to, that more than half of the effect of the inductive power of the vapor is expended in lifting the air-valve, and consequently anything which would have the effect of diminishing its velocity to any great extent would be pretty certain to lower it below that required to lift the valve. Now, the velocity of gasoline issuing from a jet is certainly not more than one-twentieth of that of vapor, and consequently in these machines the induction of air ceases as soon as the liquid begins to flow from the jet.

It will be remembered that the diaphragm or holder is inflated by the combined volumes of vapor and air. Here there is no induction of air, and the liquid that enters is only an infinitesimal portion of what their combined volumes would be; consequently there can be no inflation of the diaphragm or holder; but it is only by its being inflated that the vapor-valve can be automatically closed and the supply of liquid cut off. Consequently, then, on there being no inflation of the holder, the valve will remain open and a steady stream of liquid will flow through the jet into the machine, and from thence into the pipes, unless it is permitted to escape by a drip, in which case the entire stock of gasoline will be lost, as has actually occurred on several occasions. In the second part of my improvement I remedy this defect in a simple and effective manner. On reference to Fig. 1 it will be seen that the valve is opened or closed by the end of the lever D being carried above or below the center by the pins *b b'*, as more fully described in my specification of case No. 3, before referred to. Now, as soon as gasoline begins to flow from the jet, as I have shown, inflation ceases, so that if there is an outlet to the extent of even one burner the holder will continue to fall. I therefore attach the lever K so that the pin *b*, as it is carried down by the holder, will engage in and carry down with it its end *a*, in consequence of which the other end *a'* will be elevated and brought to bear upon the lower side of the lever D so as to force it up past the center, close the vapor-valve, and hold it closed. It must, however, be remembered that the pin *b* is already engaged in the lever D upon its upper side; consequently it is necessary that it should pass by and release the end of D before the latter can be thrown up by K. This I provide for in either of two ways. As shown in Figs. 1 and 2, I make the end L of the lever D separate from the body of the lever, and provide L with a slot, so that it may slide upon the yoke *m* as a guide, and that the length of the compound lever can be increased or diminished at pleasure. I provide the end piece L with the rod M moving freely through the cross-bar N, and at the side of N, opposite to the compression-spring O, I attach the lever P working on a pin passing through projecting arms R of the lever D, and at its lower end furnished with the adjustable set-screw S, shown as impinging against the support T.

The lever D and appendages are shown in Fig. 1 in the position which they occupy when the lever is down and the valve open, and in this position the end of the screw S presses lightly against the support T; but it will be evident that if the holder continues to fall so that the pin *b* will be brought to bear upon L with the weight of the holder the strain communicated to P will cause it to act so as to withdraw L from under *b*, and so allow *b* to

pass D so as to engage in and actuate the lever K, as already described, and at the same time it will leave D free to be thrown up by K, as already described, thereby closing the valve and cutting off the flow of gasoline. Fig. 6 shows another method of accomplishing the same purpose by making D a simple instead of a compound lever, and attaching the pin *b* to a spring, X, which, by impinging on the roller *d*, will cause the pin to be withdrawn from over the end of the lever with the same result that has been already claimed to be effected by withdrawing the end of the lever from under the pin.

Claims.

I claim—

1. The lever D, constructed and operated substantially as described, in the manner and for the purposes set forth.

2. The clutch F, constructed and operated substantially as described, in the manner and for the purposes set forth.

3. The lever K, constructed and operated substantially as described, in the manner and for the purposes set forth.

4. The sliding rod V, spring X, pin *b*, and roller *d*, constructed and operated substantially as described, in the manner and for the purposes set forth.

5. The combination, in a gas-machine, of the several parts herein claimed, constructed and operated substantially as described, in the manner and for the purposes set forth.

THOS. B. FOGARTY.

Witnesses:
JOS. T. K. PLANT,
C. E. MYERS.