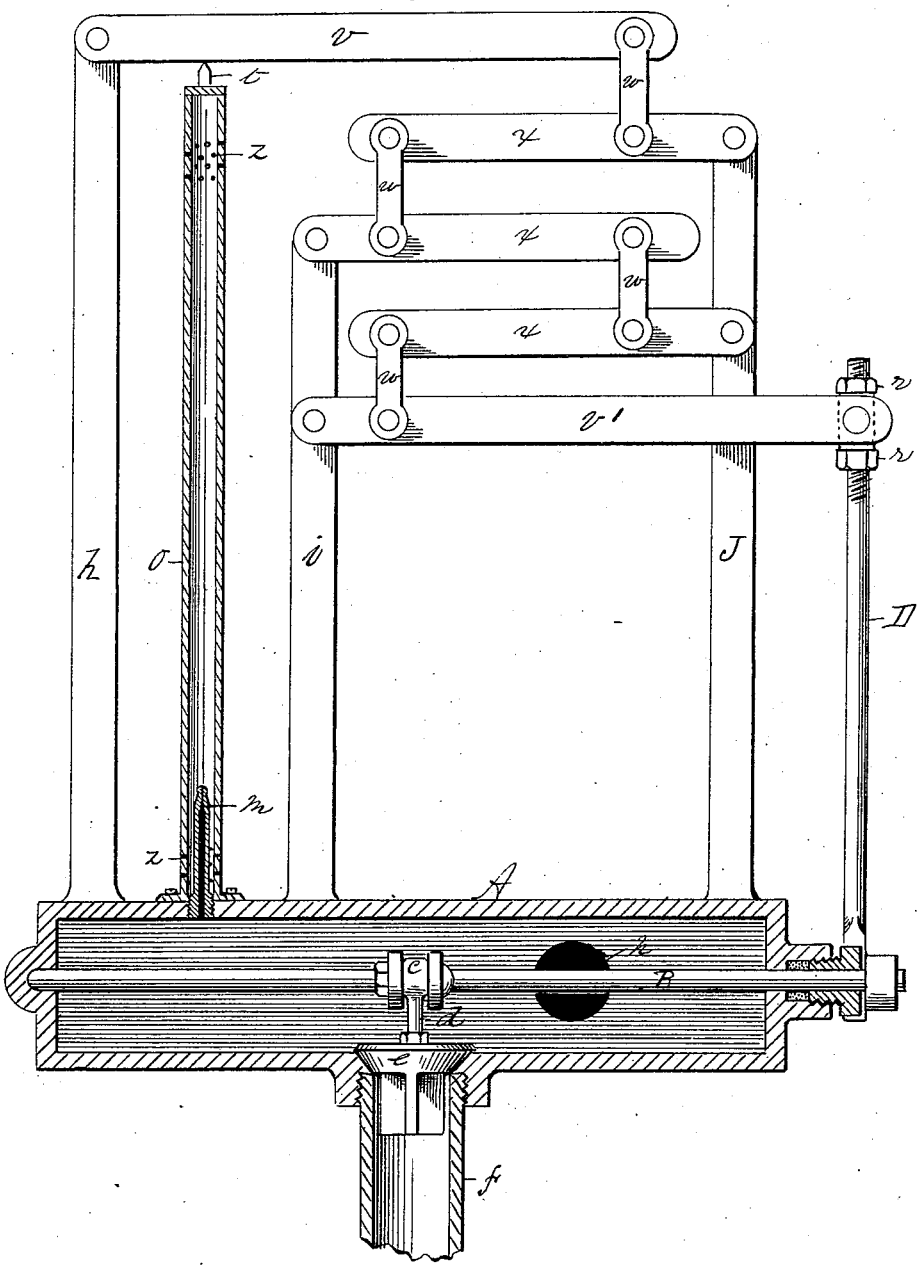
(No Model.) 2 Sheets—Sheet 1.

C. F. HOVEY & D. T. PERKINS.

AUTOMATIC MIXING GOVERNOR FOR HYDROCARBON GAS MACHINES.

No. 304,199. Patented Aug. 26, 1884.

Fig 1



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig 2

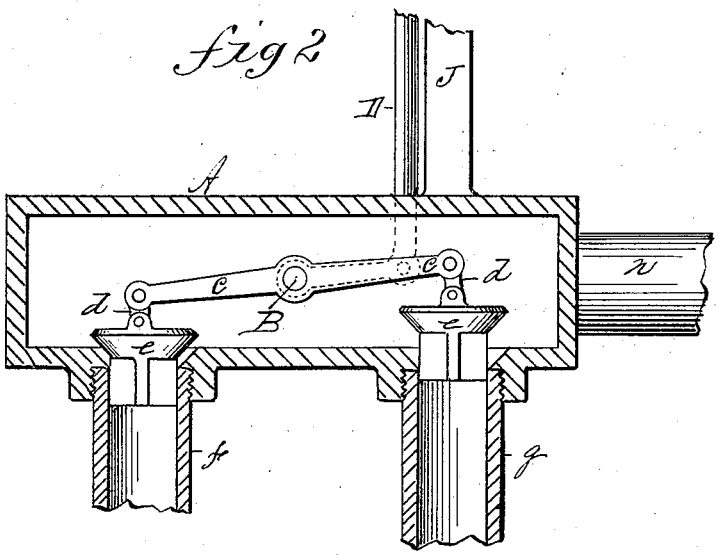
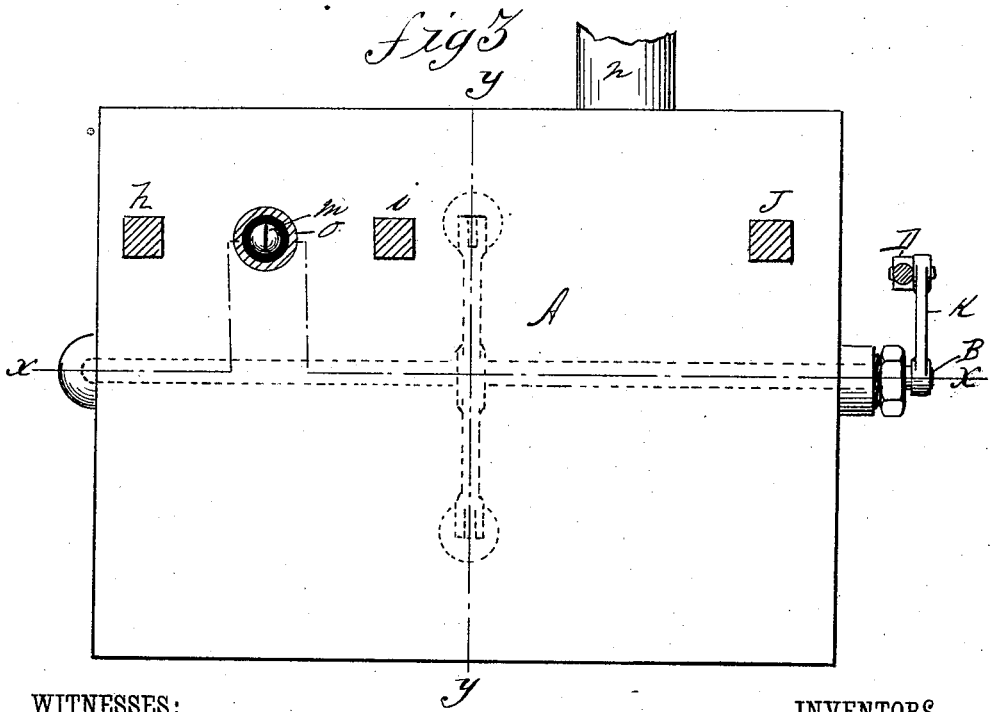


Fig 3



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UNITED STATES PATENT OFFICE.

CHARLES F. HOVEY AND DUANE T. PERKINS, OF SPRINGFIELD, MASS.

AUTOMATIC MIXING-GOVERNOR FOR HYDROCARBON-GAS MACHINES.

SPECIFICATION forming part of Letters Patent No. 304,199, dated August 26, 1884.

Application filed December 5, 1883. (No model.)

To all whom it may concern:

Be it known that we, CHARLES F. HOVEY and DUANE T. PERKINS, citizens of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have jointly invented new and useful Improvements in Automatic Mixing-Governors for Hydrocarbon-Gas Machines, of which the following is a specification.

This invention relates to improvements in apparatus to operate in connection with hydrocarbon-gas machines, for properly mixing gas and air to obtain an illuminating-gas of proper density, the object being to provide devices which govern the flow of gas and air from their respective sources into the main conduit from which the burners are supplied, which operate automatically, influenced by the quality of the combined gas and air which flows in said conduit, to increase or diminish the proportions thereof, according to the richness or lighting quality of the same.

In the drawings forming part of this specification, Figure 1 is a side elevation, partly in section, of a gas and air mixing or governing apparatus embodying our improvements. Fig. 2 is a section of the mixing-chamber on line *y y*, Fig. 3. Fig. 3 is a plan view, partly in section. The line *x x*, Fig. 3, shows the section-line of Fig. 1.

In devices heretofore employed it has been necessary to open more or less the gas or air supply pipes connected with hydrocarbon-gas machines, according to the appearance of the flame at the burners, which indicates that the gas is too rich or otherwise, or to depend upon the varying gravity of the mixed gas and air to act in raising or lowering the gas-holder, and through such movement of the latter to have valves operated to admit more or less air or gas. We have discovered, however, that a varying quality of gas develops more or less heat by combustion, the richer gas giving out more, and the operation of our devices is based upon such varying heat-developing qualities of the gas when passing to the burners or into the gas-holder.

In the drawings, A is a mixing box or chest, into which lead two induction-pipes, *f* and *g*—one for gas and one for air—flowing in the direction indicated by the arrows, forced by means well known in connection with the aforesaid gas-machines. A pipe, *n*, carries the mixed gas and air from the box A to a gas-holder or to the burners.

A gas-burner, *m*, is placed in the top of box A, and is arranged to maintain a flame by burning the mixed gas and air from within the latter.

A metallic tube, *o*, is secured on box A over the burner *m*, having suitable perforations *z* therein to admit air enough to support the said gas-flame. An opening capable of being closed may be made in the side of pipe *o* for lighting burner *m;* or the tube *o* may be removed for that purpose. The upper end of tube *o* is provided with a bearing-point, *t*, as shown. Three lever-posts, *h i* J, are set on the box A.

To the upper end of post *h* a lever, *v*, is hung, which rests on the bearing-point *t* on the end of tube *o*.

To the posts *i* and J a series of compound levers, *x x x*, is hung, and below the latter to post *i* is hung another lever, *v'*. Levers *v* and *v'* are connected through said series of levers *x* and the links *w w w w*, whereby any movement of the end of lever *v*, which is connected with the upper lever, *x*, is much multiplied at the outer end of lever *v'*.

A shaft, B, is hung in box A, as shown, one end extending through one end of the box, and having secured thereto an arm, K. Two arms, *c c*, are secured on shaft B within box A, to each of which is hung a valve, *e*, by the short connecting-link *d*. The end of the box through which shaft B passes is provided with an ordinary stuffing-box to prevent the escape of gas around the shaft. The end of the arm K on the end of shaft B is connected with lever *v'* by the rod D, the upper end of which is screwed, and has two nuts, *r r*, on it, whereby the rod may be adjusted up and down to turn shaft B slightly for the purpose of setting valves *e* to proper heights above the gas and air inlets *f* and *g* at the bottom of box A, whereby the proper standard quality or proportions of gas and air are admitted to the box.

It is obvious that the valve in box A in the end of the gas-passage may be dispensed with,

and the valve in the air-passage only be left to be operated by shaft B; but the proportionate supply of gas and air would not be so well governed as by the employment of the two valves *e e*.

The operation of our improvements is as follows: Air and gas are allowed to flow into the box A and out at pipe *n*. The burner *m* is then lighted and the quality of the gas is observed at some convenient burner. The tube *o* meanwhile has expanded by the heat of the burner-flame within it, and, forcing lever *v* upward, has, through the above-described compound-lever connections, rocked shaft B more or less and carried the valves *e* to certain positions over the induction-pipes *f* and *g*. If, now, the light is found satisfactory, the valves need no further adjustment; but if otherwise they are adjusted by turning nuts *r r* on rod D, as described. If the gas becomes less rich, the heat within tube *o* decreases and the latter contracts, causing shaft B to rock, and, lowering one of valves *e* and raising the other, reduce the opening of the air-passage and increase that of the gas-passage, and a too rich quality of gas will generate more heat in tube *o* and produce the opposite movement of valves *e*. Thus the flow of certain proportions of gas and air into box A is governed by the greater or less heat of said mixed elements, acting, while being burned, upon metal to expand it or to allow it to contract, and thereby operate governing-valves, as set forth.

What we claim as our invention is—

1. In a gas-and-air-mixing machine, a receiving-box, substantially as described, provided with suitable induction and eduction pipes, a governing valve or valves to vary the size of the induction-openings in said box, a gas-burner receiving and consuming gas from the latter, an expansible metallic element, substantially as described, located in proximity to the flame of said gas-burner, a series of levers, substantially as described, connected with the receiving-box, one of which rests upon said expansible metallic element, and means, substantially as described, for connecting said levers with the said governing valve or valves, whereby the expanding or contracting movement of said metallic element is imparted to said valves, combined and operating substantially as set forth.

2. A receiving-box provided with induction and eduction pipes, and a valve or valves for varying the openings of the eduction-pipes, substantially as described, a rock-shaft fitted in said box and connected with said valves, an expansible metallic tube secured on said box, having within it a gas-burner fed with gas from said box, and means, substantially as described, connecting said tube and rock-shaft, whereby the expanding and contracting movements of the tube are imparted to the rock-shaft, combined and operating substantially as set forth.

3. In combination, the box A, provided with the induction and eduction openings *f*, *g*, and *n*, the rock-shaft B, valves *e e*, a series of compound levers, substantially as described, connected with said rock-shaft by the arm K, the tube *o*, and the gas-burner *m*, substantially as set forth.

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Witnesses:
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