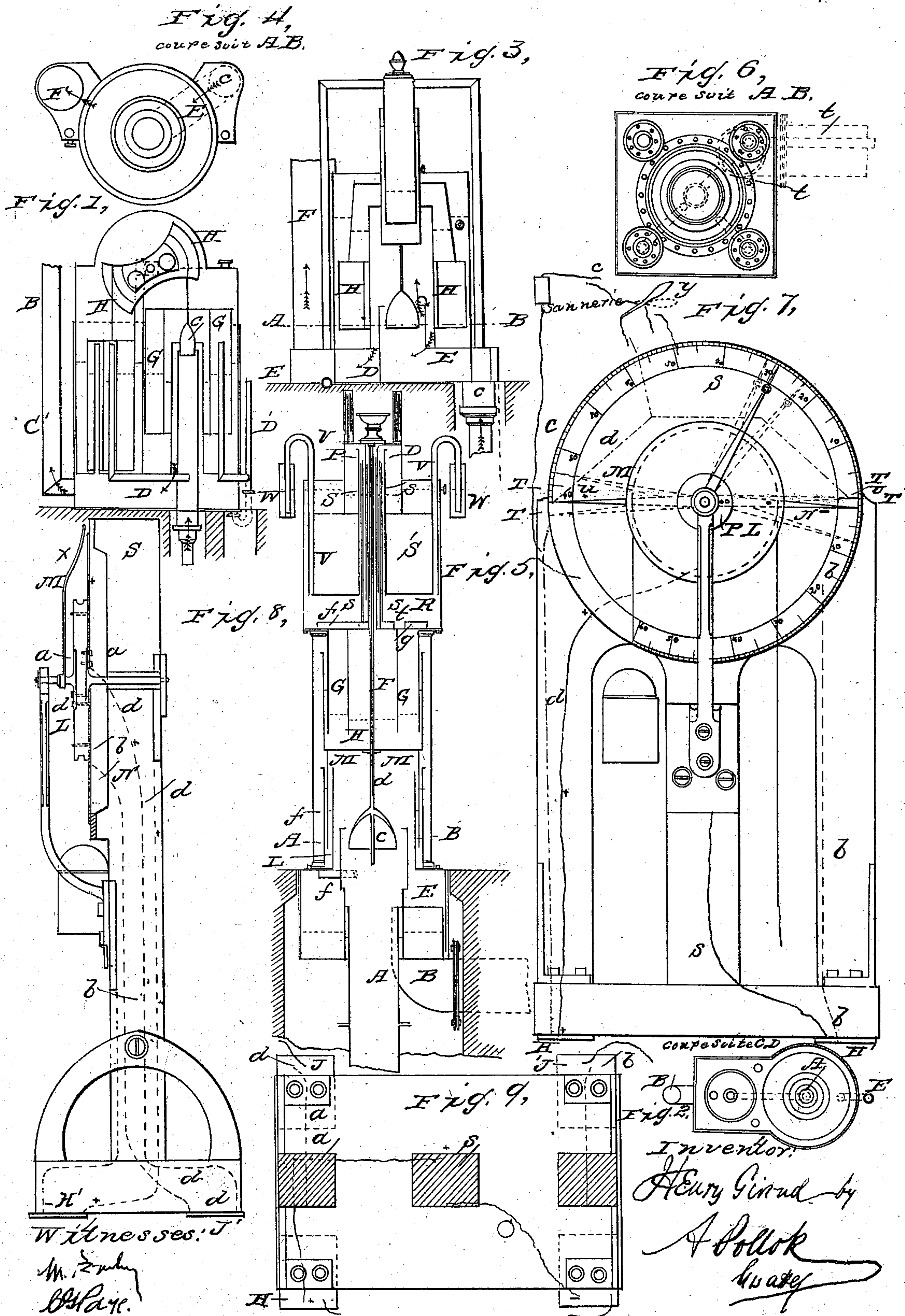


H. GIROUD.
Gas Regulator.

No. 83,706.

Patented Nov. 3, 1868.



United States Patent Office.

HENRY GIROUD, OF PARIS, FRANCE.

Letters Patent No. 83,706, dated November 3, 1868.

IMPROVEMENT IN GAS-REGULATORS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, HENRY GIROUD, of Paris, in the Empire of France, have invented a new and useful Method of and Apparatus for Regulating the Flow of Gas; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings.

The first object of this invention is a gas-regulator, in which the gas supplied to the burner, in excess of the quantity required for combustion, is the agent of its own regulation, the regulating-apparatus being thus acted on by what I call the gas of consumption.

This regulating-gas, that is to say, the gas which acts on the regulating-valve, is in a proper condition for so acting, if taken at a part of its passage at which its rate of flow is faster than the rate at which it is consumed, and it returns to the holder in a return-pipe, having no outlet save at the ends, from which pipe the gas does not escape, but remains, and acts therein on the regulating-valve, according to the variation of pressure, so that this return-gas regulates and signalizes the state of pressure.

The gas may act on the regulating outlet-valve, either directly or indirectly, that is, either with or without electric action; that is to say, the gas may act directly upon the valve, or it may work it by electric action directly, or by electric action indirectly. In the latter case, an electric current or wire may work electric apparatus, in which last case the return-pipe may be dispensed with.

When the regulating-gas is in what I above describe as the proper condition for acting at some hundred yards from the gas-holder, say, after the first few branches, the gas in the return-pipe may move the valve by apparatus hereinafter described.

Three cases might present themselves :

First, if the gas were in the above condition, at a few hundred yards from the gas-holder, or beyond the first few branches, the gas would act, through the return-pipe, on the valve directly or indirectly.

Secondly, if such conditions only occurred at such distance that the pressure would not act in the return-pipe sufficiently quick, then electricity, acting on wheel-work would be employed; and,

Thirdly, if, as is generally the case with private consumers, the gas, in passing from the holder to the regulating-apparatus, is at the same pressure as in its passage from such apparatus to the burners, such gas would act directly as a regulating-agent, the apparatus hereinafter described being employed, such apparatus differing from those hitherto used, in not being acted on by the gas as it flows to them through the meter, but by the gas of consumption, or that which passes from them in order to be consumed.

The accompanying drawings exemplify in what manner the invention may be carried into effect.

In the arrangements shown in Figures 1 and 2, the gas-pipe A leads to the burners, through an annular chamber, G, containing water, and opened and closed by a suspended conical plug, C. The gas flows, in the direction indicated by the arrows, under the false bottom D, and thence to the burner, through a pipe, B.

The gas which flows from A to B does not work the plungers or plunging-bells suspended from the pulley, but these are worked by the gas of consumption, that is, the gas flowing from the regulating-apparatus to the burners, and which flows, through the return-pipe E, into the chamber G, and as soon as the gas attains the pressure necessary for balancing the weight, bells, or plungers, from which the plug C is suspended, the plug remains stationary.

The pipe, H, of the pulley, corrects variations of weight arising from the difference of depths of immersion.

In figs. 1 and 2 (as also in Figures 3 and 4, afterwards described) the spaces occupied by the gas are colored yellow, and those occupied by the water are colored blue.

The level of water, shown in the drawing, indicates that the gas flowing to the burner has a less pressure than after its passage round the plug C.

When the pressures are equal, the pipe E may be dispensed with, and the gas, which works the apparatus, may flow through the pipe J, shown in dotted lines, or through an orifice, L.

Fig. 2 is a section on the line C×D× of fig. 1.

Figs. 3 and 4 show an arrangement of the valve, intended for cases in which the pipes are so arranged that the pressure shall not be greater after the gas passes the plug than at the end of the service or distributing-pipe, as is usual among private consumers. The valve here works like the one above described.

The gas enters at C, and flows, through the pipe E, to beneath the plug, raises the float H as it passes, and travels into the double bottom D, and thence to the burners, through a pipe, F.

The under part of the float, on which the gas acts, is of truncated-cone shape, so as to correct variations of weight arising from different depths of immersion. The generatrix of this conical figure should be determined by the thickness of material, the height of the apparatus, the pressure of gas in the pipes, and the absolute weight of the float when fitted in place, together with that of the water contained in the upper basin, which forms part of the weight of the float itself.

When these valves are used, the pressure will be the same at all the burners of any particular set of lights, and they will show that there is an escape of gas if, when the gas is turned off at the meter, the regulators still work. The faster they work, the greater such escape. The sectional area of the exit-pipe of these regulators may be nearly double that of the inlet-pipe.

Fig. 4 is a section on the line A× B× of fig. 3.

A counter-balance weight may be used instead of a float, H, in the last-described valve, the effect there produced by the cone being here produced by a compensating pipe, or by metal plates, suspended in such manner as to follow, and counterbalance, and thereby correct the motions of the float.

The vessel in which the plunger works may extend to the upper transverse side-pipe, and water is admitted through a hole, closed by a nut, gland, or ornament. A hole, closed by a screw-cap, is made in the side of the basin, through which the stud which regulates the water-level in the upper basin, may be opened and closed.

Figure 5 is a section, and Figure 6, plan of a modification, in which the gas flows from the holder through pipes A and B, and acts, through a pipe, *f*, on the dome or bell F, and rises up a pipe, *p*, to a point, P, whereby the counter-pressure is balanced or neutralized. The gas, flowing through the pipe B to the burners, equalizes the pressure, as it passes into the annular chamber G through the pipe *g*.

The pipe *t*, seen in plan, fig. 6, conveys gas from the pipe B to any desirable point, so that it thus becomes a return-pipe, and acts on the dome D, which it reaches through the conduit *s*.

The float S is balanced as shown in the drawing.

This valve may be used with or without a return-pipe for private consumers, and gas may be admitted through the pipe A, and allowed to escape through the pipe B, or *vice versa*.

In an arrangement in which electricity is used, the return-pipe leads under a float, held in a cylinder, and suspended by a silk cord from a wheel, carrying two needles, worked at the ends of a horizontal diameter by the float. As the pressure varies, the slightest alteration of equilibrium occasions a vertical motion of the float, and a consequent change in the position of the needles. The needles communicate with the wires of an electric battery, and as the wheel turns, the ends of the needles rub against a dial, composed of two metal semicircles, which are at each side of the diameter, and are insulated by two ivory contact-breakers.

When the pressure is *in equilibrio*, the needles are brought against the contact-breakers, but when the pressure varies, they send a current to the semicircles, which communicate electrically, by line-wire and earth-wire, with a train of wheels, which are moved by a weight, say about twenty pounds, and raise and de-

press a screw-rod, connected by an arm or cord with the spindle of the inlet-valve of the gas-holder.

When the gas is at the desired pressure, the needles rest, as before explained, on the contact-breakers, and while contact is thus broken, the wheel-work is held stationary by a stop; but, when the pressure is reduced, an electric current is formed, the stop is raised by electro-magnets, and the valve-spindle is put into gear with the wheel by other electro-magnets, and the valve gradually opens, so as to admit additional gas, till the pressure again rises to the required point, when the needles again drop on the contact-breakers, and contact is broken. Also, if the pressure should rise above a required point, a similar action ensues, except that the electric current is reversed, the needle, which was in contact with the lower semicircle in the former instance, is, in this instance, moved to the upper semicircle, the other needle performing a reverse action, whereby the driving-wheel is geared with the valve-spindle, and the valve gradually closed till the pressure becomes reduced to required point.

If, by some accident, the pressure should alter, the current will cease to flow to the wheel-work, and will be transmitted by the needles to bells or alarms, placed at various parts of the works, which continue to sound till the accident is remedied.

Thus the outlet-valve of the gas-holder is worked by the variation of pressure of the consumer's gas acting through a return-pipe, the valve being delicately adjusted, so as to be controlled thereby.

Having now described my invention, and the manner in which the same is or may be carried into effect,

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

1. The method, herein described, of regulating the flow of gas, by the employment, in combination with a regulator or regulating-apparatus and valves, of a return-pipe, in which the pressure of the gas supplied to the burner or burners, in excess of combustion, acts upon said regulator so as to control the flow of gas therefrom, in the manner shown and set forth.

2. The improved regulating or equilibrium-valves or regulators herein described, arranged and operating as shown and set forth.

In testimony whereof, I have signed my name to this specification, before two subscribing witnesses.

Witnesses:

E. BARRAULT,
C. A. MARK.

H. GIROUD.