H. GIROUD.

Gas-Regulators.

No. 157,281. Patented Dec. 1, 1874.

Fig. 4.

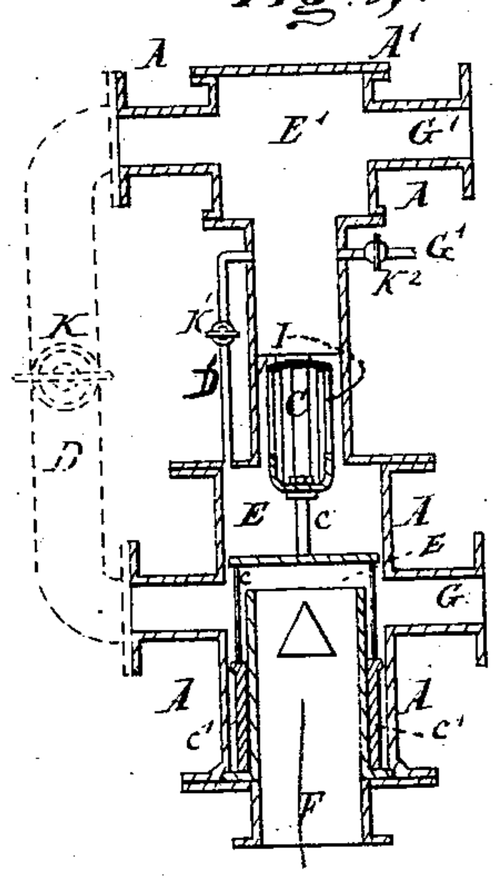


Fig. 2.

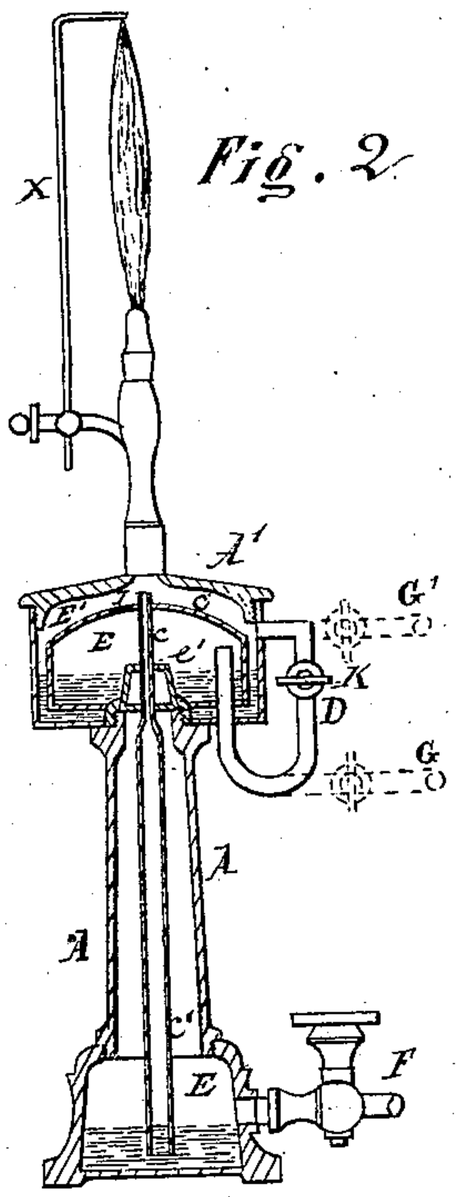


Fig. 3.

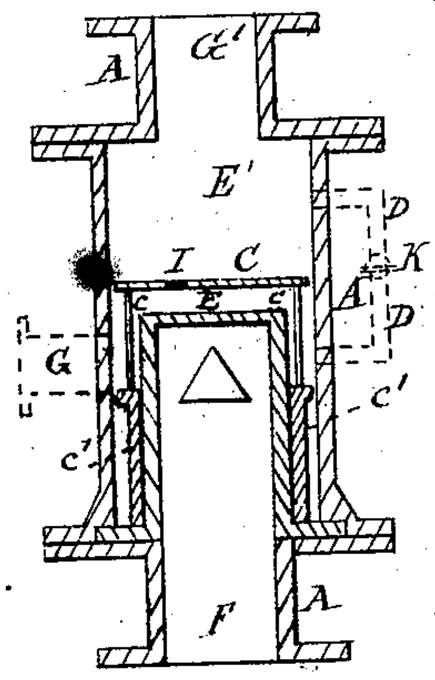
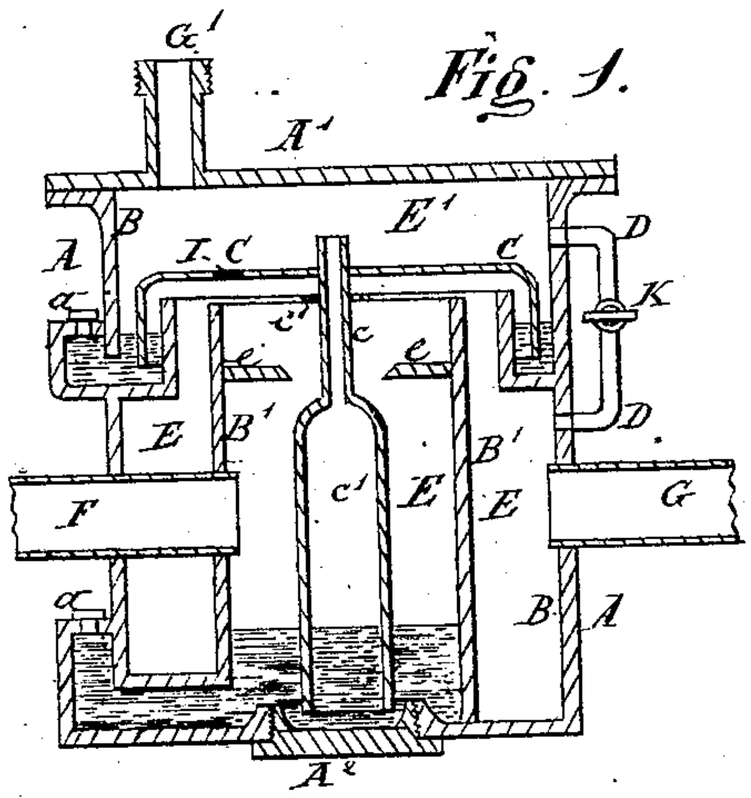


Fig. 1.



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HENRI GIROUD, OF SEYSSINET, FRANCE.

IMPROVEMENT IN GAS-REGULATORS.

Specification forming part of Letters Patent No. **157,281**, dated December 1, 1874; application filed November 20, 1871.

To all whom it may concern:

Be it known that I, HENRI GIROUD, of Seyssinet, Department of the Isère, in the Republic of France, have invented new and useful Improvements in Gas-Regulators, of which the following is a specification:

My invention has for its object to remedy certain defects heretofore found in regulators of this character, upon the working of which, so far as entirely satisfactory results are concerned, very little reliance could be placed; and consists in inclosing in a tight casing partially filled with water, mercury, or glycerine, (the latter preferred, on account of its non-evaporating and non-freezing qualities,) a movable body, such as a cap or bell or a cylinder, being connected with and operating a valve, and acting independently of the initial pressure, and, by dividing the casing into two compartments, by means of partitions and the above-mentioned movable body, connecting together said compartments by a joint-tube provided with a suitable stop-cock or regulating-cock.

Two results indispensable to the regulation of a fluid-current are obtained by my improved apparatus, either separately or together, viz: first, constancy in the volume supplied, notwithstanding difference of resistance at the final outlet; second, constancy of pressure, notwithstanding variation in the volume supplied.

I will limit this description to a regulator especially adapted to gas, pointing out only such modifications as the apparatus may undergo when employed for regulating a current of water or steam.

The weight of the movable parts has the cap C and tubes c c^1, being calculated upon a predetermined pressure to be exerted by such movable parts upon the current of gas.

In the accompanying drawings, Figure 1 is a vertical transverse section of regulator embodying my invention. Fig. 2 is a vertical transverse section of a modification of the same. Fig. 3 is a vertical transverse section through a water-regulator. Fig. 4 is a similar view of a steam-regulator.

The regulator, Fig. 1, is composed of the outer casing A, having a light cover, A^1, and divided, by means of annular partitions B B′, into two compartments or spaces, E E′, into which glycerine is introduced through the aperture a. C is the cap or bell, the lower portion of which is immersed in a bath of water, mercury, or glycerine in the chamber E′. To the center of this cap or bell is affixed a hollow tube, c, affixed to a conical or bell-shaped tube, c^1, the cone of which fits into a circular aperture formed in a ring, e, affixed to the annular partition of the chamber E, such cone acting as a valve. e' is the guide for the cone rod or tube. The conical tube extends down into the chamber E in a bath of glycerine. A^2 is an aperture in the lower portion of the casing A, by means of which easy access may be had to the movable parts. D is the junction-pipe between the chambers E E′. F is the inlet-pipe. G G′ are the pipes supplying the burners.

It is evident that pipe G′ supplies the constant volume for consumption under varying pressure, and pipe G a varying volume for consumption under constant pressure.

Assuming the conical valve to be open, gas being admitted through pipe F will fill the chamber E, and pass through the valve-opening in the ring e, and will have no effect on the bell or cap C and conical tube until all the conduits or pipes are filled, when the gas will exert its pressure at once upon the cap C, and uplift the same and close the valve. If, now, I open the cock K, and admit gas into the chamber E′, the pressure under the cap C will be diminished, the conduits supplied by the pipe G′ will be filled, when a counter-pressure from up downward will be exerted, and at the same time an equivalent or similar pressure from down upward, when the movable parts will be in equilibrium, having the valve more or less open, and the pressure exerted by the movable parts on the gas in the chamber E is that of the weight of such movable parts; which being constant or invariable, the pressure in the chamber E, therefore, will also be invariable. If, now, a burner supplied by pipe G is lighted, the pressure under the bell will decrease, and the cap with the conical tube will lower and admit sufficient gas to take the place of that consumed by the burner.

If three or more or all the burners of the district are lighted the pressure will decrease under the cap to the extent of gas consumed, and cause the bell or cap C to lower and open the valve, and admit an equivalent amount of gas to that consumed. The reverse will take place if one or more or all the burners are extinguished; and, from what has been said above, the weight of the movable parts being constant, the pressure of the outflowing gas must also be constant, notwithstanding the variations in the volume consumed; and this realizes the second result of my invention—constancy of pressure under varying volume supplied—and this pressure will remain constant so long as the outlet G′ remains the same.

Supposing that all the burners supplied by pipe G′ are lighted, the cock K having been set so as to deliver a certain volume of gas to supply a certain number of burners at a fixed rate of consumption, this rate cannot be exceeded, as it is evident that, since the weight of the movable parts is constant, hence exerting a constant and unvarying pressure, and the orifice at the cock K supplying the pipe G′ being also constant or unchanging, the volume supplied must necessarily be constant, notwithstanding the variations of the initial pressure, or the variations at the final outlet. It is therefore obvious that if the burners supplied by pipe G′ should be changed for burners of different diameters, it would be equivalent only to an enlargement or contraction of the final outlet, which would only affect the flame at such burners, enlarging or contracting the same, while the volume supplied would still remain constant, and hence I obtain the first result or condition of my invention—that is, constant volume under varying pressure.

In this regulator, whatever influence the initial pressure of the gas may have on the movable parts is here annulled or destroyed by the special provisions made for that purpose. The initial pressure being first exerted on the bath of glycerine in the chamber E, this pressure will displace the glycerine by causing it to rise inside of the conical tube c^1, without resistance affecting the movable parts.

When the apparatus is fully at work, the initial pressure still does not exert any influence on the movable parts, for the following reasons: first, because the pressure is exerted perpendicularly to the axis of the tube c^1; and, secondly, the pressure above the bell as well as below the bell being constant, the former acting downward through the tubes c c^1 and the latter upward on the bath of glycerine, it may be said that the exertions compensate each other, and the level of the bath of glycerine remains constant.

By means of the junction-pipe D and cock K, the regulator becomes a gaging or measuring apparatus, since any desired quantity of gas can be supplied above the cap or bell to the orifice G′ by means of said regulating-cock K.

By a slight modification (shown by Fig. 2) of the casing of the apparatus—that is, by reducing its dimensions and placing a burner directly on the pipe G′, and suppressing the pipe G, substituting therefor the lateral branches G G′ on the joint-tube D, taking the place of the pipes G G′—I obtain a rheometric apparatus which unites all the properties hereinafter mentioned, and which will be clearly understood by the following explanation:

The gas, being admitted at F will pass into E, and through I to the burner. It is evident that, the orifice I being constant, a constant volume flows through such orifice I to the burner; hence, if the flame of this burner is carefully measured by the index X, any changes, either above or below such index, are indications of changes in the illuminating power of the gas furnished; hence the apparatus serves to measure the absolute lighting power of gas, and, consequently, the superiority of one kind of coal over another may be determined, and facilitates the control of the working of the purifiers and other apparatus employed in the manufacture of illuminating-gas.

To apply the gas-regulator as a water-regulator, all that is required is to give the different parts the required strength, and by slightly modifying the movable parts, as shown by Fig. 3, in which F is the inlet-pipe, upon which slides almost loosely a cylinder, c^1. This cylinder is connected by rods c to the disk C, instead of a conical bell. G′ is the outlet-pipe. In this apparatus I use a cornish-valve, on which the variations of the initial pressure have no influence.

It is evident by the pipe G′ a constant volume is delivered under varying pressure, and by supplying the apparatus with pipe G, (as shown by dotted lines, Fig. 3,) so as to take the water from under the cylinder, a variable volume under constant pressure may be taken through the pipe G.

If I now apply the regulator to steam, the arrangement shown by Fig. 4 will generally be found the most suitable.

It is evident that in result it is always by the same decomposition or division of a current that the regulating action is obtained.

The piston C, fluted perpendicularly to its axis, replaces the bell C of Fig. 1, and the pipe D′ replaces the orifice I of the same figure; or the pipe D′ may be suppressed, and the flutes I of the pistons may be used only as rheometric apertures.

The two cocks K^1 and K^2 permit the variation either of the volume flowing out above the piston or the pressure of this volume, and thereby the desired result may be produced with exactitude.

The dotted junction-pipe D may be utilized,

and then the tap K and the pipes G and G′ supply steam together or separately under the conditions set forth in reference to Fig. 2.

The fitting of the cylinder or jacket c^2 on the inlet-pipe should be as nice as possible without interfering with its free movement.

I claim as my invention—

The combination of the casing A, cap or bell C, hollow tube *c*, and conical tube *c′*, with the pipe D and cock K, substantially as and for the purposes set forth.

HENRI GIROUD.

Witnesses:

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