(No Model.)

2 Sheets—Sheet 1.

W. EFFER.

Apparatus for Lighting and Extinguishing Gas Burners by Automatic Means.

No. 236,010. **Patented Dec. 28, 1880.**

Fig. 1.

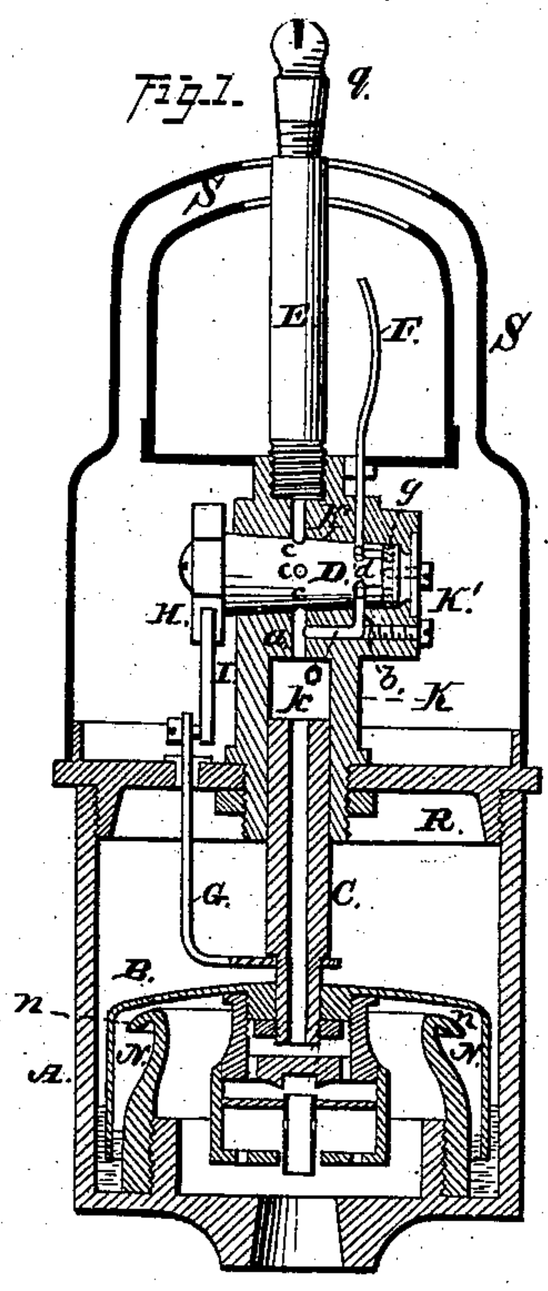


Fig. 2.

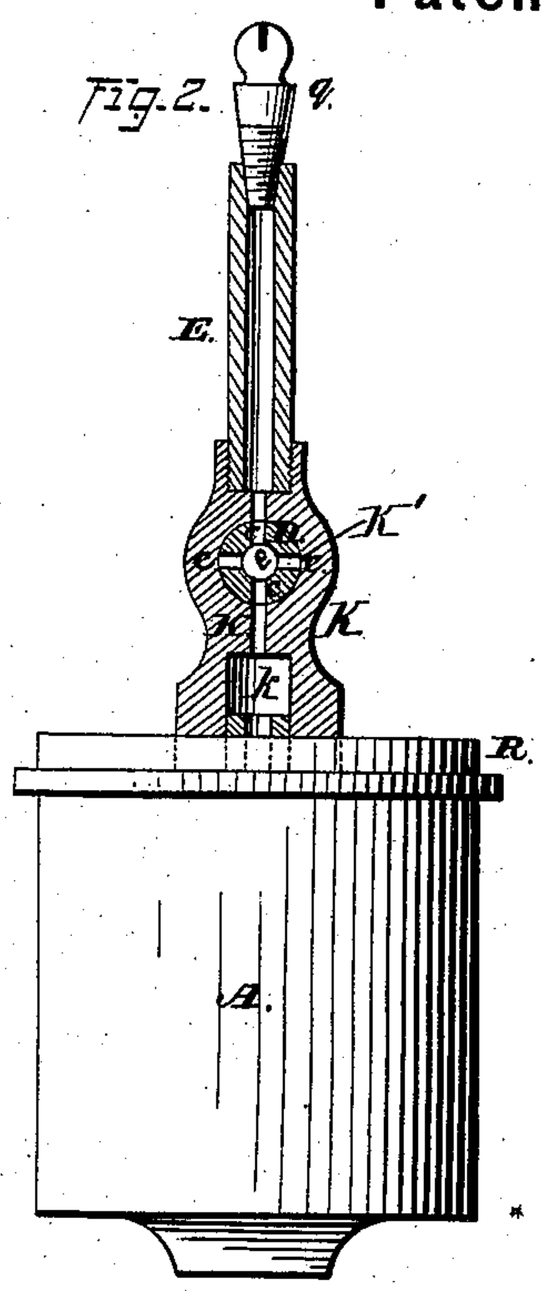


Fig. 3.

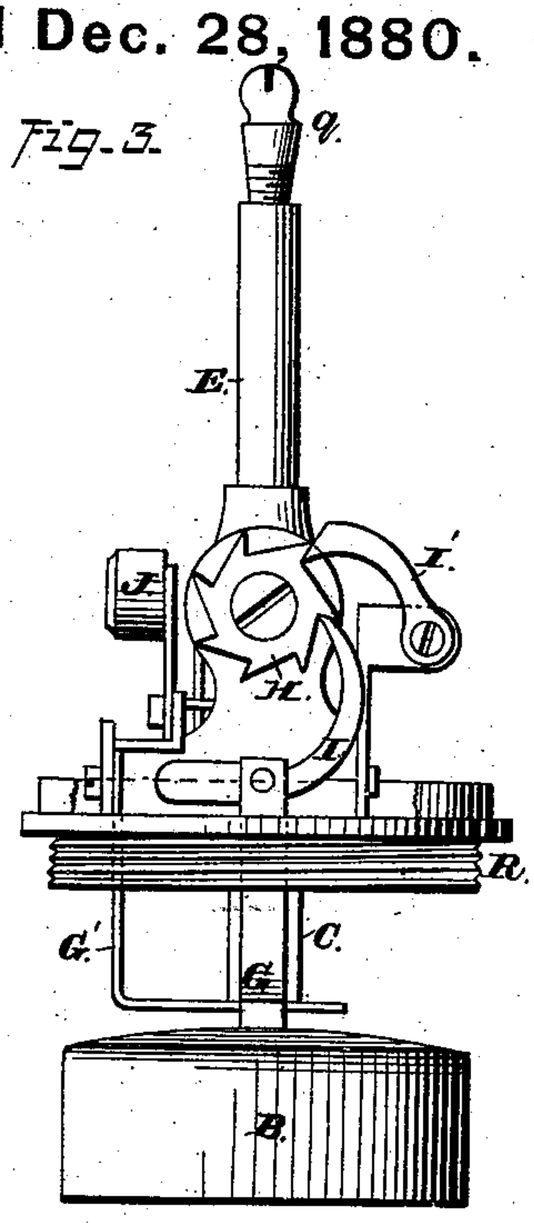


Fig. 4.

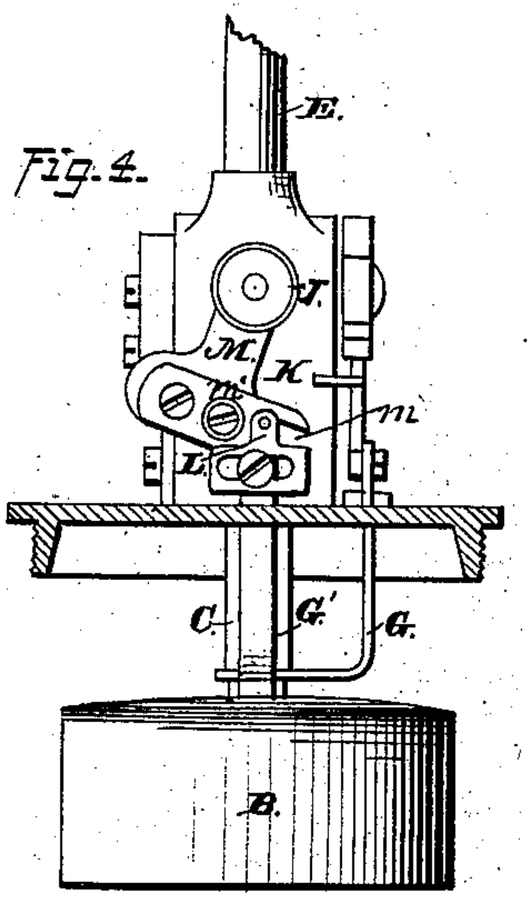


Fig. 5.

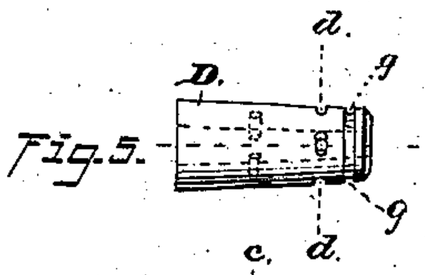


Fig. 6.

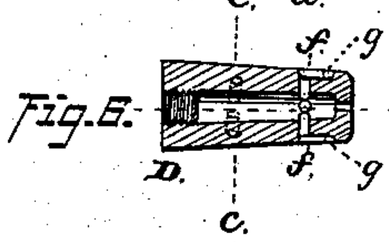
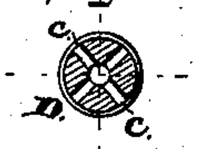


Fig. 7.

Fig. 8.



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(No Model.) W. EFFER. 2 Sheets—Sheet 2.

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Fig. 9.

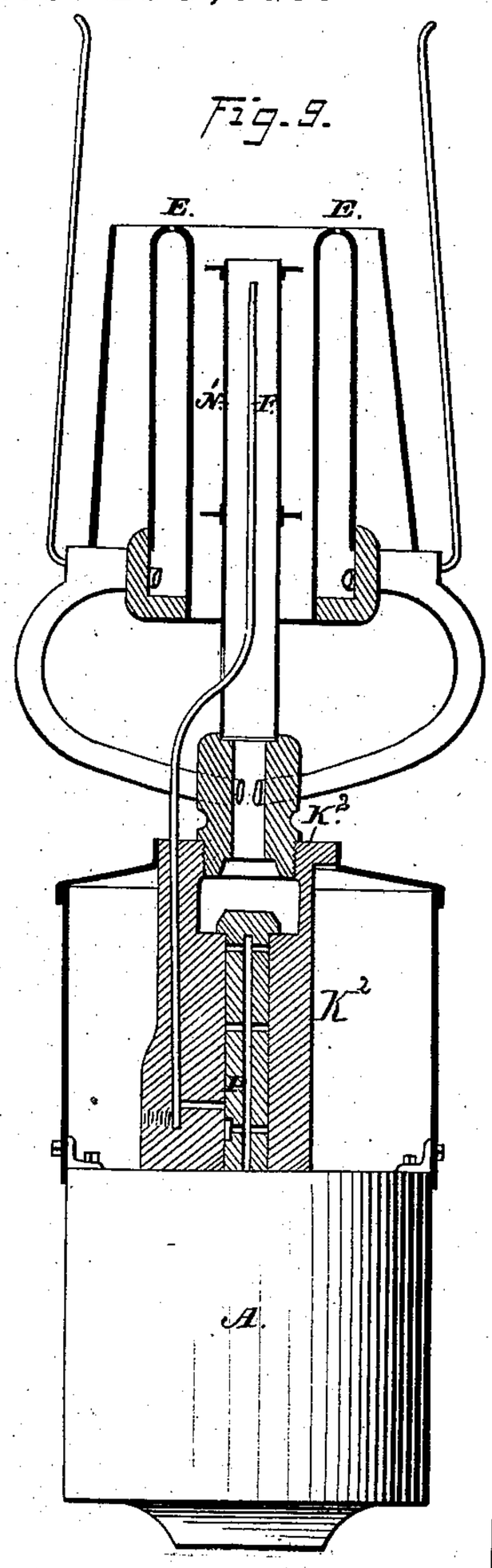

Fig. 10.

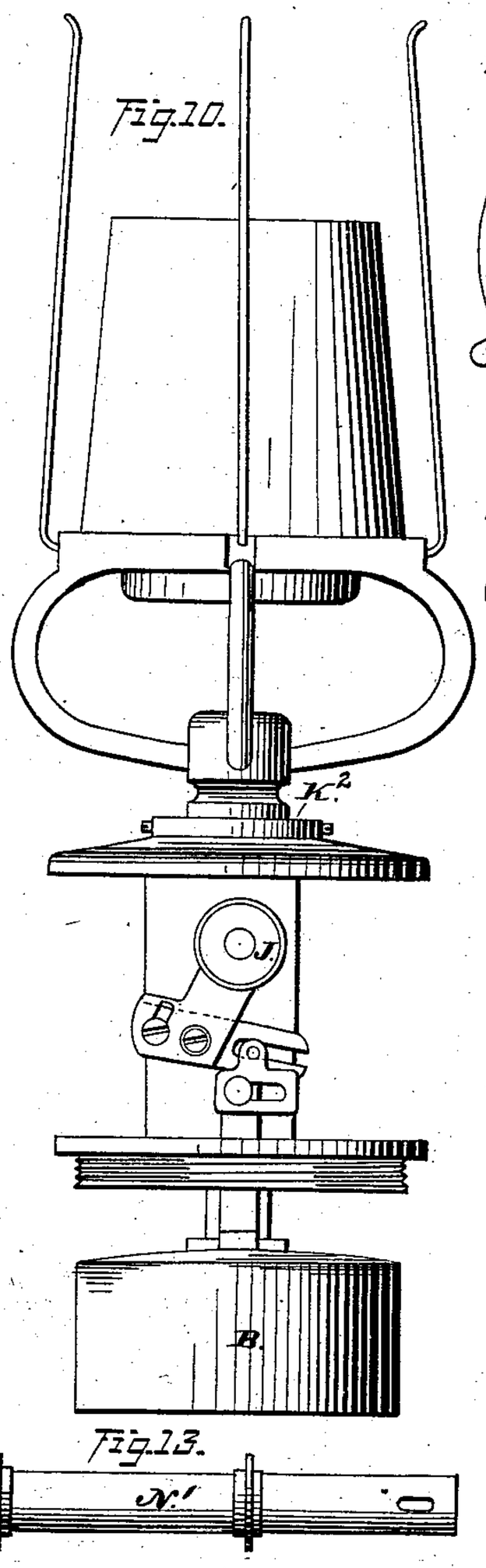

Fig. 12.

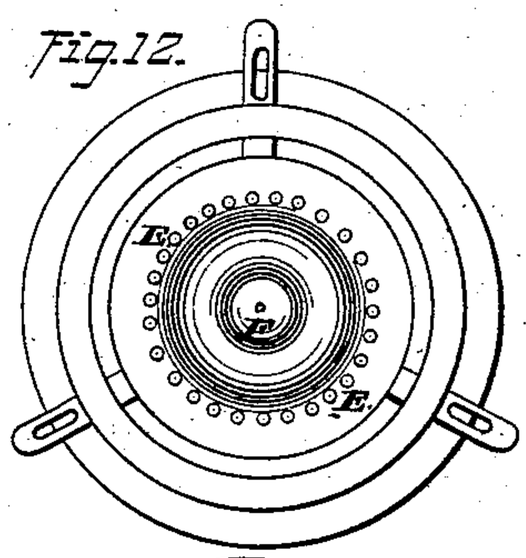

Fig. 11.

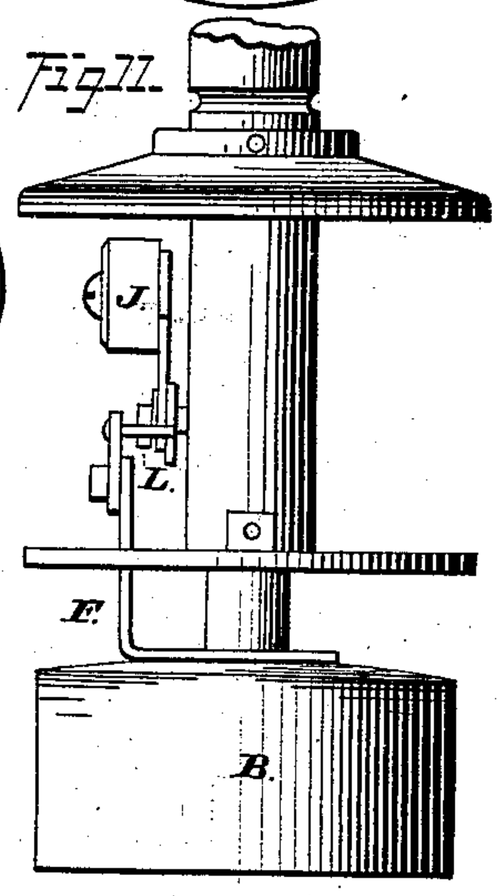

Fig. 13.

Fig. 14.

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UNITED STATES PATENT OFFICE.

WILHELM EFFER, OF BERLIN, GERMANY.

APPARATUS FOR LIGHTING AND EXTINGUISHING GAS-BURNERS BY AUTOMATIC MEANS.

SPECIFICATION forming part of Letters Patent No. 236,010, dated December 28, 1880.

Application filed August 26, 1880. (No model.) Patented in England May 10, 1880.

To all whom it may concern:

Be it known that I, WILHELM EFFER, of Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Apparatus for Lighting and Extinguishing Gas-Burners by Automatic Means, of which the following is a specification.

My invention has for its object to impart increased accuracy and efficiency to that description of apparatus for automatically lighting and extinguishing street and other gas-lamps in which the ignition and extinction are produced by the alternate increase and decrease in the pressure of the gas in the main; to prevent the diffusion or spilling of the mercury required for the floats that are acted upon by the pressure of the gas in such apparatus; to apply the automatic system of lighting and extinguishing gas to Argand burners, and, by protecting such burners against injurious external and internal agencies and increasing their illuminative power, adapt them for use in street-lamps.

In the accompanying drawings, Figure 1 is a longitudinal section of an automatic gas lighting and extinguishing apparatus fitted with my improved tap and mechanisms for actuating the same, and with my device for preventing the spilling of the mercury. Fig. 2 is an elevation, partly in section, of the same apparatus, showing the communication between the main burner and the main orifices in the tap. Figs. 3 and 4 are a side and a front elevation of the actuating-gear of the same tap, in connection with the float that is acted upon by the pressure of the gas in the main. Figs. 5 and 6 are a longitudinal elevation and section of the tap, and Figs. 7 and 8 are cross-sections through the main and auxiliary orifices of the same, respectively. Fig. 9 is a sectional elevation of an Argand burner with the auxiliary burner and the necessary appliances fitted thereto. Fig. 10 is a side elevation of the same, and Fig. 11 a front elevation of part of the apparatus connecting the float with the working-gear. Fig. 12 is a plan of the upper part of the same. Figs. 13 and 14 are an elevation and plan of the tube that encircles the auxiliary-burner tube, Fig. 9.

In all these views the same letters of reference denote identical or equivalent parts or organs.

In Figs. 1 to 4, A is the casing, that contains the usual kind of float, B, dipped in mercury and acted upon by the pressure of the gas in the main through the intervention of a regulator, in the manner heretofore in use. The socket-piece K is fixed upon the lid R of the casing A, and within the socket K slides the tube C, which moves up and down with the float B, to which it is fixed. Within the horizontal socket K′ is fitted the tap D. In the socket-piece K there are the two orifices *a b*, communicating with the main and auxiliary burners E F, respectively, and also with one another, by the aid of the canal *o*. The tap D has four main orifices, *c c*, at right angles to one another and in a line with the axis of the main burner E, and four auxiliary orifices, *d d*, also at right angles to each other and in a line with the axis of the auxiliary-burner tube F, the main and auxiliary orifices *c d* being placed at an angle of forty-five degrees to one another, as shown in Figs. 7, 8, so that whenever the tap D performs one-eighth of a revolution the gas is admitted to the main burner and cut off from the auxiliary burner, or vice versa. The orifices *d d* are enlarged near the surface of the tap, and by means of the small canals *f f*, Fig. 6, they communicate with the circular groove *g g*. The tap itself being hollow, the gas required for the auxiliary burner forms a continuous supply within this hollow, as well as in the canals *f f* and the groove *g*. These canals and the groove simply serve to augment the supply of gas, which may support the flame of the auxiliary burner momentarily after the openings *d* are closed and when a full head of gas reaches the main burner.

The angular rod G, Figs. 1, 3, 4, is fitted to the top of the float B. It passes through the lid R of the casing A, and in its upward motion works upon the teeth of the ratchet-wheel H through the pawl I. This ratchet-wheel, which is fixed at the end of the tap D, has a number of teeth that must be divisible by the number of orifices in the tap—that is to say, in this instance, by eight—and it is so placed with reference to the pawl I that at every upward motion of the rod G the ratchet, and along with it the tap, performs one-eighth of a revolution, or, in other words, revolves by an angle of forty-five degrees. At the same time the counter-pawl I′ so bears upon an upper divis-

ion of the ratchet-wheel H as to prevent it from turning in the opposite direction. A second rod, G′, also passes through a stuffing-box in the lid R, and to the top of this rod is an adjustable slide, L, from which a pin projects inwardly into a slot, *m*, made in a cranked lever, M, bearing a counter-weight, J. The lever M is pivoted to the socket-piece by means of a pivot-screw, *m′*.

The object of the weight J, arm M, and its adjustable connection with the float through arm G′ is to adjust the resistance to the movement of the float in accordance with the pressure of the gas, so that said float will properly respond to increase and decrease of pressure. As the slide L is adjusted toward or from the pivot *m′* the leverage against the weight J is decreased or increased. In practice the connection is so adjusted that the ordinary pressure of gas will not raise the float, but that it will be raised by a predetermined increase of such pressure. The float itself may be weighted in any convenient manner to cause it to properly co-operate with the other devices.

The working of the apparatus, as shown in Figs. 1 to 8, is as follows: While the axis of two of the main orifices *c* of the tap D is exactly in a line with the axis of the main burner E, this burner is fully lighted, and the auxiliary burner F, being in no communication whatever with the gas-supply, is entirely extinct. The moment an eighth of a revolution is imparted to the tap D the gas-supply is gradually cut off from the main burner, and while this is being done the entire quantity of gas stored up in the hollow of the tap *e* in the groove *g* and in the canals *f f* forces its way at once into the auxiliary burner F and is ignited by the main flame. So long as any communication continues between the main orifice *a* and the main burner the auxiliary flame is fed to an excess, and consequently continues to reach up to the main burner E; but the very moment when, the eighth of a revolution being completed, the gas is entirely cut off from the main burner, only the small low-pressure supply of gas can reach the auxiliary burner F through the orifice *b* and the auxiliary orifices *d d*, and consequently the auxiliary flame is reduced to a minimum. So soon as a further eighth of a revolution is imparted to the tap D by the renewed increase of pressure of the gas in the main, a larger quantity of gas is again admitted to the small burner, being the sum of the quantities that pass through the orifice *a* into the hollow *e* of the cone into the auxiliary orifices *d d*, the canals *f f*, and the groove *g*. Consequently the auxiliary flame shoots up again, and in doing so ignites the main flame, and by the time the eighth of a revolution is completed the gas only continues to enter the main burner and is cut off from the auxiliary orifices.

Instead of keeping some lamps lighted and extinguishing others for the sake of economy, as this is generally practiced at present during certain times of the night or during moonlight, the use of the apparatus illustrated in Figs. 1 to 8 admits of the same end being achieved without extinguishing a single flame, by merely reducing the pressure of the gas in the main, and thereby diminishing the quantity of gas supplied to each lamp. By this means the whole district remains uniformly lighted, and only the intensity of the light is less than at full pressure, whereas upon the ordinary plan entire thoroughfares are plunged in darkness. In order to extinguish the flames it becomes necessary to give out high pressure again. By so doing a partial revolution is imparted to the tap, the main flame is put out, and prior to that the auxiliary burner ignited, in the manner hereinbefore described.

The double hood S S consists of metal so perforated that the holes in the outside hood are not on the same level as those in the internal one, and by this means the apparatus is guarded from dust and protected against the effects of the wind and against other meteorological influences.

Inside the casing A, and surrounding the central opening in its bottom, is arranged an annular wall, N, having an outwardly and downwardly projecting flange, *n*, at its top; and this improvement has for its effect to prevent the spilling and diffusion of the mercury and consequent derangements so frequent in the present construction of automatic gas-lighting apparatus.

Another feature of the improved apparatus consists in that the auxiliary tube is so fitted that the auxiliary flame is perpendicular upon instead of being parallel to the incision *q* of the main burner. By this means an instantaneous ignition of the main flame is secured when required, whereas in the arrangements hitherto in use the same effect has not always been produced.

In the arrangement shown in Figs. 9 to 12 the auxiliary-burner tube F is placed inside the Argand burner E, and so connected with the vertical passage in the socket-piece K^2, that forms the superstructure of the float or diaphragm-casing A, that the alternate lighting and extinguishing of the main burner E and the auxiliary burner F is produced, in the same way as in the apparatus illustrated in Figs. 1 to 8, by the working of the sliding tube P, or any other of the existing appliances designed for alternately admitting the gas to the main burner and cutting it off from the auxiliary, or vice versa. To protect the auxiliary flame from meteorological influences, while yet leaving room enough for purveying the necessary oxygen to both flames, the tube N′ (shown separately in elevation and plan in Figs. 13 and 14) is placed around the auxiliary-burner tube F.

I lay no claim to the form of gas-cock in Fig. 9, it not being my invention, and merely shown to illustrate the application of my invention to an Argand burner.

Having now described my invention, I wish it to be understood that what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the main burner E, auxiliary burner F, and socket-piece K, of the plug D, having the orifices *c* and *d* at forty-five degrees to each other, the float B, arranged in the mercury in the casing A, and intermediate devices for transmitting rotary motion in one direction only from said float as it rises to said plug, whereby the rising of the float by a temporary increase of pressure of the gas is caused to close the plug-orifice leading to one burner while opening that leading to the other, and the falling of said float will not affect the relative position of the plug or passage of gas.

2. The combination, with the main and auxiliary burners and the plug D, of the ratchet H, fixed to the plug, pawl I, float B, and arm G, connected with said float and carrying said pawl, substantially as described.

3. The tube N′, in combination with the auxiliary burner F, placed inside the Argand burner, substantially as and for the purpose set forth.

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