A. N. ALLEN.

Automatic Gas-Lighting.

No. 203,693. Patented May 14, 1878.

Fig. 1.

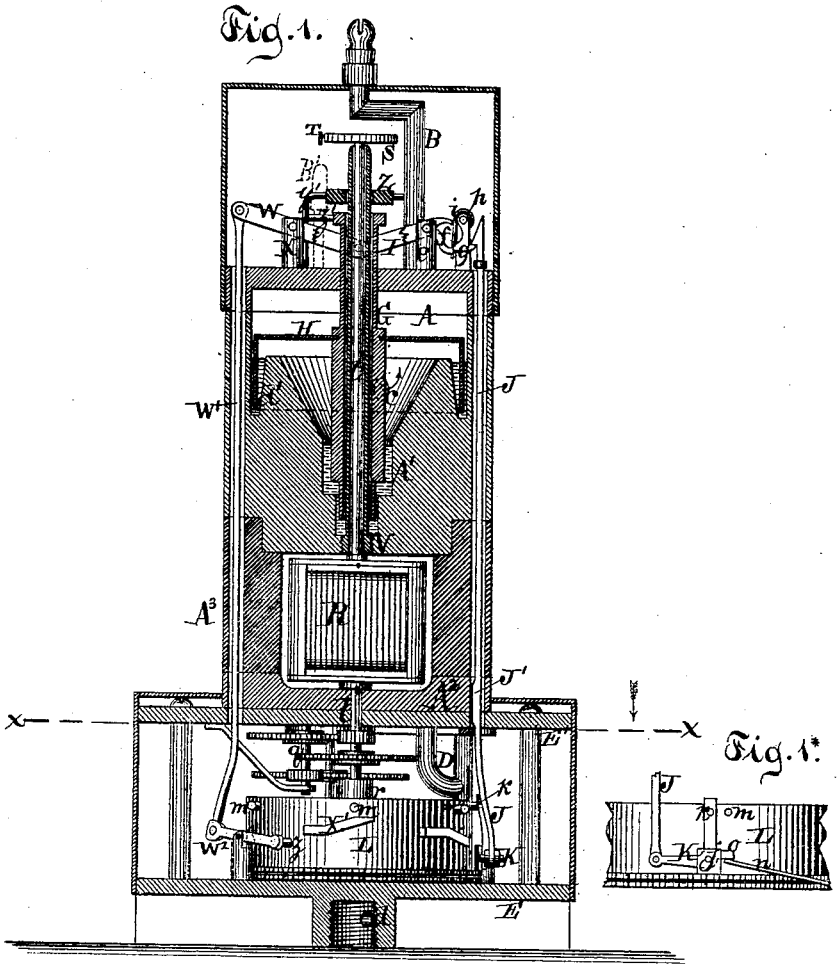
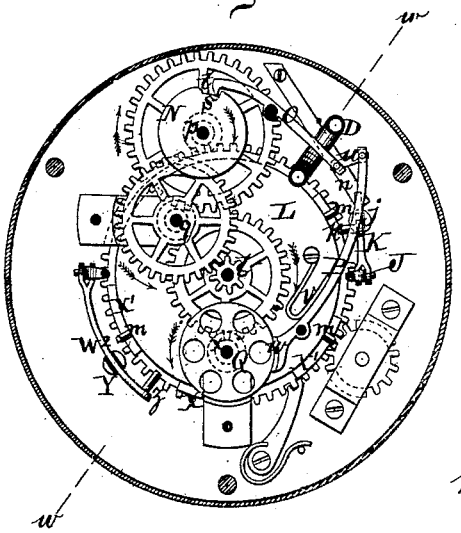


Fig. 1*.

Fig. 2.



Witnesses.
Chas. Wahlers.
J. N. Wahlers

Inventor:
Almon N. Allen
per
Van Santvoord & Hauff
Attys

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Fig. 3.

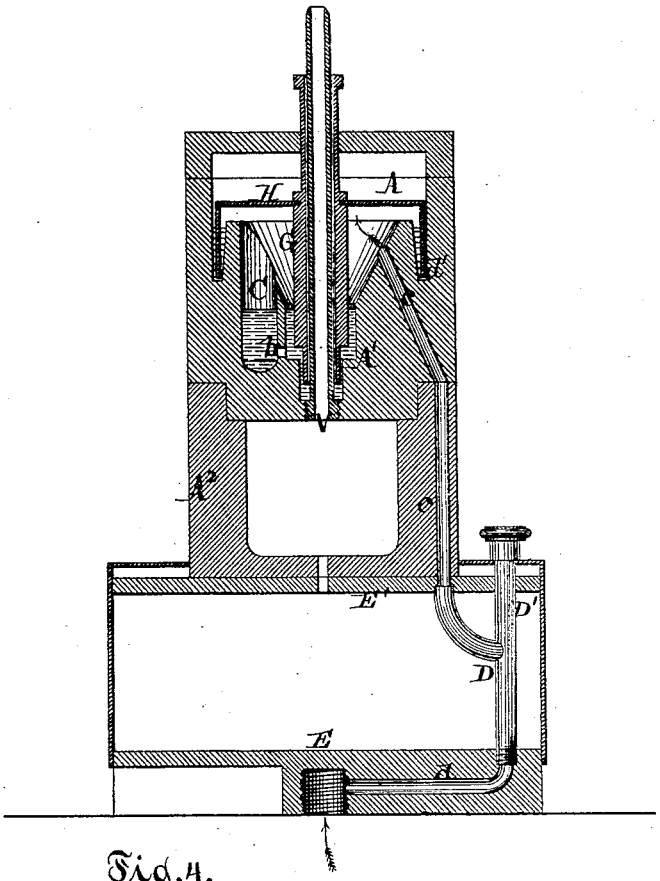

Fig. 4.

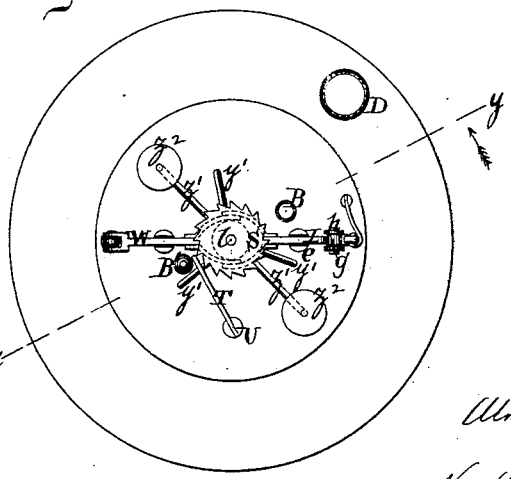

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Fig. 5.

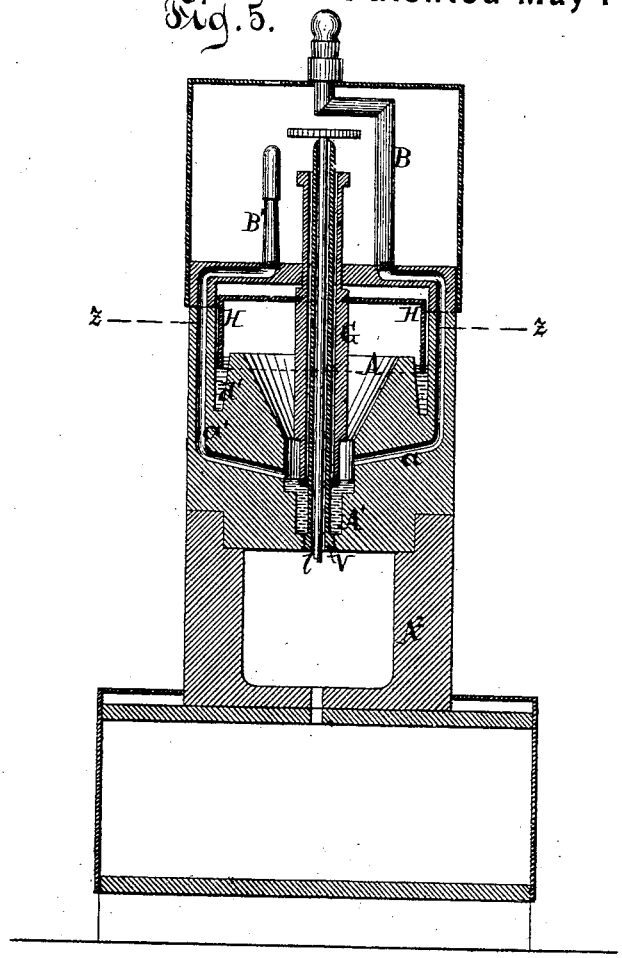
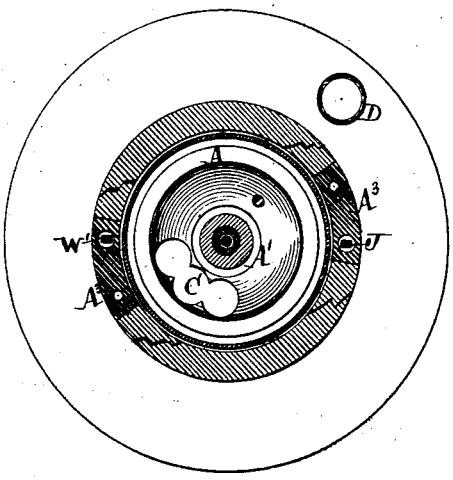


Fig. 6.



Witnesses.
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Almon N. Allen
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UNITED STATES PATENT OFFICE.

ALMON N. ALLEN, OF PITTSFIELD, MASSACHUSETTS.

IMPROVEMENT IN AUTOMATIC GAS-LIGHTING.

Specification forming part of Letters Patent No. **203,693**, dated May 14, 1878; application filed March 13, 1878.

To all whom it may concern:

Be it known that I, ALMON N. ALLEN, of Pittsfield, in the county of Berkshire, in the State of Massachusetts, have invented a new and useful Improvement in Automatic Gas-Lighters, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a vertical central section of my apparatus when the gas is shut off from the burners. Fig. 2 is a horizontal section thereof in the plane of the line *x x*, Fig. 1. Fig. 3 is a vertical central section of the same when the gas is shut off in the plane of the line *w w*, Fig. 2. Fig. 4 is a plan or top view thereof. Fig. 5 is a vertical central section of the same in the plane *y y*, Fig. 4. Fig. 6 is a horizontal section thereof in the plane of the line *z z*, Fig. 5, showing the position of the parts when the gas is let on.

Similar letters indicate corresponding parts.

My improvement relates to that class of gas-lighters for which Letters Patent of the United States were granted to me February 6, 1872, No. 123,439, to which reference is made; and it consists in a chamber containing a liquid seal and connecting at a suitable point with a gas-supply pipe, and at the point of said seal with a main and a supplemental burner, which are arranged adjacent to each other, in combination with a liquid-displacing bulb or plunger carrying a valve, which is situated in said chamber, and extending up through the top of the latter, where it is connected to a forked lever adapted to engage with a swinging catch, which, in turn, is adapted to engage with the upper end of a rod connecting at its lower end with a clock-movement, which gears with an arbor carrying a magneto-electric machine, which is situated beneath the gas or valve chamber, the said rod also connecting with a brake adapted to arrest the clock-movement, and the arbor, moreover, extending up through the liquid-displacing bulb or plunger, while it carries a commutator at its upper end, which is in contact with a spring situated over the said supplemental burner, so that, when gas is admitted to the gas or valve chamber, the valve, and with it the liquid-displacing bulb or plunger, is raised, and the gas flows to the burners, while at the same time the forked lever is tilted and the swinging catch is freed, while the connecting-rod is released from the latter and the clock-movement is released from the brake, the magneto-electric machine being thus set in motion, which has the effect of producing a spark between the commutator and spring, by which the gas issuing from the supplemental burner is lighted, whence the main burner derives its ignition; and if the connecting-rod is made to re-engage with the swinging catch, the brake is brought into action and the clock-movement is stopped.

The connecting-rod is pivoted at its lower end to a bell-crank lever, which is arranged adjacent to the spring-barrel of the clock-movement, which barrel is provided with trip-pins, the bell-crank lever being subjected to the action of a spring having a tendency to draw the connecting-rod downward and throw the bell-crank lever into the path of said trip-pins; and when the connecting-rod is released from the aforesaid swinging catch the bell-crank lever is allowed to follow the action of said spring, so that the trip-pins come in contact therewith and tilt the same, and by this means the connecting-rod is automatically moved upward and made to engage with its catch after the clock-movement has run a certain length of time.

The brake by which the clock-movement is arrested is composed of two wheels, each gearing with the clock-movement, and one of which forms a friction-wheel, while the other has a notch in the periphery thereof, and also of two levers, which are united at one end by a link, while at the opposite end one has a brake-shoe adapted to bear on said friction-wheel, while the other has a toe or detent adapted to catch in the notch of the notched wheel, one of said levers, moreover, being subjected to the action of a spring having a tendency to throw both levers into action, and being arranged in contact with the aforesaid connecting-rod, which latter has an enlargement immediately next to the point of such contact, so that when the connecting-rod is released the levers are moved by the action of said enlargement on the connecting-rod in such a way that the lever having the brake-shoe clears the friction-wheel, and thus the clock-movement is released, while, when the connecting-rod is moved upward, the levers follow the action of said spring, and thereby the lever having the toe or detent is made to engage with the notch in the notched

wheel, while the brake-lever is again brought to bear on the friction-wheel, so as to arrest the same, together with the clock-movement.

To the liquid-displacing bulb or plunger is pivoted one end of an auxiliary lever, the other end of which is connected to the upper end of an auxiliary rod, which, at the lower end, is connected to a trip-lever adapted to engage with cams arranged on the side of the spring-barrel of the clock-movement, so that, if from any cause the said bulb or plunger stops at any intermediate point between its extreme upper and lower positions, it is caused to complete its movement, so as to bring the same in either of the said positions, by the action of the cams through said trip-lever, the auxiliary rod, and auxiliary lever, the bulb or plunger being thus immersed in the liquid seal or raised, as the case may be, to the required extent, and the forked lever being brought in contact with the swinging catch, so as to insure the automatic engagement of the connecting-arm therewith.

To the upper part of the liquid-displacing bulb or plunger are secured arms, which are each adapted to receive one or more weights, so that if, when said bulb or plunger is in its lower position, the minimum pressure of the gas in the gas or valve chamber is so great as to lift the bulb or plunger, the effect of such pressure can be overcome by placing weights on the said arms. With the bulb or plunger and the said weighted arms is combined a supplemental weight, which has legs, by which it is supported and held above the plunger when the latter is in its lower position, so that this supplemental weight is brought into play only when the weights placed on the weight-arms are insufficient to overcome the minimum pressure of the gas.

In the drawing, the letter A designates the gas or valve chamber of my apparatus, having a cylindrical shape, and in the lower part of this chamber is a contracted compartment or space, A^1, containing mercury or other suitable liquid to form a liquid seal, the same serving to seal the orifices of two channels, *a* *a'*, leading, respectively, to the main burner B and supplemental burner B', as clearly shown in Fig. 5. The seal-compartment A^1 communicates, by an aperture, *b*, with a lateral compartment, C, (see Figs. 3 and 6,) containing the liquid, which runs into the said space A^1 when the liquid-displacing bulb or plunger is withdrawn therefrom, so as to cover the orifice of the channel *a'* leading to the supplemental burner, as will be better understood by reference to my patent above named.

The letter D designates a gas-supply pipe, which is connected to the chamber A through a channel, *c*, (see Fig. 3,) formed in the side of said chamber and in the side of an electro-magnetic machine, hereinafter referred to. Said supply-pipe D is situated between two plates, E E', and it is fed through a channel, *d*, formed in the lower or base plate E, (see Fig. 3,) while it is provided with a branch, D', for the introduction of alcohol or other liquid, so that it can be cleansed when desirable.

The upper plate E' serves to support the magnets A^2 of said electro-magnetic machine, and these magnets support the chamber A.

For the purpose of displacing the liquid seal in the chamber A, I prefer to use a plunger, G, and in lieu of a diaphragm I make use of a valve, H, which is secured to said plunger, and is situated in the upper part of the chamber A, the plunger, moreover, being made to extend through the top of the chamber. Said valve H has the shape of an inverted cup, and its rests in a circular groove, *d'*, formed in the chamber A, this groove also containing a liquid seal.

I, Fig. 1, designates a lever, having its fulcrum in a post, *e*, and which is connected at one end to that portion of the plunger G which is exterior of the chamber A, the other end of said lever having the form of a fork, *f*. Adjacent to said forked end of the lever I is situated a swinging catch, *g*, which has the form of a hook, and is hung in a bracket, *h*. This catch *g* is also subjected to the action of a spring, *i*, which has a tendency to force the same in the direction of a rod, J, next described.

The letter J designates a rod extending through the sides of the chambers A and through the magnets A^2, and the upper end of which is situated adjacent to the swinging catch *g*, said upper end of the rod being hook-shaped, so that it is adapted to engage with said catch.

K, Sheet 1, designates a bell-crank lever, to one arm of which the lower end of the rod J is connected, said lever having its fulcrum in a post, *j*, rising from the base-plate E, while to its other arm is secured a pin, *k*. Said bell-crank lever K is placed adjacent to a revolving barrel, L, containing a clock-spring, and which forms part of a clock-movement, the primary object of which is to give motion to an arbor, *l*, as will be presently described, said barrel and its concomitant parts being situated between the plates E and E'.

From the side of the spring-barrel L project a series of pins, *m*, which are placed at equal distances apart, and at such a part of the barrel that they strike against the pin *k* of the bell-crank lever K, and thereby displace the latter, when the spring-barrel revolves, and said pin *k* of the bell-crank lever is brought into their path. In order to throw the bell-crank lever K or its pin *k* into the path of the trip-pins *m* of the spring-barrel, said lever is subjected to the action of a spring, *n*, bearing upon a lug, *o*, which is formed on the lever, as clearly shown in Fig. 1*, and this spring *n* also has the effect of drawing the rod J downward when it is released from the swinging catch *g*.

The spring-barrel L gears with an arbor, *p*, which, through an intermediate arbor, *q*, gears with the main arbor *l*, above mentioned, said main arbor *l* being stepped in a block, *r*, secured to the top of the spring-barrel, and the

barrel, as well as the several arbors, having suitable cog-wheels mounted thereon.

On the arbor *p* is mounted a wheel, N, (see Fig. 2,) in the periphery of which is formed a notch, *s;* and O designates a lever, one end of which is provided with a toe or detent, *t*, which bears on the periphery of said wheel, the other end of said lever being connected to a lever, P, by means of a link, *u*. Said lever P is subjected to the action of a spring, *v*, and carries a shoe, *w*, which is arranged adjacent to the periphery of a friction-wheel, Q, mounted on an arbor, *x*, which gears with the main arbor *l*. The wheels N and Q and the levers O and P are arranged directly under the plate E′; and at or near the point where the rod J emerges from said plate the lever P is held in contact therewith, as seen in Fig. 1, by the action of the spring *v*. Immediately above that portion of the rod J which is in contact with the lever P when the parts last described are in their normal positions is formed an enlargement, J′. When said parts are in their normal positions, as shown in Fig. 1, the lever P follows the action of the spring *v*, and if the notch *s* of the wheel N is opposite the toe or detent of the lever O, so as to permit said toe or detent to drop into said notch, the shoe *w* of the lever P is brought to bear on the periphery of the friction-wheel Q, and by this means the motion of the several parts of the clock-movement is arrested. When, however, the rod J is moved downward, its enlargement J′ pushes the lever P back against the action of the spring *v*, and thereby the brake-shoe *w* is brought out of contact with the friction-wheel Q, and the clock-movement is released, the same continuing to move after the rod J has been moved to a higher position until the toe or detent of the lever O again drops into the notch of the wheel N, this wheel being thus permitted to make one revolution.

The main arbor *l* of the clock-movement extends upward, and is connected to a magneto-electric machine, consisting, essentially, of the magnets A^2 and of a helix, R, this machine being constructed substantially as described in my Letters Patent No. 123,438, bearing even date with the patent hereinbefore referred to. From said electro-magnetic machine the arbor *l* extends up through the plunger G, (which to this end is made hollow,) and on its upper end it is provided with a commutator, S. This commutator has the form of a ratchet-wheel, as shown, and it is in contact with a spring, T, (best seen in Fig. 4,) which is secured to a post, U.

In order to produce a tight joint at the point where the arbor *l* passes through the bottom of the gas or valve chamber A, I inclose the arbor by a tube, V, which is screwed or otherwise secured in said bottom of the chamber A, as shown; but this purpose can also be effected in other ways.

The letter W designates an auxiliary lever, having its fulcrum in a post, X, rising from the top of the chamber A, and which is pivoted at one end to the plunger G, while at its other end it is connected to the upper end of a rod, W^1. This rod extends through the sides of the chamber A and through the magnets A^2, similarly to the rod J, and at its lower end it is connected to a trip-lever, W^2, which has its fulcrum in a post, Y, rising from the base-plate E. From said trip-lever W^2 projects a pin, *z*, and the lever is so arranged that this pin is brought in the path of a series of cams, X′, secured to the side of the spring-barrel L of the clock-movement, and by the action of which an oscillating motion is transmitted to the auxiliary lever W through said trip-lever W^2 and rod W^1. In order to permit of passing the rods J and W^1 and the gas-channel *c* through the magnets A^2 without interfering with the working of the machine of which they form a part, I arrange, at suitable points between the poles of the magnets, pieces of brass A^3, or its equivalent material, having passages for said rods, and having, also, a channel which coincides with the gas-channel *c*.

The operation of my apparatus is as follows: Gas is admitted to the chamber A with sufficient pressure to raise the valve H, the plunger G being thereby raised, so that the level of the liquid in the seal-compartment A^1 sinks below the orifices of the channels *a a′* leading to the burners, and the gas being allowed to flow to the burners, the channel leading to the supplemental burner B′, however, being closed after a short time by the liquid, which runs into the seal-compartment A^1 from the lateral compartment C. By the upward movement of the plunger G the forked lever I is tilted, and the lower portion or arm thereof, which sustains the swinging catch *g* when the plunger is in its lower position, is brought out of contact with the catch, and the latter is disengaged from the upper or hooked end of the rod J, the upper portion of the forked lever I, however, being brought in contact with the catch when the plunger has reached its highest position, so that the catch is in a position to engage with the rod J, whether the plunger G is in its upper or lower position. When the rod J is released it is drawn downward by the action of the spring *n* on the bell-crank lever K, as hereinbefore stated, and thus the enlargement J′ of the rod is caused to actuate the brake-lever P, and by this means the clock-movement is released. By the clock-movement the helix R of the electro-magnetic machine is set in motion, and thereby a spark is produced between the commutator S and the spring T, by which the gas issuing from the supplemental burner B′ is lighted. This supplemental burner burns just long enough to light the main burner B, which is situated adjacent to and above the mouth of said supplemental burner, the gas being shut off from the supplemental burner by the liquid-seal, as before stated.

When it is desired to shut off the gas from the main burner B, the pressure thereof in the

chamber A is reduced, so as to allow the valve H and plunger G to fall, and thus to cause the orifice of the channel *a* leading to said main burner to become covered by the liquid-seal.

When the clock-movement is in motion the pins *m*, projecting from the side of the spring-barrel L, actuate the bell-crank lever K, and by this means the rod J is pushed upward and engages with the catch *g*, while the brake-lever P is released from the enlargement J′ of the rod, and the brake is put on. The clock-movement is thus allowed to remain in operation only just long enough to produce a spark, for the purpose of lighting the supplemental burner.

The auxiliary lever W is tilted when the plunger G moves up or down, and when the plunger is in its extreme upper or lower position the trip-lever W^2, which is connected to said auxiliary lever by the rod W^1, clears the cams X′ on the side of the spring-barrel L; but, if the plunger should stop at any intermediate point, the trip-lever W^2 is brought in such a position that it comes in contact with said cams, and by this means the plunger is moved to its upper or lower position, as the case may be. I thus insure the complete or necessary immersion of the plunger G in the liquid composing the seal A^1, in order to seal the orifices of the gas-channels *a a′* when the plunger is moved down, and also the partial withdrawal of the plunger from the liquid-seal, so as to uncover said channels when the plunger is moved upward, the forked lever I being, by the same means, caused to sustain the catch *g* in either position of the plunger.

The letter z^1 designates two arms, (best seen in Fig. 4,) which are secured to and project radially from the plunger G near the upper edge thereof, and which are intended to carry weights z^2; and Z designates a supplemental weight, which is supported by legs *y′*, and thereby held a short distance above the plunger G when the latter is in its lower position.

The object of these weights z^2 or Z is to compensate for the variable minimum pressure of gas found in different places or cities, the weights z^2, placed on the arms z^1, being intended to overcome the minimum pressure of the gas, and thus prevent the plunger from being thereby raised under ordinary circumstances, while by the supplemental weight Z this effect is attained if the weights *y′* are insufficient.

By arranging the valve H in a liquid seal, as before stated, the gas is prevented from escaping into the upper part of the chamber A and interfering with the working of the valve; and it may be remarked that neither this valve nor the plunger G is at any time completely or entirely withdrawn from its seat. It may be remarked, moreover, that the clock-movement which imparts motion to the arbor *l* may be released by a secondary clock-movement instead of by the change in the pressure of the gas.

If desired, the gas can be made to pass up to the burners through channels in the plunger G, instead of through the channels *a a′*, as specified, the burners being in this case affixed to the upper end of the plunger, so as to partake of its motion.

It is obvious that, instead of giving motion to the clock-movement by means of a spring, a weight can be used, and when my apparatus is applied to a lamp-post this weight can be arranged in such post.

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

1. In an automatic gas-lighter, the combination of the chamber A, containing a liquid-seal, the gas-supply pipe D, main burner B, and supplemental burner B′, all connected to said chamber, with the liquid-displacing bulb or plunger G, valve H, secured to said bulb or plunger, forked lever I, swinging catch *g*, connecting-rod J, a clock-movement, a brake connecting with said rod and adapted to arrest or release said clock-movement, the arbor *l*, an electro-magnetic machine connecting with said arbor, the commutator S, and spring T, the whole being adapted to operate substantially as described.

2. The combination, with the connecting-rod J, of a bell-crank lever, K, its spring *n*, the spring-barrel L of a clock-movement, and trip-pins *m* projecting from the side of said barrel, all adapted to operate substantially as described.

3. The combination, with the connecting-rod J and its enlargement J′, of a clock-movement and a brake composed of the notched wheel N and friction-wheel Q, each gearing with said clock-movement, the spring-impelled lever P, having the brake-shoe *w*, and lever O, having the toe or detent *t*, said levers being united by a link, *u*, and the whole being adapted to operate substantially as described.

4. The combination, with the liquid-displacing bulb or plunger G, of the auxiliary lever W, auxiliary rod W^1, and trip-lever W^2, the spring-barrel L of a clock-movement, and cams X, secured to the side of said barrel, all being adapted to operate substantially as described.

5. The combination, with the liquid-displacing bulb or plunger G, of arms z^1, secured to the upper part thereof, and adapted to receive a weight or weights, substantially as and for the purpose described.

6. The combination, with the liquid-displacing bulb or plunger G and the weight-arms z^1, of a supplemental weight, Z, having legs, by which it is supported and held above the plunger when the latter is in its lower position, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 8th day of September, 1877.

ALMON N. ALLEN. [L. S.]

Witnesses:

I. D. FERRY,

W. E. DAY.