W. C. CUTLER & F. V. SANDFORD.
Electric Gas-Lighting Apparatus.

No. 211,384. Patented Jan. 14, 1879.

Fig 1

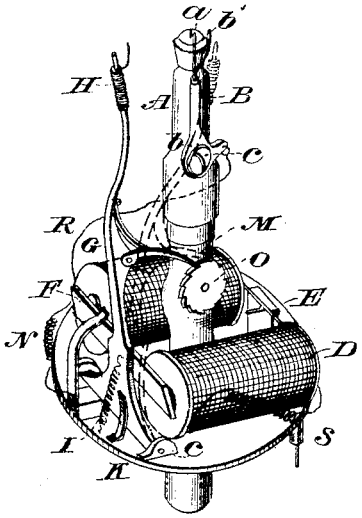
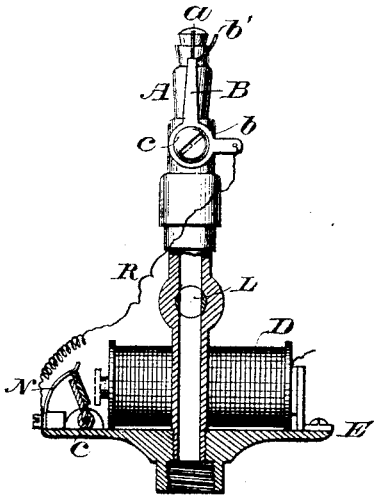


Fig 2



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM C. CUTLER AND FRANK V. SANDFORD, OF CHELSEA, MASSACHUSETTS, ASSIGNORS OF ONE-THIRD THEIR RIGHT TO JOS. W. BARTLETT, (DECEASED,) OF NEW YORK CITY, THROUGH PHILENA H. BARTLETT, ADMINISTRATRIX, OF NEW YORK CITY.

IMPROVEMENT IN ELECTRIC GAS-LIGHTING APPARATUS.

Specification forming part of Letters Patent No. **211,384**, dated January 14, 1879; application filed March 27, 1878.

To all whom it may concern:

Be it known that we, WILLIAM C. CUTLER and FRANK V. SANDFORD, both of Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Lighting Gas by Electricity, of which the following is a full, clear, and exact description, reference being had to the drawing accompanying and forming part of this specification.

This invention relates to apparatus for lighting gas by electricity of the kind that is attached to individual burners, and in which the opening and closing of the gas-cock at the burner are effected by the action upon a ratchet-wheel attached to the gas-cock of a pawl reciprocated by electro-magnetism, and the gas is ignited by a spark produced in near proximity to the orifice in the burner from which the gas issues by the separation of two arms, which make contact at their extremities near said orifice, and when in contact complete an electric circuit.

In certain apparatus for lighting gas by electricity now known and used, there is, in combination with the gas-burner, a stationary metallic arm, terminating in a metallic point, in near proximity to the orifice in the burner from which the gas issues, which arm is fixed to the burner, is insulated therefrom, and is connected with one pole of a battery; a movable metallic arm, which is connected to the other pole of the battery, is pivoted at one end to the burner, and on the other end carries a spiral spring, one end of which is attached to the arm, and the other end extends out horizontally from said arm, and when the arm is vibrated makes contact with the extremity of the fixed arm, and thus acts as a yielding and elastic circuit-closer; and a device for vibrating the movable arm, so that its end will pass by the fixed arm and a spark for igniting the gas issuing from the burner will be produced when the horizontal extension of the spiral spring on the movable arm breaks contact with the fixed arm, and the electric circuit completed by the contact of said horizontal extension with the end of the fixed arm is broken.

In an application for Letters Patent of the United States filed by Frank V. Sanford February 6, 1877, he has described and claimed as of his invention an apparatus for lighting gas by electricity, in which, in combination with a gas-burner, there is a fixed and a movable arm constructed and operating in substantially the same manner as the fixed and the movable arm in the hereinbefore-described apparatus; but in addition there is a ratchet attached to the gas-cock of the burner and a pawl attached to the vibrating arm, which pawl engages with the ratchet upon the gas-cock at each vibration of the movable arm, and thus the opening and closing of the gas-cock are effected by the same movement of the arm which causes the production of the spark igniting the gas.

In this apparatus the vibratory movement of the movable arm is effected by hand.

Our present invention is an improvement upon this hereinbefore-described apparatus, in which improvement the movable arm is vibrated by electro-magnetism, and consists in the combination, substantially as hereinafter more fully set forth, of a gas-burner having a stationary metallic arm, or its equivalent, fixed thereto and insulated therefrom, which arm terminates in a metallic point in near proximity to the orifice in the burner from which the gas issues; a vibrating metallic arm, one end of which carries a spiral spring, constructed and operating as in the hereinbefore-described apparatus, so as to act as a yielding and elastic circuit-closer, or any device which will accomplish the same result, (at its other end it is pivoted to a suitable support upon the burner, and is attached to the armature of an electro-magnet, also properly supported upon the burner,) and is of such length and amplitude of vibration that when made to vibrate by the attraction by the electro-magnet of the armature attached to the arm its extremity will pass the end of the fixed arm, or its equivalent, and the horizon-

tal extension of the spiral spring, or its equivalent, on said movable arm will make and break contact with the metallic point on the extremity of the fixed arm, or its equivalent, carrying a pawl, which engages with a ratchet-wheel upon the gas-cock of the burner at each vibration of the arm, and has attached thereto a suitable spring, or its equivalent, for withdrawing the arm from the electro-magnet when the circuit through said electro-magnet is broken and its armature attached to the arm ceases to be attracted; a gas-cock in the burner having attached thereto a ratchet-wheel having a limited number of teeth, as hereinafter described; an electro-magnet for vibrating the movable arm, properly supported upon the burner; and a circuit-changer and connections, arranged and operating as hereinafter described, so that when the movable arm has been vibrated to such an extent that the yielding and elastic circuit-closer upon said arm is in contact with the end of the fixed arm an electric circuit will be established through said arms, the yielding and elastic circuit-closer, and the electro-magnet, and a spark for igniting the gas will be produced when the yielding and elastic circuit-closer breaks contact with the end of the fixed arm, or its equivalent, on the further movement of the movable arm.

In the accompanying drawing, Figure 1 is a perspective view of our improved apparatus, and Fig. 2 is a view of the said apparatus in elevation and partly in section.

In these figures the same letters refer to the same parts.

Referring to the drawing, A is the gas-burner. B is an upright metallic arm fixed to the side of the burner, and terminating in a metallic point, *a*, which is preferably of platinum, in near proximity to the orifice in the burner from which the gas issues. This arm is insulated from the burner in any suitable manner. As represented, this result may be accomplished by washers *b b*, of any suitable insulating material, one of which is placed between the arm and the head of the screw C, which secures the arm to the burner, and the other is placed between the arm and the burner; but instead of this device any other may be used which will effect the insulation of the arm.

That part of the burner to which the arm is attached may be made of some insulating substance; or that part of the burner may be of metal, and a section of the burner below the arm may be made of some insulating substance.

Instead of a metallic arm constructed as shown, any device which will afford a metallic point in near proximity to the orifice in the burner from which the gas issues and is attached to the burner and insulated therefrom may be used.

D is an ordinary electro-magnet, supported upon a platform, E, attached to the burner, or in any other suitable manner attached to the burner.

F is the armature of this electro-magnet. This armature is attached to the arm G, pivoted at *c c* to the platform E, or to any other suitable support attached to the burner.

The arm G is of such length and has such an amplitude of vibration that when the armature attached thereto is attracted by the electro-magnet, the upper end of the said arm will pass the metallic point *a* on the fixed arm B, or its equivalent.

Surrounding the upper end of the movable arm G is a spiral spring, H, one end of which is attached to the arm, and the other end extends out horizontally from the arm, and when the said arm passes the fixed arm makes and breaks contact with the metallic point *a* on the said fixed arm, or its equivalent, as in the apparatus hereinbefore described.

The object of this device is to afford a yielding and elastic circuit-closer on the arm G, for the purpose of increasing the size of the contact-spark; and instead of the spiral spring, constructed and operating as described, any other device which will act as a yielding and elastic circuit-closer may be used.

In Fig. 1 the arm G is represented in dotted lines in such a position that the horizontal extension of the spiral spring H is in contact with the metallic point *a* on the fixed arm B.

I is a spring attached to the arm G, for the purpose of retracting it when the attraction of the magnet ceases; or this retraction of the arm may be effected by its weight. K is another spring, which prevents the arm from being withdrawn so far from the magnet that the armature attached thereto cannot be attracted when the circuit through the magnet is completed. L is the gas-cock in the burner, and O is a ratchet-wheel of eight teeth attached to the said gas-cock. M is a suitable pawl, attached to the arm G, which pawl at each vibration of the arm engages with one of the teeth of the ratchet-wheel, and turns the gas-cock one-eighth of a rotation.

We have shown the ratchet-wheel O as having eight teeth. We do not confine ourselves to this number; but for the reason that the circuit through the electro-magnet must be broken and closed once in order to rotate the gas-cock the distance of a single tooth, it is desirable that the number of teeth be limited, as the breaking and closing of the circuit are not effected automatically.

The number of these teeth should be a multiple of four if the gas-cock is single or double wayed; but if it contains an odd number of ways this will not be necessary; but in all cases there must be twice as many teeth in the ratchet-wheel as there are ways in the gas-cock.

A spring may be attached to the pawl, for the purpose of insuring its engagement with the teeth of the ratchet-wheel.

N is a flat strip of metal, which is connected by a wire to one pole of the electro-magnet, and at one end is attached to a block, P, of hard rubber or any other suitable insulating material upon the platform E, or is other-

wise suitably insulated from the burner. The other end of this strip rests upon the top of the armature F, and is so constructed that when the armature is attracted, as shown in dotted lines in Fig. 2, to such an extent that, as shown in dotted lines in Fig. 1, the horizontal extension of the spiral spring H, or its equivalent, is in contact with the metallic point *a* on the fixed arm B, or its equivalent, it breaks contact with the armature F. A wire, R, connects this strip N to the insulated fixed arm B.

S is an insulated wire, connected with one pole of the electro-magnet D, the other pole being connected to the earth through the burner by either the strip N or the arm G, according to the position of said arm.

The object of the strip N is to cause the establishment of a circuit through the movable and fixed arms when the armature is attracted and the ends of these arms are in contact; and, instead of the strip N, we can use any other device which will effect this result.

Attached to the arm B is a metallic arm, *b'*, so placed that when the horizontal extension of the spring H escapes from the metallic point *a* on the further movement of the arm G, this extension will make contact with the arm *b'*.

The operation of this apparatus is as follows: Supposing the gas-cock at the burner to be in such a position that the gas is shut off and it is desired to turn on and ignite the gas. On closing the circuit through the electro-magnet by means of a suitable key in the circuit at any distance from the burner, the armature F will be attracted, and the arm G will be moved so that the pawl M will engage with the ratchet-wheel O on the gas-cock and rotate it the distance of one tooth, thereby partially opening the gas-cock. At the same time the horizontal extension of the spiral spring H, or its equivalent, on the end of the movable arm G will make contact with the metallic point *a* on the fixed arm B, or its equivalent, contact will be broken between the strip N and the armature of the electro-magnet, and by means of the wire R the circuit will be completed through the fixed and movable arms and the electro-magnet.

On the further movement of the arm G by the continued attraction of the armature, the horizontal extension of the spring H suddenly breaks contact with the metallic point *a* on the end of the arm B, or its equivalent, and an electric spark, owing to the inductive action of the magnet in the circuit, will instantly be produced at that point. The said horizontal extension will then come in contact with the arm *b'*, and the continuity of the circuit through the arm G will be re-established, and the armature F held up to the electro-magnet.

On breaking the circuit at the key the retracting-spring restores the arm G to its original position; and on again closing the circuit at the key the arm G is again moved as before, the pawl engages with the ratchet-wheel and rotates it another tooth, the gas-cock is fully opened, and the spark produced when the horizontal extension of the spring H breaks contact with the metallic point *a* ignites the issuing gas. By again twice closing and breaking the circuit at the key, the gas-cock is turned another quarter-rotation, and the flow of gas is shut off.

If the ratchet-wheel has twelve, sixteen, or twenty teeth it is obvious that the circuit must be closed three, four, or five times in succession, in order to fully open or to fully close the gas-cock, and the number of breaks and closings required will depend upon the number of teeth in the ratchet-wheel.

We are aware that in apparatus for lighting gas by electricity a movable arm, which makes and breaks contact with a fixed arm upon the burner, in near proximity to the orifice in the burner from which the gas issues, with the production of a spark, and is operated by electro-magnetism, is not new.

We are also aware that it is not new to attach to such an arm thus operated a pawl which engages with a ratchet-wheel on the gas-cock when the arm is moved, and thus rotates the gas-cock; and also that it is not new to cause the induction of the igniting-spark by the rupture of the circuit through the electro-magnet, which moves the arm which makes and breaks contact with a fixed arm, or its equivalent, near the orifice in the burner from which the gas issues; but

What we claim as our invention, and desire to secure by Letters Patent of the United States, is—

1. The combination, substantially as and for the purpose set forth, of a gas-burner, a stationary metallic arm, as described, attached thereto and insulated therefrom, a vibrating metallic arm, as described, carrying on one extremity a yielding and elastic circuit-closer, constructed and operating as described, a pawl attached to said vibrating metallic arm and engaging with a ratchet-wheel on the gas-cock of the burner, a retracting-spring or its equivalent attached to said arm, a gas-cock in the burner having attached thereto a ratchet-wheel having a limited number of teeth, an electro-magnet properly supported on the burner for moving the vibrating arm, and a circuit-changer and connections acting, as described, to cause an electric circuit to be established through the fixed and the movable arm when the movable arm is moved to such an extent that the yielding and elastic circuit-closer thereon makes contact with the end of the fixed arm or its equivalent.

2. The combination, substantially as and for the purpose set forth, of the following elements, viz: a gas-burner, the fixed arm or its equivalent, as described, attached to the burner and insulated therefrom, a movable arm making contact with said fixed arm when moved, and a circuit-breaker and connections acting,

as described, to cause a circuit to be established through the movable and the fixed arm when the movable arm is moved to such an extent that it makes contact with the fixed arm or its equivalent.

3. The combination, substantially as and for the purpose set forth, of the following elements, viz: a gas-burner, a fixed arm or its equivalent attached to the burner and insulated therefrom, a movable arm vibrated by an electro-magnet attached to the burner, and when vibrated making contact at its extremity with the end of the fixed arm or its equivalent, and a circuit-changer and connections acting, as described, to cause an electric circuit to be established through the movable arm, the fixed arm or its equivalent, and the electro-magnet when the movable arm is vibrated to such an extent that it makes contact with the fixed arm or its equivalent.

4. The combination, substantially as and for the purpose set forth, of the gas-burner, the fixed arm B or its equivalent, as described, attached to the burner and insulated therefrom, the movable arm G, pivoted to a suitable support attached to the burner, and having on its extremity a yielding and elastic circuit-closer, as described, the electro-magnet D, operating said arm, the armature F, attached to said arm, the retracting-spring I or its equivalent, the strip N, constructed and operating as described, insulated from the burner, and connected by a wire to one pole of the electro-magnet, and the wire R, connecting the strip N to the fixed arm B or its equivalent.

5. The combination, substantially as and for the purpose set forth, of a gas-burner, the fixed arm B or its equivalent, attached thereto and insulated therefrom, the point *a*, and arm *b'*, attached to said arm, the vibrating arm, as set forth, carrying the yielding and elastic circuit-closer, as set forth, and the electric connections, as described.

In witness whereof we have hereunto set our hands.

WM. C. CUTLER.
FRANK V. SANDFORD.

Witnesses:
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