(No Model.)

A. LÜNGEN.

Electric Gas Lighting Burners.

No. 243,344. Patented June 21, 1881.

Fig. 1.

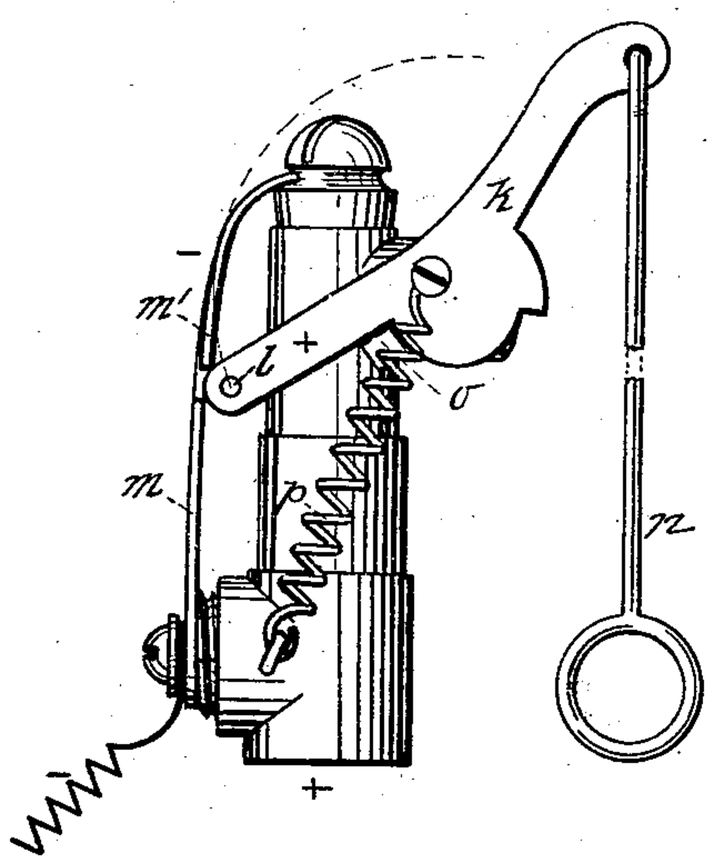


Fig. 2.

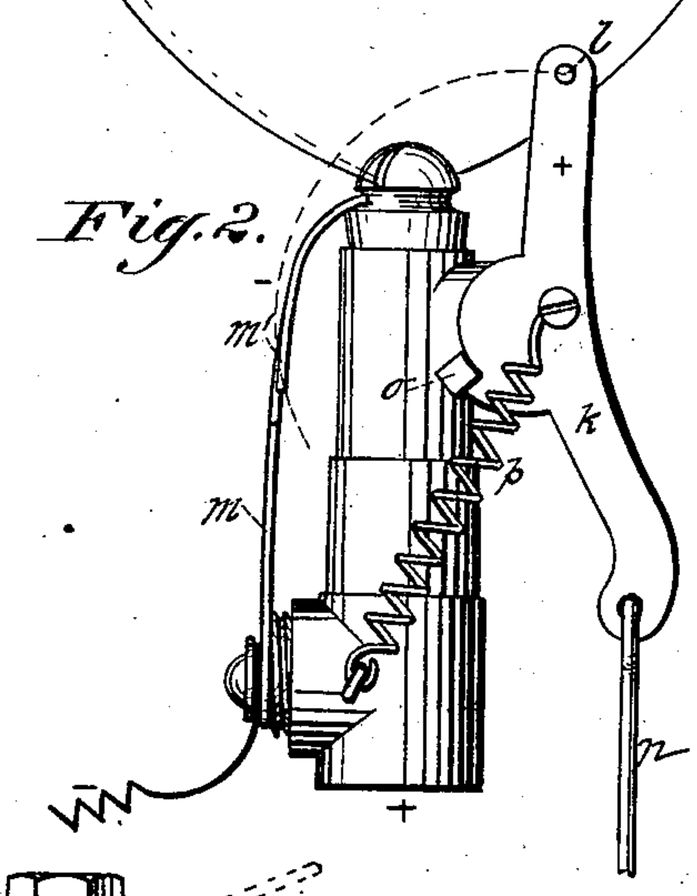


Fig. 4.

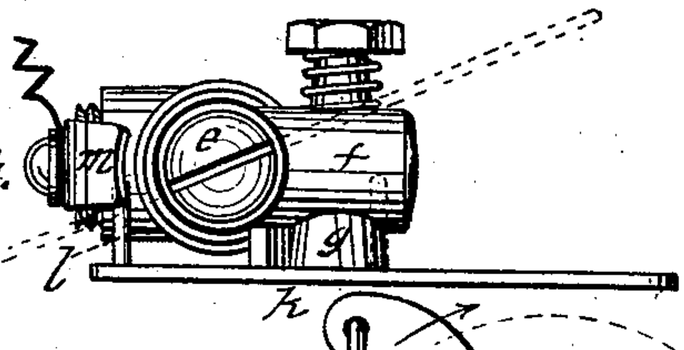


Fig. 3.

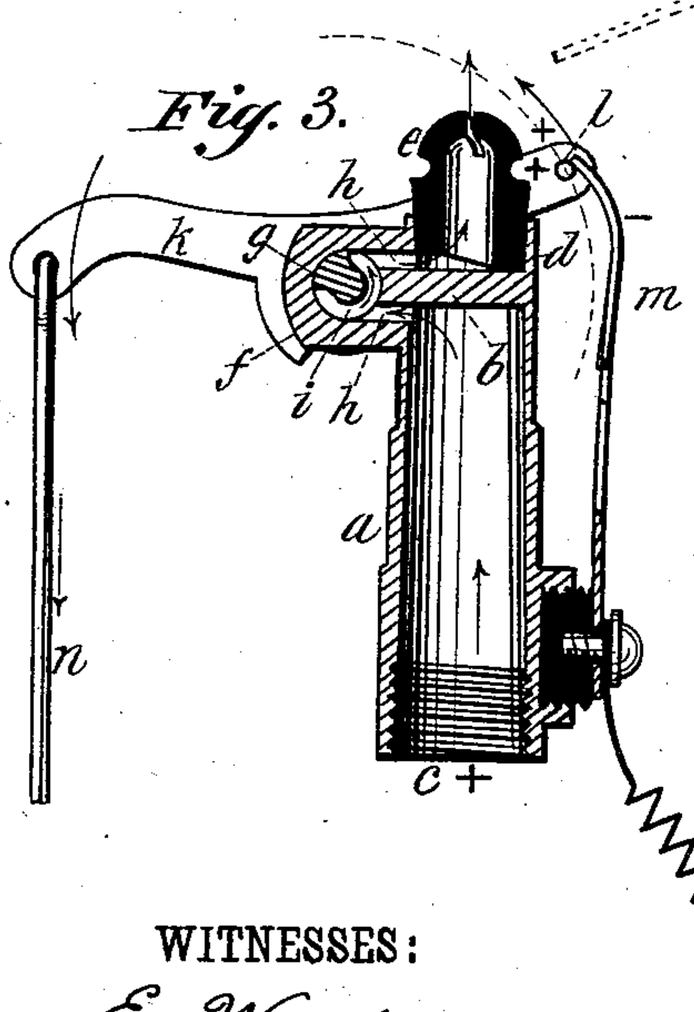


Fig. 5.

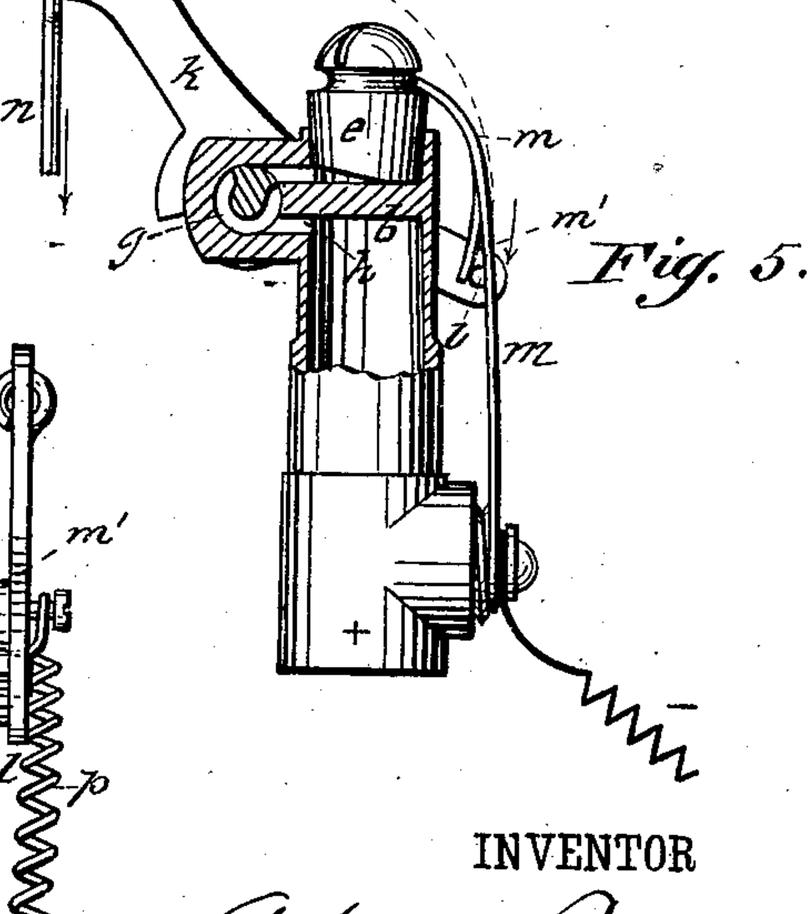
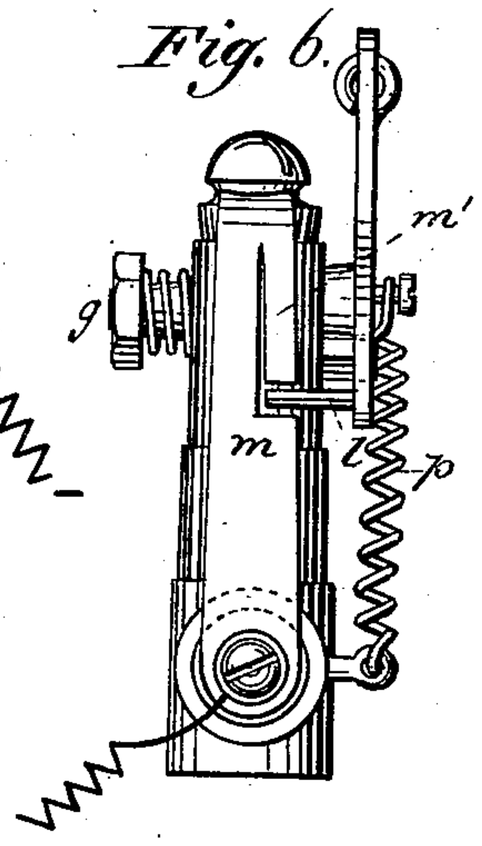


Fig. 6.



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UNITED STATES PATENT OFFICE.

ADAM LÜNGEN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ROBERT EDWARDS, OF SAME PLACE.

ELECTRIC GAS-LIGHTING BURNER.

SPECIFICATION forming part of Letters Patent No. 243,344, dated June 21, 1881.

Application filed March 24, 1881. (No model.)

To all whom it may concern:

Be it known that I, ADAM LÜNGEN, of New York city, New York, have invented certain new and useful Improvements in Electric Gas-Lighting Burners, of which the following is a specification.

As indicated by the title, my invention relates to that class of gas-burners which are placed in an electric circuit, with two electrodes or terminals of the circuit mounted on the burner and normally separate, but one of which is capable of being moved by the hand to close and break the circuit with the other, and thus produce an igniting-spark in the issuing gas.

The electrodes in burners of this class have been of various forms and arrangements relatively to the burner. In most cases one electrode is stationary and fixed close to the gas-jet, so as to lie in the flame when the gas is ignited, and hence requires to be made of an expensive refractory metal, such as platinum. In a more recent burner both electrodes retire from the burner-jet out of range of the flame when the gas is ignited. Now, in my invention the movable or operating electrode retires, as usual, from the jet when the gas is ignited; but the opposite or yielding electrode is so relatively arranged and constructed that it always tends to lie against or closely approach the burner-tip, yet is always out of range of the flame when the gas is ignited.

In some burners of this class the movable electrode is operatively connected with the gas-cock, so that the motion to produce the igniting-spark turns on the gas at the same time, while in most cases the gas-cock is operated separately by the hand, in the usual manner, and has no connection with the electrodes. My invention has reference to burners of both these kinds.

The main requisites for an efficient electric gas-lighting burner, as will be readily appreciated, are that the electrodes make a prolonged moving contact with each other, and, finally, a sudden break as near as possible to or actually in the issuing jet of gas, so as to there deliver a strong igniting-spark, and thus light the gas with certainty at one action; also, that the electrodes shall be out of the flame when the gas is ignited, so that they may be made of cheap metal; and, furthermore, that the back and forth movements of the electrodes to engage and disengage each other shall be smooth, easy, and certain, and not liable to entanglement or displacement; and, finally, that the general construction be simple, neat, and durable.

My invention aims to embody the above-named advantages; and it consists in a special form and arrangement of the electrodes and of the burner relatively to each other, as hereinafter fully set forth.

Figure 1 of the annexed drawings gives a side elevation of my improved burner with the electrodes in their quiescent position and the gas turned off. Fig. 2 is a similar elevation with the operating-electrode raised after having produced the igniting-spark, and showing the gas lighted. Fig. 3 is a sectional elevation, viewed from the reverse side of Fig. 2, with the gas shown turned full on and the electrodes shown just on the point of breaking contact to produce the igniting-spark. Fig. 4 is a plan view of Fig. 3. Fig. 5 is a view similar to Fig. 4, showing the gas turned off and the operating-electrode in the opposite position and near the end of its return movement, where it disengages the yielding electrode. Fig. 6 is a front elevation of the burner, viewed from the left of Fig. 1.

The burner *a* is cast in about the usual form, as illustrated, except that near the top thereof it is formed with a cross-partition, *b*, which divides the gas-inlet *c* at the bottom from the tip-socket *d* at the top. The end *c* is threaded, as usual, to screw upon the gas-pipes, and the end *b* is ground to receive the usual lava tip, *e*, which is cleft with the ordinary jet-slot, as shown, but which tip serves the additional purpose of an insulator in my burner, as hereinafter shown. The burner is formed with a lateral lug or boss, *f*, at the location of the partition *b*, which is bored with a conical hole or socket to receive a tight-fitting taper valve-plug, *g*, capable of rotary motion therein in the manner of an ordinary gas-cock, and from this socket, on either side of the partition *b*, ports *h h* extend, respectively, into the tip-socket and the hollow body of the burner, as illus-

trated in Figs. 3 and 5. A groove, *i*, is formed about two-thirds around the rotary valve-plug *g* at the location of the ports, so that when the plug is turned far enough in one position, as in Fig. 5, so that the solid part of the plug covers the upper port, communication between opposite sides of the partition is closed, and the gas is hence shut off; but when rotated slightly in the opposite direction the gas is turned full on, and so continues during even a large partial rotation of the plug, as seen in Fig. 3. Now, the valve-plug is thus moved by a lever, *k*, which is fixed thereto, as shown in the several figures, and this lever at the same time serves as one of the electrodes of the burner, one of its arms being fitted with a projecting pin, *l*, which makes and breaks contact with the opposite electrode, *m*, while the other arm is provided with a pendent rod, *n*, by which the lever is pulled down to turn on the gas and produce the igniting-spark, or is pushed up to afterward turn off the gas and extinguish the light.

One pole of the battery, usually the positive, is connected to the gas-pipes, with which the burner is, of course, in metallic connection, and the lever *k* hence forms the positive electrode in being in metallic connection with the burner. The negative wire from the battery accordingly connects to the other electrode, *m*, as shown, which is, of course, insulated from the burner—say by a block of insulating material screwed or swaged into a hollow boss on the side of the burner and held in an ordinary simple manner, as clearly illustrated in the several figures.

The electrode *m* may be called the "yielding" electrode, as it yields to the movement of the rigid electrode *k l*, and, as may be observed, is formed and acts as a plate-spring, being made preferably of sheet-brass or German silver, and of a good width and thickness, as illustrated, so that strength and durability are obtained. The lower end of this spring-electrode *m* is fixed to the insulator, as shown, while the upper end curves toward and normally rests with a slight elastic pressure against the lava tip *e*, preferably in the groove below the slotted head thereof, as shown, against which it constantly tends to spring, as illustrated in Figs. 1, 2, 5, and 6, and it will be readily seen that as lava is an insulator, hence the circuit is not closed by this contact, while the spring is by this means supported at its free end, and has thus greater stability.

It will be readily noted from the several figures of the drawings that the axis of the electrode-lever *k* is arranged at such position and the electrode-pin *l* at such radius relatively to the spring-electrode *m* that the arc through which the pin moves intersects the spring at a slight distance from its tip. Now, it will be seen on reference to Figs. 5 and 6 that at this part the spring is cleft by a cut, so as to form a secondary spring tongue or pawl, *m'*, pointing downward, and that during the downward or return movement of the lever *g*, as shown in Fig. 5, the electrode-pin *l* contacts with said tongue, presses it inward, and finally rides over its tip, and passes behind the spring into the position shown in Figs. 1 and 6, the limit of its motion being determined by the arm of the lever striking one side of the stop *o* on the burner, as seen in Fig. 1.

It will be readily understood from Figs. 5, 6, and 1 that in the position of parts just described the gas is shut off, the electrodes are out of contact, and the circuit broken, the parts being hence quiescent. When, however, it is desired to light the gas, the rod *n* is pulled down, which of course swings the lever around, and the first part of its motion at once turns on the gas, as will be understood from Figs. 3 and 5, and at the same instant brings the pin *l* into contact with the spring *m m'*, thus closing the circuit. The pin now continues a rubbing contact with the spring on the inner curved side thereof till it arrives at its tip, as seen in Fig. 3, when the spring rides off, thus breaking contact, and hence emitting a strong spark in the issuing gas-jet, which ignites the same, as shown in Fig. 2, the lever being thence moved to the limit of its up motion, which is determined by a shoulder on its opposite arm striking the opposite side of the stop *o*, as in Fig. 2.

It may be noted that the lever is held in either its up or down positions by the tension of a spring, *p*, which connects to a crank-pin at a short distance from its center, and which, passing over the center, on either side of its swing, holds the lever reliably in either of the positions in which it may be set.

The merits of the described construction and arrangements of parts may be now appreciated when it is noted, first, that by this means the gas is turned on well in advance of the igniting-spark, so that the dead gas or air, always present to some extent in the outer parts of the pipes, has thus free chance to escape before the advance of the rich gas, which issues in its fullness by the time the igniting-spark is produced, so that the lighting of the gas is thus rendered more certain; second, the gas-cock is arranged so close to the tip of the burner that the air which has to be driven out before the gas is reduced to the smallest possible quantity, and thus contributes to the result above stated. Furthermore, the relative form and position of the spring-electrode *m* is such that it is nearly tangential to the arc, through which the contact-pin *l* moves, (see Figs. 1 and 3,) which possesses two advantages: First, it insures a prolonged rubbing contact of the electrodes, and thereby keeps the circuit closed long enough to charge the circuit up to a high tension, so that when the break finally occurs, as in Fig. 3, the full reaction insures a vigorous spark for the certain ignition of the gas; second, the mechanical advantages thus given to the lever over the pressure and friction of the spring *m* on

the pin *l* enables the spring to be made strong and to press with considerable friction on the pin, so as to keep the contact-surfaces bright and clean, in a condition for perfect electrical action, yet the frictional resistance thereof becomes hardly perceptible to the hand in operating the lever. Moreover, it may be noted from the several figures that the jet-slot in the burner-tip is placed diagonal to the arc through which the pin *l* moves, that the end of the yielding electrode *m*, when quiescent, rests against the tip just below the jet-slot, and that the pin, in breaking contact therewith, takes an upward course and rises over the tip and through the edge of the gas-jet, and thus emits the igniting-spark directly into the jet, which renders its ignition sure; but after the ignition occurs, as in Fig. 1, it will be seen that both electrodes are removed from the flame, the electrode *m*, which never enters the jet, resting against the lava tip *e'*, below the flame, where the heat is never injurious thereto, while the lever and pin *k l* retire to a lateral distance from the flame, as shown best by dotted lines in Fig. 4. Hence both electrodes may be made of brass or German silver instead of platinum, as would be otherwise necessary.

In addition to these advantages, it may be observed that the engaging and disengaging motions of the electrodes are smooth and easy, and such as not to render them liable to entanglement or displacement in their back and forth motions.

It will be therefore observed from the above recapitulation that my burner embodies all the desirable advantages before referred to, and constitutes a material improvement in this line.

In the drawings I have shown the operating-electrode as operatively connected with the gas-cock and the gas-cock or valve embodied in the burner; but in most cases an ordinary valveless burner will be used, with the operating-electrode simply pivoted thereon, the valve-plug *g*, ports *h h*, and partition *b* being dispensed with and the gas turned on or off by the operation of a separate stop-cock in the usual way. In this case, also, the lever-electrode *k* will be so acted on by its spring as to always tend to return to the position shown in Fig. 1 after the gas is lighted. The construction in other respects will, however, be substantially the same as illustrated.

What I claim is—

1. In an electric gas-lighting burner, a yielding electrode arranged, when in its normal or quiescent position, to approach or rest against the jet-tip below the flame, substantially as and for the purpose herein set forth.

2. An electric-lighting gas-burner provided with a quiescent electrode arranged to closely approach the tip of the burner below the flame, in combination with a movable electrode arranged to move in a curved path against the former electrode and over the burner-tip, and to break contact therewith in its movement over the tip of the burner, substantially as herein shown and described.

3. In an electric-lighting gas-burner, a quiescent or yielding electrode arranged parallel to the burner, or nearly so, and terminating at or near the tip, with a movable electrode arranged to move in an arc tangential to the former electrode, or nearly so, and over the tip of the burner, substantially as herein shown and described.

4. The combination, with an electric gas-lighting burner serving as one conductor of the current, and provided with a lava or non-conducting jet-tip, with a yielding electrode or conductor mounted on the burner and insulatingly fastened thereto at the lower end, with the upper end resting against the non-conducting jet-tip, substantially as herein set forth.

5. An electric-lighting gas-burner provided with one electrode terminating at or near the jet-tip below the jet, with a movable electrode arranged to break contact therewith by a movement over the jet-tip, in combination with the jet-tip arranged with its jet diagonal to the path of motion of the latter electrode, substantially as and for the purpose set forth.

6. In an electric-lighting gas-burner provided with a valve to turn on the gas simultaneously with the operation of the electrodes, the electrode valve-lever *g*, arranged to move between stops determining the closed and open positions of the valve, with a spring connecting to an eccentric pin or crank on said lever, in such position as to retain the lever against either of said stops when moved over the center line in either direction, substantially as herein shown and described.

7. In an electric-lighting gas-burner, a movable electrode moving in a path or arc which intersects the opposite or yielding electrode in its motion to or from the same, in combination with such yielding electrode, formed with a secondary yielding tongue at the said point of intersection, to permit the passage of the movable electrode behind the said yielding electrode at the return movement of the former, substantially as and for the purpose set forth.

8. An electric-lighting gas-burner formed with a partition, *b*, across its gas-passage, between the inlet and tip socket, with a valve, *g*, arranged to govern the flow of gas between opposite sides of said partition, and with means for operating said valve simultaneously with the operation of the electrodes, substantially as herein shown and described.

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Witnesses:
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CHAS. M. HIGGINS.