(No Model.)

J. A. NORTON.

ELECTRIC GAS LIGHTING APPARATUS.

No. 315,055. Patented Apr. 7, 1885.

Fig. 1.

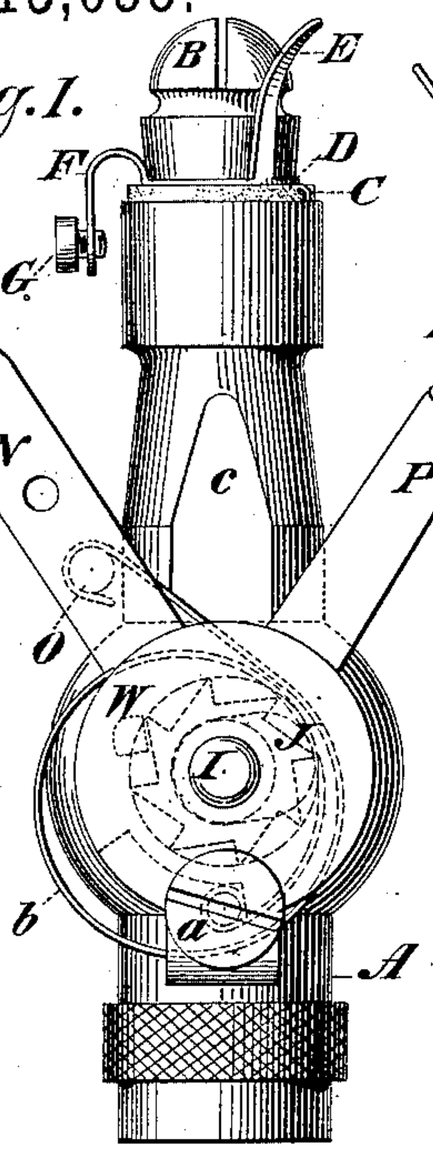


Fig. 2.

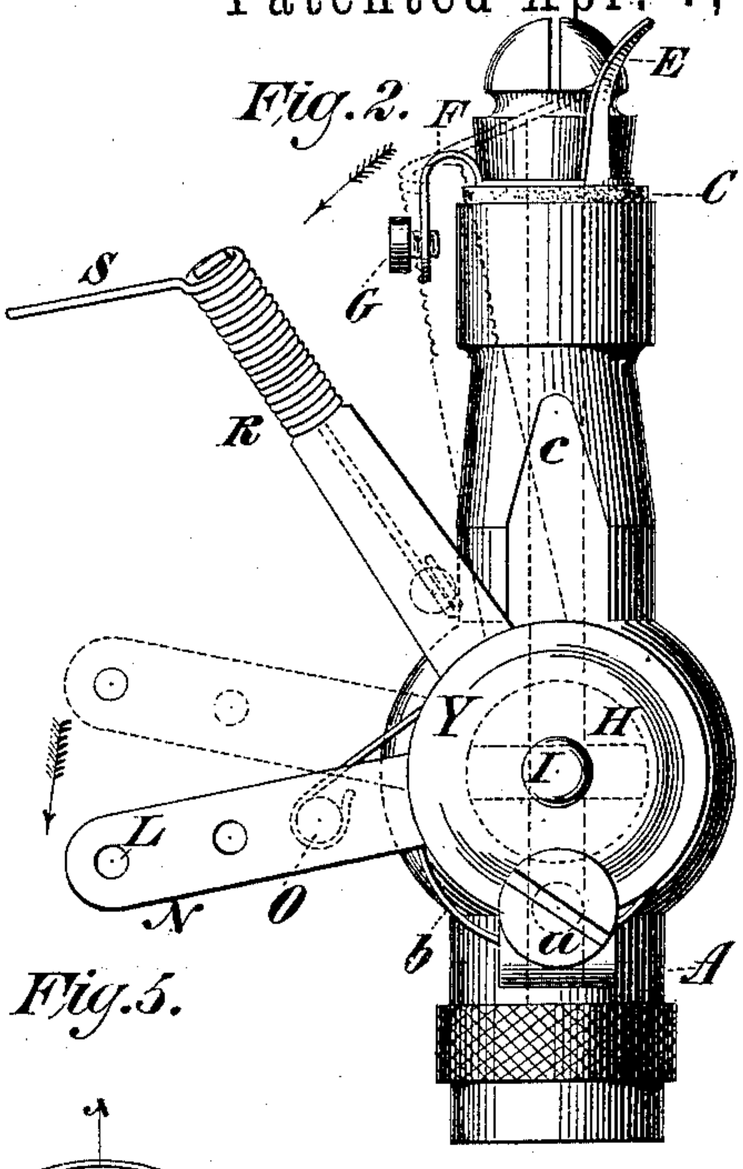


Fig. 3.

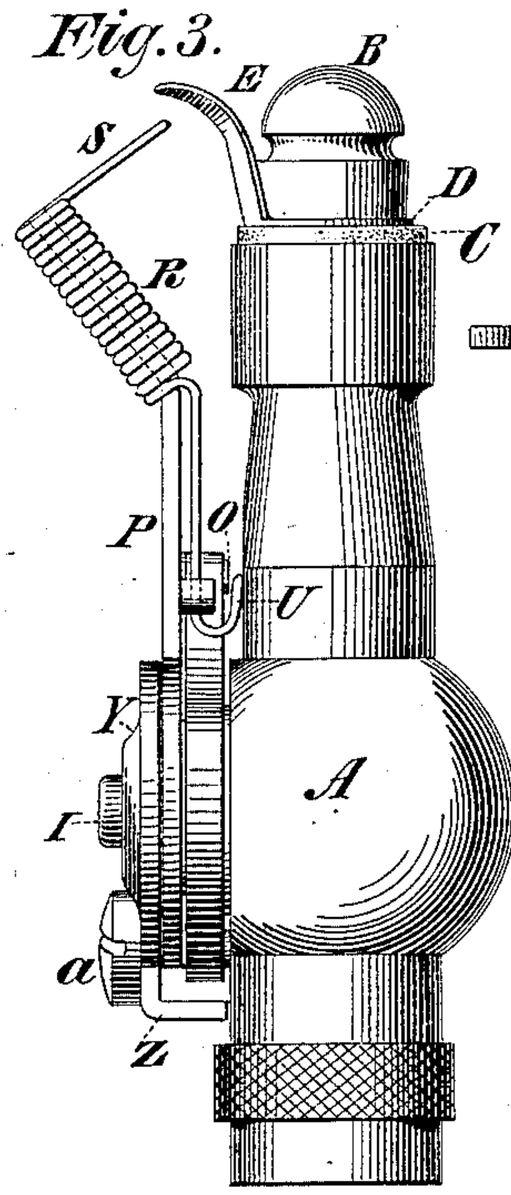


Fig. 5.

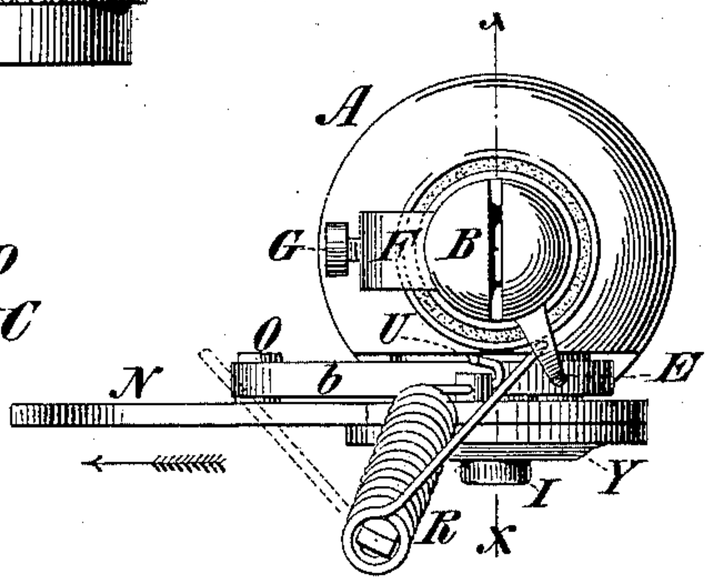


Fig. 6.

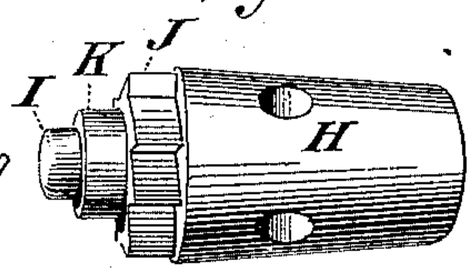


Fig. 7.

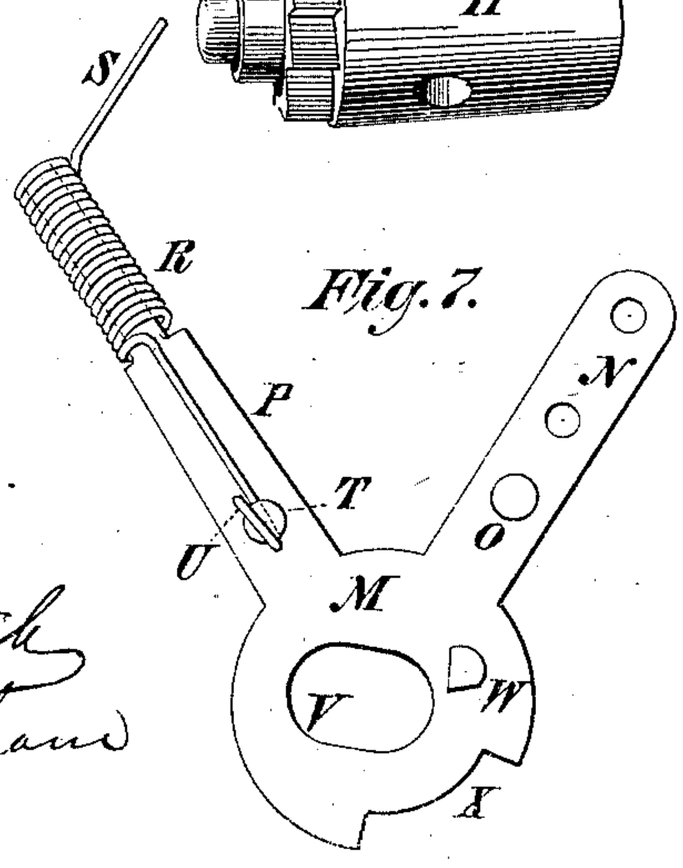
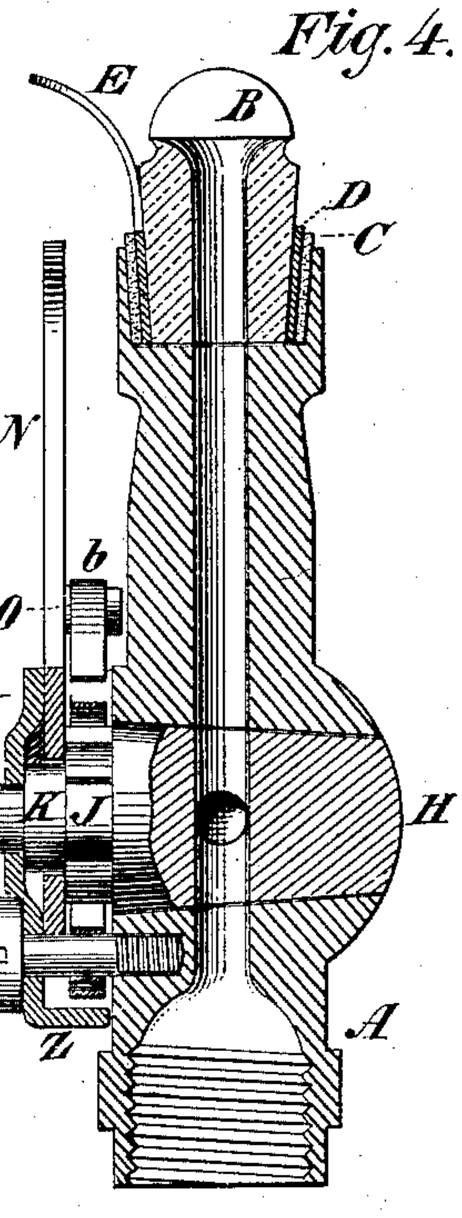


Fig. 4.



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ELECTRIC GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 315,055, dated April 7, 1885.

Application filed March 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. NORTON, of Brookline, Norfolk county, Massachusetts, have invented a new and useful Improvement in Electric Gas-Lighting Apparatus, of which the following is a specification.

The invention relates to that class of electric gas-lighting devices in which the turning of the gas-cock to admit the gas-flow simultaneously causes the making and breaking of contact of electrodes at the gas-escape orifice, thereby producing sparks which ignite the gas.

The invention consists in the improved apparatus hereinafter described, and more particularly in the construction and arrangement of the fixed electrode; in the mechanism for vibrating the movable electrode, whereby it, after passing the fixed electrode and making contact therewith to produce sparks, is moved in the reverse direction below said fixed electrode and clear of the gas-flame; in a means of short-circuiting the current which passes from the fixed electrode to the movable electrode out of the mechanism of the apparatus and leading it directly to earth, and in the construction of the mechanism for operating the gas-cock and electrodes, all as in the following specification fully set forth and claimed.

In the accompanying drawings, Figure 1 is a front elevation showing the movable electrode in its normal position. Fig. 2 is also a front elevation, showing the said electrode when moved to the end of its path, and also by dotted lines in its intermediate position. Fig. 3 is a side elevation showing the position of the movable electrode during its return travel. Fig. 4 is a vertical longitudinal section on the line *x x* of Fig. 5. Fig. 5 is a plan view. Fig. 6 shows the gas-cock and its attachment; and Fig. 7 shows the movable electrode, disk, and arm separate from the burner.

Similar letters of reference indicate like parts.

A is the feed-pipe of the burner. B is the tip, of lava or other non-conducting material, which is inserted in the upper extremity of said pipe, which is suitably recessed to receive it, as shown in Fig. 4. In the end of the pipe A, before inserting the tip, I place a ring, C, of asbestus or other insulating material, and within said ring C, I insert a ring, D, of metal, upon which is formed or to which is attached a projection, E, which forms the fixed spark-producing electrode. Also formed upon or attached to the ring C is another projection, F, which is bent downward and provided with a binding-screw, G. To this projection, by means of the screw G, is connected one terminal of the circuit-wire, which communicates with any convenient source of electricity. The tip B is inserted in the ring D. By this means I provide a novel and convenient arrangement for supporting the fixed electrode and insulating the same from the burner-pipe, and also for connecting the circuit-wire directly to the support of said electrode.

The feed-pipe A is provided with a transverse opening to receive the gas-cock H. (Shown in detail in Fig. 6.) Said cock is provided with suitable apertures to coincide with the bore of the feed-pipe A when turned to admit the gas to the tip. As here shown, the cock is a two-way cock—that is, it has two transverse diametrical apertures, as indicated in dotted lines in Fig. 2, so that the gas-duct is fully opened at every quarter-revolution.

Upon the gas-cock spindle I is rigidly secured a ratchet-wheel, J, and outside of this wheel a disk, K. If desired, the gas-cock H, ratchet-wheel J, disk K, and circular projection or spindle end I, may be formed of one piece of metal suitably shaped. The parts being thus assembled or formed together, the cock H is inserted in its aperture or seat in the burner-pipe A.

Referring now more particularly to Fig. 7, M is a mutilated disk of metal having two arms preferably integral with it. One arm, N, is the lever for working the apparatus, and has on its inner side a stop-pin, O. The other arm, P, supports the movable electrode, which is arranged in the following manner:

R is a coil of wire, which passes over the end and rests upon a shoulder formed on the arm P. One end, S, of this coil projects horizontally and forms a spring wiping-point, which, as will be hereinafter described, rubs against the fixed electrode when the apparatus is op-

erated. The other end of the wire-coil extends downwardly beside the arm P, and passes through an aperture in a stud, T, which is affixed to or formed upon said arm. The extremity U of the wire, after passing through the stud, is bent outward and upward, as best shown in Fig. 3. In the disk M is an elongated eccentric slot, V. Upon the inner side of said disk is secured or formed a pin or stop, W, and on the edge of the disk is a recess, X.

The combination of parts represented in Fig. 7 and above described is placed upon the gas-cock, so that the disk K on the latter enters the slot V, and so that the pin or stop W on the inner side of the disk M comes into position to act upon the ratchet-teeth of the wheel J, as best shown in dotted lines, Fig. 1. Outside of the disk M and its attachments is a cap or cover, Y, of thin sheet metal, which has a central aperture, into and through which passes the spindle end or projection I of the gas-cock. This cap has formed upon it or attached to it a projecting piece, Z, which is bent horizontally, as shown in Figs. 3 and 4. In this projection is an aperture, through which passes a screw, *a*, which enters the body of the burner.

It will be apparent that this single screw holds all the parts of the device securely in position. The gas-cock is tapering and enters a tapering aperture; hence by turning the screw *a* inward said cock is wedged more tightly and made to fit more closely in its seat. On the other hand, it is necessary to remove only the screw *a*, when all parts of the device may at once be separated. This mode of connection by a single screw, which at the same time serves as a means of adjusting the cock to its seat and the several parts tightly to each other, is one of the most important and advantageous features in my invention.

In addition to the parts already named I provide a spring, *b*, of thin steel or other suitable material, one end of which is hooked over or otherwise suitably secured to the pin O on the lever-arm N. This spring is carried around the exterior of the ratchet-wheel J, and is secured at its other end, by hooking or otherwise, to the body of the screw *a*, as best shown in Fig. 1. From said figure, and also Fig. 4, it will be seen that the screw *a* passes through the recess X in the edge of the disk M, so that when said disk is rotated the shoulders formed by said recess and at its opposite ends will meet the screw-body, which thus serves as a stop to limit the rotary movement of the disk.

The operation of the apparatus can now be easily followed. With a two-way valve or cock, as shown, it is apparent that the gas will be turned on every quarter-revolution, or, in other words, turned on and off alternately at each succeeding eighth-revolution, the valve always rotating in the same direction—say from right to left. It follows, therefore, that the embodiment of my invention shown in the drawings is to be so constructed that at one operation it will move the valve one eighth-revolution and turn on the gas; that the parts, excepting the valve, will then return to their normal position, so that the gas is left turned on; that at the next operation the valve will be moved again in the same direction one eighth-revolution to turn the gas off; that the parts, excepting the valve, will then return to their normal position, so that the gas is left turned off. This is done in the following way by the apparatus shown: The respective parts normally take the position shown in Fig. 1. The gas is then turned off. The right-hand shoulder of the recess X in the disk M is brought in contact with the screw *a* by the action of the spring *b*. The pin W on the disk M is ready to act upon the ratchet-wheel J, but is not in contact with the adjacent tooth. The operator now pulls the lever N over in the direction of the arrow in Fig. 2. The disk is thus turned, being resisted, of course, by the elasticity of the spring *b*. The pin W on the disk M meets the adjacent tooth of the ratchet-wheel J, and carries that wheel around until the left-hand shoulder of the recess X in the disk M meets the body of the screw *a*. When this happens, the ratchet-wheel J, and consequently the cock H, will have been turned one-eighth revolution, and the gas will be fully turned on.

It will be apparent that the arrangement described whereby the pin W has some play or movement before it strikes the ratchet-tooth avoids the necessity of very delicate or nice adjustment of the device, as might be required did the pin at once begin to act upon the tooth.

The gas-duct, as the cock is turned, of course opens gradually, so that between the point of total stoppage of the gas-flow and complete opening of the duct the cock is open in greater or less degree. It follows, then, that the gas-flow begins before the cock is wholly open.

As soon as the gas begins to escape, the lighting device should come into play. As the lever-arm N is moved over, the arm P, with the spring-electrode R, is moved up to the fixed electrode, and just after the pin W has begun to move the ratchet-wheel J, and so open the valve, the end S of the spring-electrode meets the fixed electrode E. As the lever N is further drawn over, the end of the spring-electrode wipes over and across the fixed electrode E.

Inasmuch as the electric circuit in the apparatus is arranged to proceed from the battery to the fixed electrode E, and then to the movable electrode S, and so back to the battery or to ground, the circuit is completed when the electrodes are in contact, as described, and it is broken when the spring-electrode S is moved out of contact with the fixed electrode E by the further motion of the lever N. When the electrodes meet and separate, sparks are produced which ignite the outcoming flow of gas.

I am aware that in an apparatus of this

kind a movable electrode having a yielding or elastic contact-point is not new; but I have devised in connection with such a contact-point some important and novel features, which I will now describe.

On referring to Fig. 3 it will be seen that the outer end of the arm P, which supports the spring-electrode S, is bent outwardly. This enables me to use a long and elastic spring end or wiping-point.

On referring to Figs. 1 and 2 it will also be observed that the side of the burner-tube at *c* is flattened, so that its side edges form shoulders. Now, when the lever N is moved over to the left, as described, the bent projection U on the lower end of the spring-electrode R S meets the right-hand edge, corner, or shoulder of this flattened portion *c*, and is consequently retarded.

The spring R is thus rotated, so that the end S is turned in the direction which it would naturally be turned by contact with the fixed electrode E. The result, therefore, is that the spring S always meets the fixed electrode with a light pressure, less than that due to its normal elasticity, yet quite sufficient to maintain rubbing contact with said fixed electrode.

The arrangement of spring-electrode as here shown accomplishes, however, another and important result. It has been stated that the current from the fixed electrode passes to the movable electrode and so to the ground. Ordinarily, in apparatus of this sort, the current goes through the metal of the operating mechanism and so to the gas-pipe. Where the mechanism consists of several pieces in contact, dust or foreign substances may become interposed, or the pieces themselves may become by wear slightly separated, so that considerable resistance may thus be thrown into the circuit, so reducing the strength of the current. I obviate all this danger through the downward extension of my spring-electrode, which, by the contact of its bent lower end U with the side *c* of the burner, short-circuits the current entirely out of the valve mechanism, the current then passing from fixed electrode E to spring-electrode S R, and then directly to the burner-pipe at *c*.

I have now described the operation of my apparatus in passing from the position shown in Fig. 1 and in full lines, Fig. 2, during which operation the gas has been turned on and ignited in the manner described.

By referring to Fig. 1 it will be seen that the disk K on the cock H lies in the left-hand extremity of the slot V in the moving disk M. The last-mentioned disk is therefore centrally supported on the disk K, and turns on its true center when it is carried over to the left by the lever N and against the action of the spring *b;* but, when the lever-arm N is released and is retracted by the spring *b*, the stop W on the inside of the disk M must pass over the inclined side of the next ratchet-tooth of the wheel J. As this wheel J is fixed in place, the disk M must move laterally to let the stop get over the tooth, and the movement is permitted by the elongated slot V. The effect is then to move the disk M to the left, so that the disk K on the cock H centers in the right-hand end of the slot V, and the disk M is eccentrically supported on the cock-stem.

From Fig. 1, however, it will be apparent that the right-hand end of the slot V is higher than the left-hand end; hence the arm P, carrying the spring-electrode, will, when the disk M centers on the right-hand end of the slot, be substantially shortened, so that the spring-electrode S will not reach the fixed electrode E. Consequently, by the above-described construction and arrangement of parts, these results are secured, namely: First, the operating-lever N and attachments move back to normal position without affecting the gas-cock H, because the stop W on the lever-disk M slips over the inclined side of the ratchet-teeth on the cock-stem; second, the spring-electrode S on its back travel passes under the fixed electrode E, because its arm P is substantially shortened by reason of the disk M, supporting that arm, becoming eccentrically instead of centrally pivoted; hence the spring-electrode S is kept out of the flame on its return, and is not thus subjected to overheating and destruction.

Near the end of the lever N, I provide a hole or holes, L, to which a cord, chain, or rod for moving said lever may be attached.

In two other applications for Letters Patent filed simultaneously herewith, and serially numbered 124,605 and 124,606, I have described electric gas-lighting apparatus analogous to the foregoing. All inventions claimed in my aforesaid applications are herein disclaimed.

I am aware that it is not new to insert into the end of a gas-pipe a tube of insulating material and place therein a lining of waterproof material in which separate electrodes are embedded, as shown in United States Patent No. 252,848, January 24, 1882, and also that it is old to attach a fixed electrode to a burner by a metallic ring encircling the exterior of the burner-pipe and insulated therefrom, as shown in United States Patent No. 260,804, July 11, 1882.

I claim as my invention—

1. In an electric gas-burner containing electrodes and circuit-connections, the combination of a gas-burner pipe, a ring or band of conducting material inserted in the end thereof and carrying one electrode, a partition of insulating material interposed between said band and the pipe, and a burner-tip insulated from said band and inserted therein, substantially as described.

2. In an electric gas-burner containing electrodes and circuit-connections, the combination of a gas-burner pipe, a lining of insulating material inserted in the end of said pipe, a ring or band of conducting material inserted within said lining, and having attached to or formed upon it one electrode, and a burn-

er-tip of insulating material inserted within said conducting ring or band, substantially as described.

3. In an electric gas-burner containing electrodes and circuit-connections, a burner-pipe having a tapering upper orifice lined with insulating material, a correspondingly-tapered burner-tip of insulating material, and an electrode formed upon or attached to a band of conducting material, the said electrode being held in place upon the burner by the interposition of said band between the insulated end of the burner-pipe and the burner-tip inserted in said band, substantially as described.

4. In an electric gas-burner, a fixed electrode supported on the gas-burner near the gas-escape orifice, a yielding elastic electrode, a movable support for said elastic electrode, and means of moving said support, the said elastic electrode having two contact-points, one making contact with the fixed electrode and the other simultaneously making contact with a conductor in circuit, substantially as described.

5. In an electric gas-burner, a fixed electrode supported on the burner near the gas-escape orifice, and a movable arm supported on the burner-pipe, the said arm having two elastic contact-points, one making contact with the fixed electrode and the other simultaneously making contact with the burner-pipe or other conductor in circuit, substantially as described.

6. In an electric gas-burner, a fixed electrode supported on the burner near the gas-escape orifice, an oscillating arm pivoted to or on the burner-pipe, a coiled spring supported on the extremity of said arm, one end of said spring making contact with the fixed electrode and the other end making contact simultaneously with the burner-pipe or other conductor in circuit, and circuit-connections, substantially as described.

7. In an electric gas-burner, circuit-connections, a fixed electrode supported on the burner near the gas-escape orifice, a movable arm supported on said burner, and an electrode supported on said arm and adapted to make contact with said fixed electrode, and a means of short-circuiting the current received by the movable electrode from the fixed electrode to a conductor in the circuit, and thus preventing the passage of the current to ground by way of the arm, substantially as described.

8. In an electric gas-burner, the burner-pipe A, insulated fixed electrode E, pivoted arm P, and spring R, having contact-points S and U, substantially as described.

9. In an electric gas-burner, the combination of the pipe A, gas-cock H, the ratchet J, disk K, and projection I, attached to or formed integral with said gas-cock, disk M, having an elongated slot, V, and provided with a stop or pin, W, arm N, attached to or formed upon said disk M, coiled spring *b*, connected at one end to disk M and at the other end to a fixed support upon the gas-pipe, covering-plate Y, and a means of rigidly attaching said plate to the gas-pipe or other fixed support, substantially as described.

10. In an electric gas-burner, the pipe A, tapered gas-cock H, and tapering seat therefor in the pipe A, the ratchet J, disk K, and projection I, rigidly secured to or formed integral with the said gas-cock, disk M, having a central opening to receive the disk K, stop W and recess X, arm N, attached to or formed upon said disk, and covering-plate Y, in combination with the set-screw *a*, passing through said covering-plate Y and having a bearing in the body of the pipe, substantially as described.

11. In an electric gas-burner, the combination of the burner-pipe A, gas-cock H, ratchet J, disk K, projection I, covering-plate Y, and screw *a*, with the disk M, having a central opening to receive the disk K, stop W, arm N, and recess X, substantially as described.

12. The combination of the burner-pipe A, valve H, ratchet J, disk K, projection I, disk M, having an operating lever-arm, N, and an arm, P, carrying an elastic electrode, stop W and recess X, plate Y, screw *a*, spring *b*, and fixed electrode E, substantially as described.

13. In an electric gas-burner, the combination of the gas-pipe, a fixed electrode supported thereon near the gas-escape orifice, an oscillating arm supported on said pipe, and a spring contact-piece or electrode movably held upon said arm, and means for moving said contact-piece on its support, so as to reduce its pressure upon and to delay its period of contact with the fixed electrode, substantially as described.

14. In an electric gas-burner, the combination of the gas-pipe, a fixed electrode supported thereon near the gas-escape orifice, a movable arm supported on said pipe, and a coiled spring movably supported upon said arm, the said spring having two points or projections, one adapted to make and break contact with the fixed electrode and the other to make contact with the gas-pipe, so that by said last-mentioned contact the spring is rotated on the movable arm and the contact-point held less strongly and longer in contact with the fixed electrode, substantially as described.

15. In an electric gas-burner, the burner-pipe A, having a flattened side, *c*, insulated fixed electrode E, pivoted arm P, and spring R, having contact-points S and U, substantially as described.

JOHN A. NORTON.

Witnesses:
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