(No Model.) 2 Sheets—Sheet 1.

LE ROY S. WHITE.

APPARATUS FOR LIGHTING GAS BY ELECTRICITY.

No. 298,531. Patented May 13, 1884.

Fig. 4.

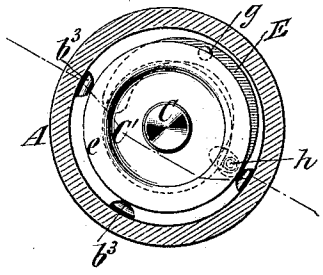


Fig. 2.

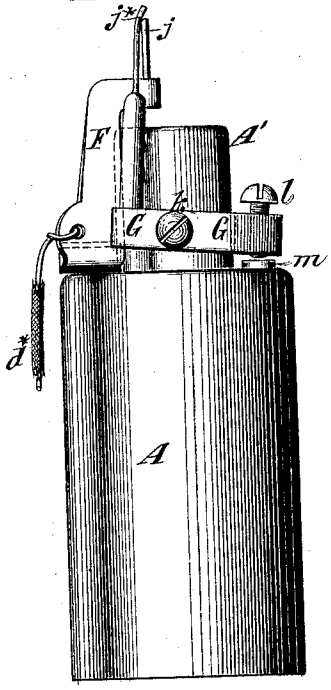


Fig. 1.

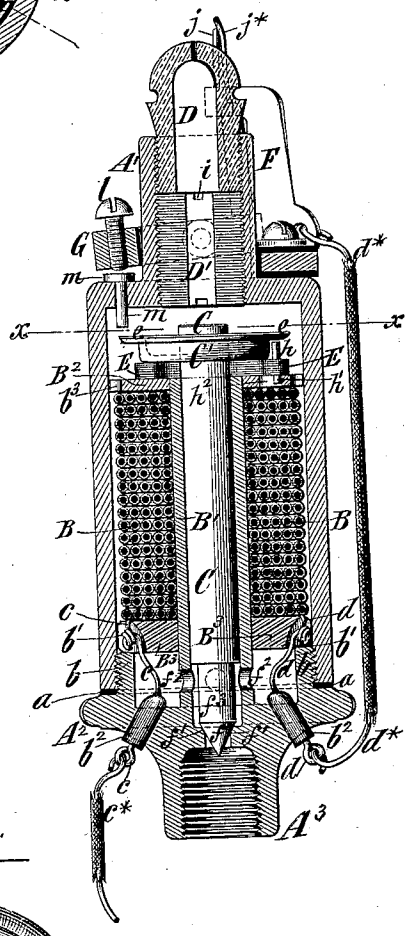
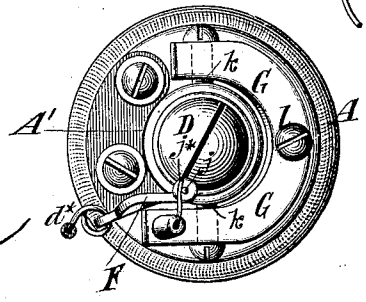


Fig. 3.



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N. PETERS. Photo-Lithographer, Washington, D. C.

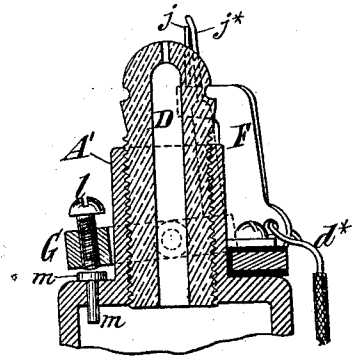
(No Model.) 2 Sheets—Sheet 2.

LE ROY S. WHITE.

APPARATUS FOR LIGHTING GAS BY ELECTRICITY.

No. 298,531. Patented May 13, 1884.

Fig 5.



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UNITED STATES PATENT OFFICE.

LE ROY S. WHITE, OF WATERBURY, CONNECTICUT, ASSIGNOR TO THE ELECTRIC APPLIANCE COMPANY, OF SAME PLACE.

APPARATUS FOR LIGHTING GAS BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 298,531, dated May 13, 1884.

Application filed January 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, LE ROY S. WHITE, of the city of Waterbury, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Apparatus for Turning On, Lighting, and Shutting Off Gas by Electricity, of which the following is a specification.

My invention relates more particularly to the electric gas-burner shown and described in my Letters Patent No. 282,816, dated August 7, 1883, in which there are combined with a gas-valve adapted to close automatically when released an electro-magnet for opening the valve, and a permanent magnet, which, by the electro-magnet, is moved so as to form of itself a positive stop or lock to hold the valve open; but some features of the invention may be embodied in electric gas-burners in which the valve, when opened by the action of an electro-magnet, is held open by a permanent magnet, which does not form of itself a positive stop or lock, or by other means.

The objects of my invention are to simplify the construction and manner of assembling and connecting the several parts of the burner shown in my former patent, to dispense with all springs for making or breaking contact at the tip of the burner, to provide for the ready adjustment of the several parts on the proper action of which depends the certainty of making and breaking contact, and to afford facility for taking the burner and its internal mechanism apart for repair or cleaning.

The construction and manner of combining the several parts of the apparatus whereby the advantages above referred to are secured will be hereinafter fully described, and pointed in the claims.

In the accompanying drawings, Figure 1 represents a central vertical section of an electric gas-burner embodying my invention. Fig. 2 is an elevation of the entire burner with the exception of the base portion of the case. Fig. 3 is a plan of the burner. Fig. 4 is a horizontal section on the dotted line *x x*, Fig. 1; and Fig. 5 is a central vertical section of the upper portion of an electric gas-burner also embodying my invention, and hereinafter referred to.

Similar letters of reference designate corresponding parts in all the figures.

The case of the burner, which is of metal, consists of a cylindric portion, A, having at the top a socket or hollow projection, A′, for the reception of the burner-tip, and a base portion, A^2, which is screwed into or otherwise secured in the lower open end of the cylindric portion A, and is provided with an internally screw-threaded socket, A^3, for attaching it to a gas-bracket. A packing, *a*, of any suitable material, may be placed between the lower end of the portion A and the base A^2, to form a gas-tight joint. Within the case is arranged an electro-magnet, the coil B of which is wound upon a tube, B′, which is or may be of brass, and which is formed integral with or rigidly secured to the base portion, A^2, of the case. Preferably the tube B′ and base A^2 will be formed of a single brass casting. The coil B is wound between heads B^2 B^3, the upper head, B^2, being of brass and fixed upon the tube B′, and the lower head, B^3, being of vulcanite or other non-conducting material. In assembling these parts, the lower head, B^3, is slipped upon the tube B′, and the upper head, B^2, is securely fixed on the upper end of the said tube. As here shown, the head B^2 is bored out to fit the tube B′, and is driven or otherwise tightly fitted upon it. The lower head, B^3, bears against the upwardly-projecting flange *b* of the base A^2, which is screwed into the portion A of the case, and when the wire of the coil B is wound on the tube B′ it will hold the head B^3 against said flange *b*. The two terminals *c d* of the coil B are carried down through openings or notches *b′* in the edge of the lower head, B^3, and through insulations b^2, fixed in the base A^2. To these terminals *c d* the conductors *c* d** are attached, as shown in Fig. 1.

C designates the core of the electro-magnet. It is provided at the upper end with a head, C′, having an outwardly-projecting flange, *e*, and at the lower end of the core is a gas-valve, *f*, which closes on a valve-seat, *f′*, in the base A^2.

Just above the base A^2 the tube B′ is provided with one or more apertures, f^2, which form a gasway for the passage of gas from the

interior of the tube B′ into the case A A², and at f^3, immediately above the valve *f*, the core C is somewhat reduced in diameter to permit the gas to pass freely upward and through the apertures f^2. The notches *b′* in the lower head, B^3, and similar notches, b^3, in the upper head, B^2, afford ample space for the passage of gas upward to the burner-tip D.

Upon the top of the head B^2 of the coil B is a permanent magnet, E, which is of U shape, and which is shown in Fig. 4. This permanent magnet is similar to the one shown in my former patent above referred to, and its functions are the same here as there. It rests upon the head B^2, to which it is pivoted at *g*, and it can swing or move slightly on said pivot, as one or the other of its poles is attracted by the core C.

At one of the ends of the permanent magnet E is an upward projection, *h*, and a downward projection, *h′*, which enters an elongated hole or slot, h^2, in the head B^2, as shown in Fig. 1. The projections *h h′* are conveniently formed by a single pin driven through the magnet E, and projecting above and below it. The slot h^2 in the head B^2 limits the play of the projection *h′*, and thus determines the movement or extent of oscillation of the permanent magnet E. The projection *h* on the permanent magnet E does not operate in any way on the flange *c;* but when the core C is raised the magnet E may be swung in a direction to bring the projection *h* below the head C′, and the core C will then be held in an elevated position, with the valve *f* open. As shown in Fig. 1, the valve *f* is closed, and the whole weight of the core C rests upon the valve-seat *f′*, and is otherwise unsupported; hence the valve *f* will normally be held tightly closed and the wasteful escape of gas will be prevented.

From the above description it will be understood that all the internal mechanism to which I have referred is supported by the base portion A^2, and is not attached in any way to the cylindric portion A of the case; hence, when the conductors *c* d** are disconnected from the terminals *c d* of the coil B and the base portion A^2 is unscrewed from the cylindric portion A of the case, the coil B, tube B′, heads B^2 B^3, and core C will all be removed, together with the base, from the cylindric portion A. The core C and valve *f* can then be at once taken out, or the core can be turned to grind the valve *f* to its seat *f′*. When the base A^2 and its attached parts are removed from the portion A of the case, the operation of the electro-magnet and valve *f* can be tested by holding a piece of iron (for an armature) over the core C.

D′ designates a soft-iron armature, which is screwed into the socket A′, wherein the burner-tip D is placed, and which has a gasway through it. I preferably make the burner-tip D of iron, and when it is screwed down so as to make contact with the armature D′ it adds to the mass of the armature, and therefore itself acts as an armature. An iron burner-tip of sufficient size and length may form of itself an armature without the piece D′, and in Fig. 5 I have shown such a burner-tip, D.

In the upper part of the armature D′ is a nick, *i*, for the insertion of a screw-driver, by means of which the armature may be adjusted to give just the required movement to the core C. Such adjustment of the armature is very desirable, because the packing *a* may vary in thickness, and in different burners the head of the core may not stand at exactly the same height.

To adjust the armature D′, it is screwed down until it touches the top of the core C, when the core is in its lower position, the valve being closed, and then it is turned back one or two turns, or more, as may be desired. The pitch of the thread on the armature being known, its distance from the core C can thus be determined and definitely fixed.

*j j** designate the two contact-points which are adjacent to the burner-tip D, and by the separation of which the spark for lighting is produced. The contact *j* is fixed to a post or standard, F, which is secured to the top of the case A, it being insulated therefrom, as best shown in Fig. 1. The conductor *d** extends from the terminal *d* of the magnet-coil B to the post or standard F, as is also shown in Fig. 1. The movable contact *j** is carried by a yoke or yoked lever, G, which is pivoted to the socket or projection A′ at *k*, and is so proportioned that its weight on the side of its fulcrum opposite the contact *j** will preponderate and hold the movable contact *j** normally against the fixed contact *j*. In the heavier side of the yoke or yoked lever G is an adjusting-screw, *l*, and immediately below this is a headed pin or piece, *m*, which projects downward into the case of the burner, and the lower end of which falls within the circumference of the flange *e* on the core-head C′, as is shown in Fig. 1. When the parts are in the position shown in the drawings, the screw *l* should be adjusted so that it will not quite touch the head of the pin *m*, and the preponderating weight on that side of the yoke will hold the contact *j** against the fixed contact *j*. When the core C is raised, the flange *e* strikes the pin *m* and raises it, thus bringing it against the screw *l*, and tilting the yoke G sufficiently to break contact between *j** and *j*, and thus produce a spark. It is desirable that the movement of the contact *j** should be as little as possible, and this result is attained by the several adjustments which I have provided. The armature D′ should be adjusted to allow a movement of the core C upward sufficient to enable the pin or projection *h* on the permanent magnet E to pass under its head C′. The screw *l* should then be adjusted so that the pin *m* will not strike it and break contact between *j** and *j*, until just as the core completes its upward movement. The circuit through the apparatus is normally closed, and the current entering at *c* c*

passes through the coil B and its terminal *d* to the conductor *d**, thence through the post or standard F, contacts *j* j*, yoke G, and case A A^2 to the gas-pipe, and thence to the ground. With the apparatus should be employed a double key of ordinary construction, by which currents of opposite polarity may be sent through the conductor *c**, and this key should be connected with the opposite poles of a battery as well as with the conductor *c** and the gas-pipe. When a current of the proper polarity is passed through the coil B, the core C is raised by the armature D′ sufficiently to allow the projection *h* on permanent magnet E to pass under the head C′, by which the valve *f* is held open. By its rising the core C has broken contact between *j** and *j*, and the spark thus produced ignites the gas. When the circuit is broken by the key, the core cannot fall, being held up by the pin *h* on the permanent magnet E, and thus the gas-valve is held open. When it is desired to put out the gas, a current of opposite polarity is sent through the coil B. The pole of the permanent magnet E, which was before attracted by the core C, is now repelled, the pin *h* is moved from under the head C′, and when the circuit is broken by the key the core C falls, closing the gas-valve *f* and allowing the yoke G to move to make contact between *j** and *j*. The use of the pivoted and gravitating yoke G to carry the movable contact *j** is very desirable, as I thus dispense with all springs in the circuit-breaking mechanism, and am enabled to accurately regulate the extent of movement allowed the movable contact. Springs adjacent to the tip of a gas-burner soon become so softened or annealed by the heat that they are incapable of properly performing their functions. If desired, an ordinary sparking-coil may be used to increase the spark produced by breaking contact. The contact *j* constitutes the fixed member of a circuit-breaking device, and the contact *j** and yoke G constitute a gravitating movable member of such device. The pin or piece *m*, interposed between the yoke G and the movable core C, serves as a means of producing the circuit-breaking movement of the gravitating member.

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

1. The combination, with the burner-case having a separable base, of an electro-magnet having a movable core, and the coil of which is attached to and has its terminals passing through said base, a circuit-breaking device outside of said case, and a piece interposed between said core and circuit-breaking device passing through said case from the interior to the exterior thereof, for producing the operation of said circuit-breaking device by the movement of said core, substantially as herein described.

2. The combination of the case A, the base A^2, provided with a valve-seat, *f′*, the tube B′, projecting upward from said base, the core C, arranged within said tube, and having the gas-valve *f* at its lower end, and the coil B, surrounding the said tube, and having its terminals *c d* extending through the base, substantially as herein described.

3. The combination of the case A, the base A^2, having the screw-threaded flange *b* and the valve-seat *f′*, the tube B′, projecting upward from said base, the core C, having the gas-valve *f* at its lower end, the head B^3, fitting upon said tube and bearing against the flange *b*, the head B^2, applied to the upper end of said tube, and the coil B, surrounding said tube between the heads B^3 B^2, and having its terminals *c d* extending through said base, substantially as herein described.

4. The combination, with the case of an electric gas-burner, provided with a screw-threaded socket or projection for the burner-tip, of circuit-breaking devices upon the top of the case, a pin projecting downward into the case and serving by its upward movement to break the circuit, an electro-magnet arranged within the case, and having a movable core adapted to act upon said pin in its rising movement, and having its armature adjustable in said socket or projection, substantially as herein described.

5. The combination, with the case A, provided with the socket or projection A′, of the electro-magnet having its core C arranged within the case, circuit-breaking devices on the exterior of the case, the pin *m*, adapted to be acted on by said core in its upward movement, and an iron burner-tip, D, fitted in said socket or projection and acting as an armature to the core C, substantially as herein described.

6. The combination, with the case A, having the socket or projection A′, of the coil B and core C, arranged in said case, and the armature composed of the piece D′ and burner-tip D, both of which are adjustable in said socket or projection, substantially as herein described.

7. The combination, with the case of an electric gas-burner and an electro-magnet having a movable core arranged within the same, of a circuit-breaking device consisting of a fixed member and a gravitating movable member, and a piece passing through the case and interposed between the said movable core and said gravitating member, for the purpose of producing the circuit-breaking movement of said gravitating member by the movement of said core, substantially as herein described.

8. The combination, with the case of an electric gas-burner and an electro-magnet having a movable core arranged within the same, of the fixed and movable contacts *j j**, the pivoted gravitating lever or yoke G, carrying said contact *j**, and the pin *m*, adapted to be operated by the said magnet-core to tilt the said lever or yoke and break contact between *j** and *j*, substantially as herein described.

9. The combination, with the case of an

electric gas-burner and an electro-magnet with a movable core arranged within the case, of the fixed and movable contacts *j* *j**, the pivoted gravitating yoke or lever G, carrying the contact *j**, and provided with the adjusting-screw *l*, and the pin *m*, adapted to be operated by said magnet-core to tilt said yoke or lever and break contact between *j** and *j*, substantially as herein described.

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