

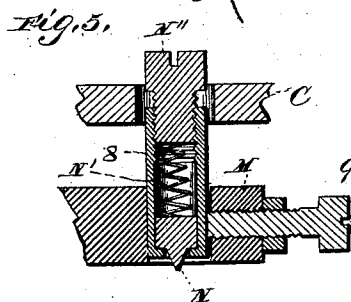
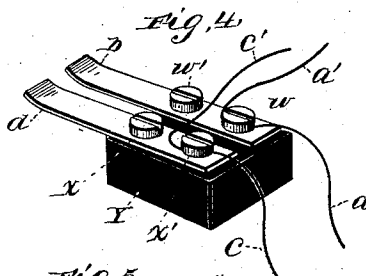
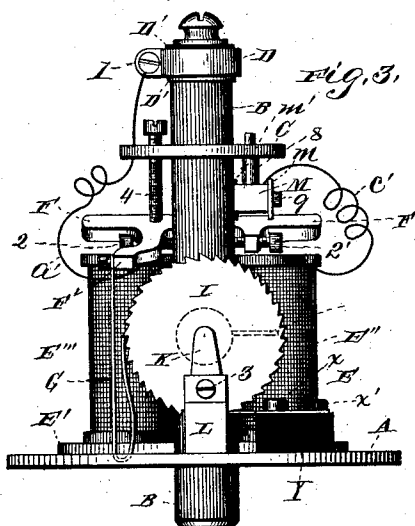
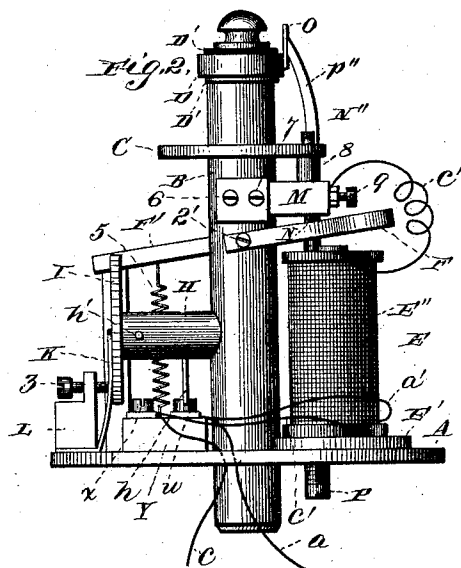
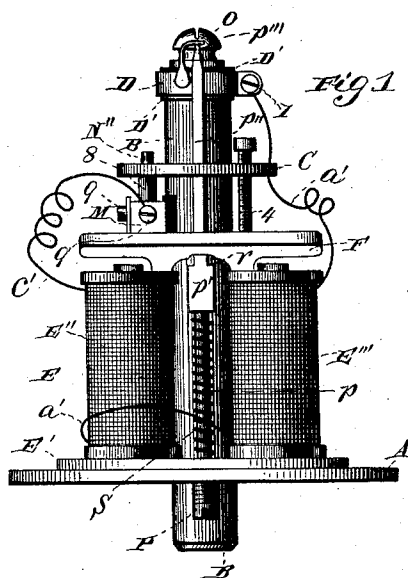
(No Model.)

R. C. NOURSE & T. W. LANE.

AUTOMATIC ELECTRIC GAS LIGHTING BURNER.

No. 469,408.

Patented Feb. 23, 1892.



Witnesses:
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UNITED STATES PATENT OFFICE.

RUFUS C. NOURSE AND THOMAS W. LANE, OF BOSTON, MASSACHUSETTS,
ASSIGNORS TO THE ELECTRIC GAS-LIGHTING COMPANY, OF PORTLAND,
MAINE.

AUTOMATIC ELECTRIC GAS-LIGHTING BURNER.

SPECIFICATION forming part of Letters Patent No. 469,408, dated February 23, 1892.

Application filed December 29, 1890. Serial No. 376,189. (No model.)

To all whom it may concern:

Be it known that we, RUFUS C. NOURSE and THOMAS W. LANE, both of Boston, Massachusetts, have invented a new and useful Improvement in Automatic Electric Gas-Lighting Burners, of which the following is a specification, reference being had to the drawings.

Our invention relates to the well-known class of "automatics," so called, in which the gas is turned on, the breaker vibrated, and an electric-lighting spark obtained from the current in traversing a single circuit, to which the distant operator admits it by means of the ordinary push-button.

Our invention in general consists in passing the current through but one helix of the electro-magnet, and then through the circuit-breaker at the tip of the burner in letting on the gas and through the other leg or helix and a part other than the circuit-breaker at the tip to turn it off, although the current in passing through one leg or helix will render the core of the other leg magnetic.

Our invention consists, further, in doing away with any of the well-known forms of commutators and circuit-shifters commonly used in such devices, and substituting therefor a short-circuiting device which is greatly superior in practice.

It consists, further, in changes and adaptations which will more clearly appear from the description hereinafter made.

Referring now to the drawings, Figures 1, 2, and 3 are different side elevations of the apparatus, the ordinary shell, of which no description is needed, being removed. Fig. 4 is a detail showing the circuit connections. Fig. 5 a detail showing our novel circuit-breaker attachment.

A is a preferably brass platform; B, the gas-pillar; C, the upper platform; D, the metal collar; D', the insulating-collar, held in place by D, which is clamped by the screw 1, which also holds the wire a' , as shown later. E is an electro-magnet having the base E' and the two legs E'' E'''.

F is the armature, pivoted at 2 and 2' to the pillar and having the extension F' to carry the bent spring G, steadied by a hole in plat-

form A, by which the ratchet-wheel is to be rotated.

The gas-cock plug (not shown) is, as is usual in this class of burners, cut away, so that it is open about one-third of the rotation and closed about two-thirds of the rotation, and is continuous with its spindle H, having spurs $h h'$. The ratchet-wheel I is firmly attached to spindle H. Both are conveniently held in place, and any wear provided for by spring K, secured between the base A and block L and adjustable as to pressure upon the ratchet by the screw 3. The limit of upward stroke of the armature is adjustable by screw and bolt 4. The normal position of the armature is secured by a slight coiled spring 5, attached to platform A. A block M is attached to the pillar B by the screws 6 7, being properly insulated from both the pillar and the screws by thin mica or other insulators $m m'$. A socket 8, held in block M by binding-screw 9, holds a plunger or circuit-breaking point N by a small spiral spring N', Fig. 5, which in turn is held by screw N'', which passes through platform C without touching or being in electrical connection therewith. From the base of the block projects the plunger N in contact with the armature during most of its motion and until that is drawn nearly down to the magnet, and which apparatus constitutes a circuit-breaker, as hereinafter described.

The fixed electrode O may be constructed as part of the collar D; but its point is of platinum.

The movable electrode or circuit-breaker is constructed as follows: The socket-screw P, inserted through platform A, has a hollow, in which is loosely socketed a rod p , having an enlargement p' , which is formed with a shelf r , upon which the descending armature will strike and push the rod p down against the stress of helical spring S. From r the rod p continues p'' , and, being provided with a platinum point p''' , is held normally in contact with the fixed electrode O by stress of spring S.

We will now particularly describe the circuit connections. The wires are not shown

to be covered, as may be done by rubber tubing or other insulation, in order to make the drawings plain. Wire *a* from the battery (not shown) is held by binding-posts *w w'* in electric connection with both its extension *a'* and with the flat spring *b*, and *a'* extends to and connects with the coils of helix *E'''*. Spring *b* extends beneath spindle *H* and makes contact with spur *h*, projecting from the spindle, when proper revolution is made. Wire *c* (from same battery) is held by binding-posts *x x'* in electric connection with both its extension *c'* and with flat spring *d*, and *c'* extends to and connects with the coils of helix *E''*. Spring *d* extends beneath spindle *H* and makes contact with spur *h'*, projecting from the spindle when proper revolution is made. These circuit connections are insulated from the platform *A* upon a proper stand *Y* of any proper material.

We will now describe the operation of the apparatus, assuming the gas to be on and lighted and spur *h* in contact with spring *b*, as in Fig. 2. It is evident that if depression of the same push-button be continued no vibration of the armature will occur, because the circuit is shorter from *a* through *b*, *h*, *H*, and *B* to ground, than from *a* through *a' E''' a' D O p'''*, &c., to ground. Consequently the ratchet-wheel will not be turned, and so the gas remains burning. If now it be desired to extinguish the gas, the current is admitted by another push-button from the same battery (not shown) over wire *c*, whence it passes to wire *c'*, to helix *E''*, whose core becomes magnetic and attracts the armature, the current passing on by continuation of *c'* to block *M*, plunger *N*, and so to the armature and to ground, until, as the armature separates from *N*, breaking the circuit, this helix is de-energized and the armature released until again brought to contact with *N* by stress of spring *5*. By this make and break the ratchet is rotated by the pawl on extension *F'* of armature until spur *h'* contacts with spring *d*, and at once the current ceases to pass by wire *c'*, but by the shorter circuit *d*, spur *h'*, spindle, and pillar to ground, leaving the gas-cock so far rotated as to be closed and the gas extinguished. If it be now desired to relight it, the current is admitted by wires *a a'*, helix *E'''*, which at once attracts the armature, the current passing by continuation of *a'*, Figs. 1 and 3, to the circuit-breaker until the armature, striking the enlargement *p'* of the circuit-breaker rod *p*, separates the point *p'''* from *O*, making a spark and breaking the circuit, and so de-energizing the magnet and allowing the armature to resume position and the point *p'''* to make contact with *O*, whereupon the operation is repeated, and by these vibrations so established of the armature the gas cock and spindle are rotated until as the cock becomes fully open by the slit therein coming in line with the gas-tube the spur *h* makes contact with spring *b*, and the current, instead of passing by wire *a'*, now passes by this spring *d*,

spur *h*, spindle, and burner to ground, the armature ceases to vibrate, and the gas having been lighted by the successive sparks at the burner-tip is left on and burning.

It will now be seen that our invention is in development of the single-circuit automatic first suggested in Letters Patent No. 130,170, to J. P. Tirrell, and improved in later Letters Patent to him in 1876, 1878, and 1880, to Bosworth in 1887, to Bailey in 1888, and to Lane in 1890; and that while the two main novelties of mechanical construction are to be found in the use of a second circuit-breaker and in the springs and spurs for the utilization of the same the chief electrical novelty in this burner over its predecessors lies in the application of an electrical "short-circuit"—or the principles which explain its origin and nature—for the purposes of a switching mechanism in the form of burner which uses a ratchet-wheel to open the gas-valve.

Having described our invention, we desire to protect not only the burner as a whole, as shown and described, but also certain sub-combinations less than the whole, and also individual parts of which we are the inventors—that is to say:

We claim—

1. The secondary-circuit breaker for electric gas-lighting burners, composed of the block *M*, having the insulators *m m'*, the socket *S*, binding-screw *9*, plunger *N*, spiral spring *N'*, screw *N''*, holding said spring *N'*, which in turn holds the plunger *N*, and a co-operating contact, substantially as described.

2. The short-circuiting switching mechanism for electric gas-lighting burners, composed of wires *a a' c c'* and proper connecting-screws, the springs *b d*, block *y*, the gas-cock spindle *H*, and its spurs *h h'*, combined with an electro-magnet so that wire *a'* shall electrically connect with one and wire *c'* with the other of its helices, and combined with two circuit-breakers so that the several circuits between the battery and ground by way of the circuit-breakers shall be longer than those by way of the flat springs, spurs, and spindle, substantially as described and shown.

3. In an electric gas-lighting burner, the combination, with the ordinary platforms, pillar, and fixed electrode, of a gas-cock spindle provided with spurs, ratchet-wheel, and proper retaining devices therefor, a circuit-breaker normally in contact with the fixed electrode, a circuit-breaker normally in contact with the armature, an electro-magnet and an armature therefor pivoted to the tube and extending into an armature-lever, a bent spring attached to said lever adapted to gear with the ratchet-wheel, and two wires from an electric battery, one electrically connected with one helix of the magnet electrically connected with the circuit-breaker at the burner and the other with the other helix electrically connected with the other circuit-breaker, said wires also electrically connected severally with two circuit-springs alternately making and breaking

contact with the spurs upon said spindle, substantially as described.

4. In an automatic electric gas-lighting burner, the combination, with an electro-magnet electrically connected with two electric circuits, of two circuit-breakers and two corresponding short-circuiting devices, substantially as described.

5. In an automatic electric gas-lighting burner, the combination, with two electric circuits and two corresponding short-circuiting devices, substantially as described, of an electro-magnet with two circuits, one helix in electrical connection with one circuit and the other helix with the other circuit, so that the alternate series of vibrations of the armature may be made to operate the circuit-breaker which is at the burner-tip to there produce sparks when the gas is to be turned on and lighted and to operate the circuit-breaker which is not at the tip when the gas is to be turned off.

6. The combination, with the pillar, platforms, magnet, armature, armature lever and pawl, gas-cock, spindle, ratchet, holding block and spring, fixed electrode, pawl-carrying bar, rod, and break-piece or movable electrode or circuit-breaker at the burner, of two wires from the battery in electrical connection severally with the several helices of the magnet, and also with two springs, two spurs upon said spindle adapted to alternately make and break contact with said springs, a second circuit-breaker electrically connected with one

helix of the magnet, the other helix electrically connecting with the other circuit-breaker or movable electrode at the burner, substantially as described.

7. The automatic electric gas-lighting burner, composed of the lower platform A, tube B, upper platform C, collar D, insulating-collar D', magnet E, having the base E'' and helices E'' E''', armature F, extension or lever F', ratchet-moving spring G, a gas-cock and spindle H thereof and spurs *h h'* thereon, ratchet-wheel I, pressure-spring K to retain the cock in adjustment, block and screw 3 to hold the wheel, adjusting-screw 4, armature-retracting spring 5, and a second circuit-breaker constituted by block M, attaching-screws 6 7, insulators *m m'*, socket 8, screw 9, plunger N, spiral spring N', screw N'', substantially as described, and fixed electrode O, and a circuit-breaking rod composed of the socket-screw P, rod *p*, enlargement *p'* thereof, shelf *r*, and retracted by a helical spring S, continuations *p'' p'* of rod *p*, wire *a*, posts *w w'*, extension *a'* of battery-wire *a*, spring *b*, battery-wire *c*, binding-posts *x x'*, extension *c'* of battery-wire *c*, spring-contact *d*, and insulating stand or block Y, all substantially as described.

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