J. P. TIRRELL.

Electric Gas-Lighting Apparatus.

No. 206,057. **Patented July 16, 1878.**

FIG. 1.

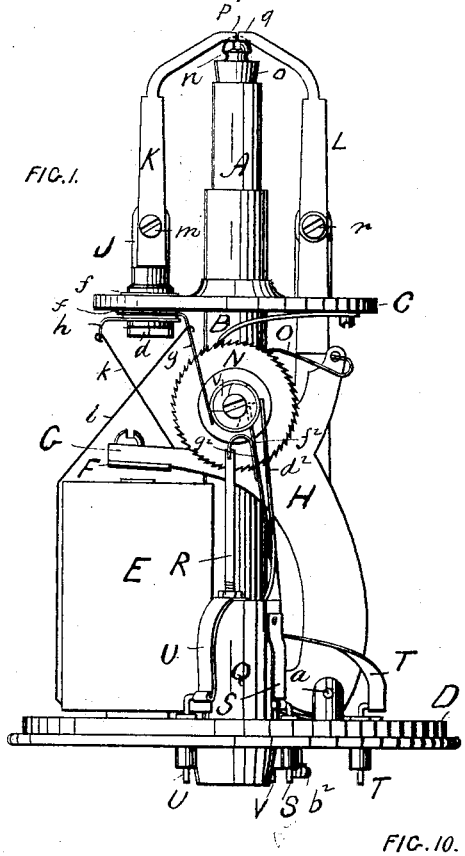


FIG. 2.

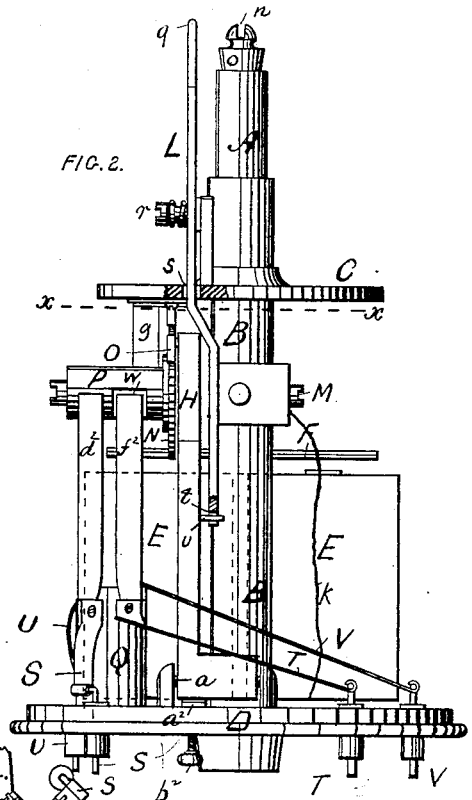


FIG. 10.

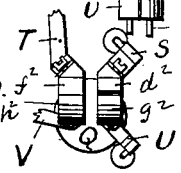


FIG. 3

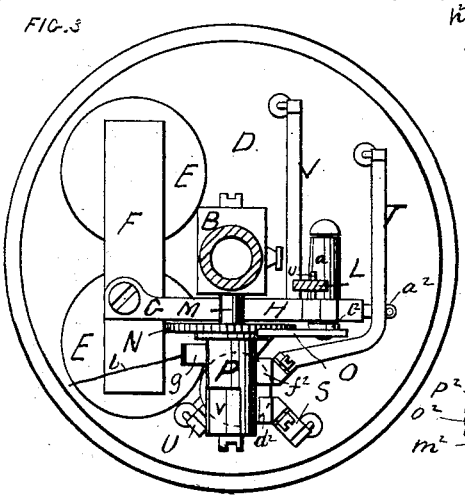


FIG. 11.

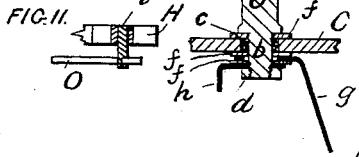


FIG. 4.

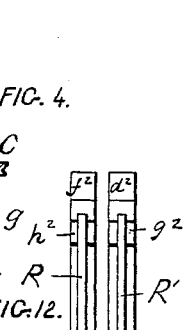


FIG. 12.

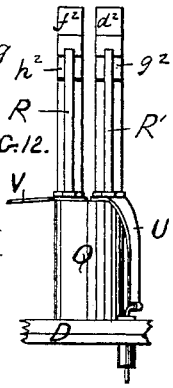


FIG. 9.

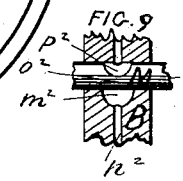


FIG. 8.

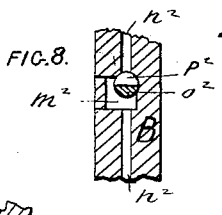


FIG. 6.

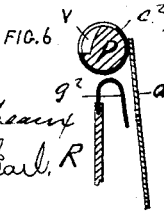


FIG. 7.

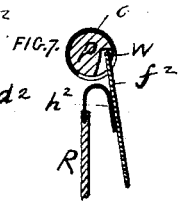
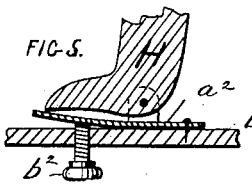


FIG. 5.



WITNESSES.

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UNITED STATES PATENT OFFICE.

JACOB P. TIRRELL, OF SOMERVILLE, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC GAS-LIGHTING APPARATUS.

Specification forming part of Letters Patent No. **206,057**, dated July 16, 1878; application filed October 18, 1877.

To all whom it may concern:

Be it known that I, JACOB P. TIRRELL, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electric Gas-Lighting Apparatus, of which the following is a specification:

This invention relates to electrical apparatus for lighting street-lamps in which the current is successively thrown into the magnet at each burner, one after another, and particularly to that class of such apparatus in which the circuit-breaker is located at the burner-tip, and is operated by the armature of the magnet at the burner, which armature also operates a pawl to open and close the valve and secure the automatic switching of the current from its magnet into the magnet of the next burner, and so on through the series of burners which are arranged in the circuit.

The present improvements are particularly in the construction, connection, and arrangement of the several parts, all substantially as hereinafter described, reference being had to the accompanying plate of drawings, in which—

Figures 1 and 2 are side elevations; Fig. 3, a horizontal section on line *x x*, Fig. 2; Figs. 4, 5, 6, 7, 8, 9, 10, 11, and 12, views in detail.

In the drawings, A represents a gas-burner, and B its feed-pipe, provided with two horizontal platforms, C and D, which carry the mechanism of this apparatus. E is a U electro-magnet, vertically secured and insulated on the lower platform D at one side of the gas-pipe B. F is the armature to magnet E. This armature is at the upper end of the magnet, and it is secured to the horizontal arm G of an upright lever, H, which turns on a fulcrum, *a*, of the lower platform D.

J is a stud or post on upper platform C, and its screw-threaded part *b* passes through the hole *c* in the platform C; and on the under side of the platform it has a screw-nut, *d*, which fastens it in position.

f is mica lining and washers on stud J, to insulate it and the platform, and also to insulate the two metal arms *g* and *k*, which are fastened to said stud J by said screw *d*, under the platform, from each other, and the one *g* from the stud or post J. *k* and *l* are two wires, one, *k*, connecting the arm *k*, and thus the post or stud J, with one pole, and one, *l*, connecting the arm *g* with the other pole, of the magnet.

K is a vertical metal extension of post J, which is fastened thereto by a set-screw, *m*, and ends in close proximity to the slit *n* of the burner-tip *o*, where its point *p* is in contact with the point *q* of an arm, L, which is the circuit-breaker of the apparatus when such circuit-breaker is at rest.

This circuit-breaker turns on a fulcrum, *r*, of the upper platform C, and it extends through an opening, *s*, of the platform down alongside of the vertical lever H, before referred to, and has its forked lower end *t* engaged with a pin, *u* of such lever.

M is the spindle to the gas-valve, and N a ratchet-wheel fastened to it; and this ratchet, with the valve-spindle, is turned by a spring-pawl, O, secured to the vertical lever H, every time such lever swings forward toward the magnet from the attraction of the armature by the magnet, as will hereinafter appear.

a^2 is a bent spring, arranged to bear on lower end of lever H to throw such lever back and the armature which it carries from contact with the magnet when there is no attraction of the magnet.

b^2 is a screw in lower platform, and in position to bear on the bent spring, so that by screwing it in and out the tension of said spring may be regulated at pleasure, and accordingly the speed of the lever in its forward and backward movements is increased or diminished.

The valve-spindle M projects beyond the ratchet-wheel N, and such projection P is insulated from the ratchet-wheel and its metal connection with the gas-pipe; and it is made of metal c^2, that is cut away in two places, *v w*, and each cut-away place embraces about one-third of the circumference of the projection, and the two places are on opposite sides, but in different vertical planes.

d^2 f^2 are two spring-metal vertical fingers, fastened to an insulated post, Q, of the lower platform D, and in position for the upper free end of the one spring, d^2, to bear upon the valve-spindle extension P in the plane of its one cut-away portion, *v*, and for the upper free end of the other spring f^2, to bear upon the valve-

spindle extension P in the plane of its other cut-away portion, *w*.

R R′ are two metal standards, secured to insulated post Q of lower platform D, and terminating at their upper ends with wider plates g^2 h^2, in position for a contact between them and the said spring-fingers d^2 f^2, respectively, when such fingers are off their bearing on the extension P of valve-spindle, and are opposite to the cut-out portions *v* *w* of such spindle, and to be out of contact when such fingers are on their bearing of the valve-spindle extension.

S is the turning-on wire, and T the shutting-off wire. These two wires lead from the electric battery, and the turning-on wire S connects with one spring-finger, d^2, and the shutting-off wire T with the other spring-finger, f^2.

U V are two wires. The one, U, connects the rest-plate g^2 of one spring-finger, d^2, with the same spring-finger of the next burner of the series of burners, and the other, V, similarly connects the rest-plate h^2 for the other spring-finger, f^2, with the same spring-finger of the next burner, and so on through the series of burners.

The metal arm *g*, which, as has been stated, was insulated from the post of the upper platform C and connected with one pole of the magnet by a wire, *l*, is at all times in contact with the extension P of the valve-spindle M, so that when either of the spring-fingers d^2 f^2 is in contact with the said extension P, and the current from the battery is directed into the wire which leads to such spring-finger, the circuit, so long as such contact exists, is then complete through the magnet of the burner where such spring-finger is located to the ground, and passes through said spring-finger to the valve-spindle extension P; thence to the arm *g*, which is always at a bearing on said extension, and from this arm to one pole of the magnet; thence through the magnet to the other pole, and from thence along the wire to the stud, up through the extension K to the circuit-breaker L, and thence through it and the gas-pipe to the ground.

The circuit, when thus complete, through the magnet of a burner attracts the armature F, which swings the lever H, and through this swing of the lever the ratchet-wheel and valve-spindle are turned and the contact of circuit-breaker at the point *p* is broken, whereby a spark is emitted and the circuit through the magnet is broken, destroying its attraction of the armature, which then is carried back to its normal position by the reaction of the bent spring a^2 upon the lever H, which carries it, and thus the circuit-breaker is brought again into contact at the point *p*, which re-establishes the circuit, when the same operation again takes place, and so on until, by the turning of the valve-spindle, its cut-away portion in same vertical plane as the spring-arm through the wire of which the current from the battery is flowing comes opposite to the said finger, which breaks contact with valve-spindle extension and leaves it free to act, comes into contact with its rest-plate g^2 of the standard R′, and thus the current is switched into the next burner of the series, and, operating through the apparatus of that burner, goes from that to the next, and so on, all as above described.

When the one spring-finger is off its bearing on the extension P of the valve-spindle M, the other is on; and thus the apparatus at each burner is at all times in readiness for a current to be directed through its magnet by either the turning-on or the shutting-off wire, as the case may be.

The spring-pawl O is fastened to a stud, l^2, and this stud is fitted in a socket in the lever H, so that by turning it to the left or right the pawl may be made to bear with a greater or lesser force upon the ratchet.

By simply loosening the screw which fastens the extension K to the stud J, the point P of such extension K, which makes the contact with the circuit-breaker L, can be readily adjusted at pleasure.

To detach the circuit-breaker, it is only necessary to first set it off of its fulcrum, when it is free to be lifted through the opening *s* in the platform, as is obvious.

The gas-valve M lies within an enlargement, m^2, of the passage n^2 through gas-pipe to the burner, and it is there placed so that its solid portion o^2 within the said enlargement will close the passage n^2 therefrom to the burner when the valve is properly turned to bring its solid portion across the same, and that its cut-away portion P^2 will open the said passage to the said enlargement when the valve is properly turned therefor, the enlargement being at all times open to the part of the gas-passage in gas-pipe which is below said enlargement.

This construction and arrangement of the gas-valve secures a letting on in one half-turn of the valve and a shutting off in the other half-turn.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the extension P of valve-spindle M, insulated as described, and having cut-away places *v* *w*, with the spring-fingers d^2 f^2, rest-plates g^2 h^2, and arm *g*, all arranged relatively to each other and connected by wires, substantially as described, for the purpose specified.

2. The insulated stud J, having arms *g* *h*, which are insulated from each other, and one, *g*, from the stud, and connected the one with one pole and the other with the other pole of an electro-magnet, all substantially as described.

3. The bent spring a^2 and its regulating-screw, in combination with the lever carrying the armature and the circuit-breaker, substantially as described.

4. The combination, with the circuit-breaker L and terminal K, of wires *k* *l*, connected with

opposite poles of an electro-magnet, E, arms *h g*, metallic spindle P, having cut-away portions *v w*, fingers d^2 f^2, connected to wires S T, and the rest-plates R R′, connected with wires V U, substantially as and for the purpose set forth.

5. The combination of pivoted spring-lever H, carrying armature F, and having pin U projecting therefrom, and the pivoted circuit-breaker L, having slot *t* in its end and embracing said pin, substantially as and for the purpose set forth.

6. The combination of pivoted spring-lever H, carrying armature F and spring-pawl O, and having pin U projecting therefrom, the pivoted circuit-breaker L, having a slot embracing said pin, and the ratchet-wheel N, arranged upon the gas-cock spindle, substantially as described.

7. The combination, with lever H, of the circumferentially-adjustable pin l^2, the bent spring-pawl O, rigidly secured to said pin, and the ratchet-wheel N, whereby the pressure of the spring-pawl upon said wheel may be adjusted as desired.

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Witnesses:
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