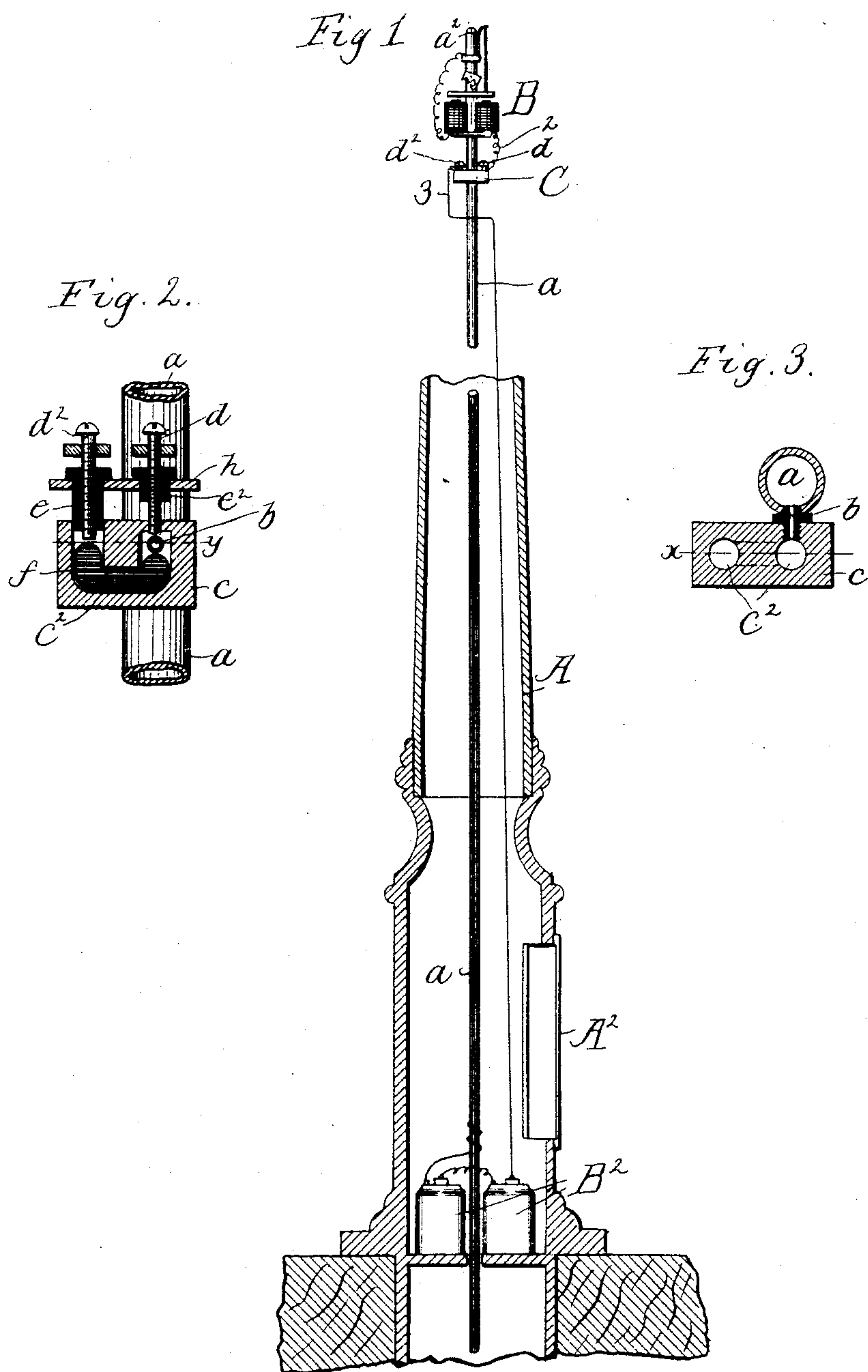


(No Model.)

H. H. CUTLER.
ELECTRIC GAS LIGHTING APPARATUS.

No. 445,727.

Patented Feb. 3, 1891.



Witnesses.
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UNITED STATES PATENT OFFICE.

HENRY H. CUTLER, OF NEWTON, MASSACHUSETTS.

ELECTRIC GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 445,727, dated February 3, 1891.

Application filed May 6, 1890. Serial No. 350,786. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. CUTLER, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in
5 Circuit-Closers for Electric Gas-Lighting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 My invention is embodied in an electric gas-lighting apparatus, and relates, mainly, to a circuit-closer to be used in connection therewith, the apparatus being especially intended for lighting street-lamps by means of electric
15 appliances in a local circuit at each lamp to be lighted. The electric gas-lighting appliances themselves constitute no part of the invention, which may be employed in connection with the electric gas-lighting mechanism
20 of that kind in which the alternate closures of a circuit turn on and off the gas and ignite the gas at the same operation by which it is turned on. Such appliances have heretofore commonly been operated by a push-button or
25 similar manual circuit-closer, requiring that the circuit should be extended to the point from which it is to be operated.

The present invention relates, mainly, to the circuit-closer, and is embodied in a circuit-closer supported upon a gas-pipe and adapted to be operated by changes in pressure in the gas flowing through the pipe, such means of operation being efficient and reliable and not interfering appreciably with the
35 regular working of the gas apparatus.

The circuit-closer may be constructed in various ways, its essential characteristic being that it has a movable member exposed to the pressure of the gas and moved by changes
40 in said pressure, so as to make and break contact with the other member of the circuit-closer.

In the construction herein shown for illustrating the invention the movable member or
45 contact portion of the circuit-closer consists of a column of mercury contained in a U-shaped tube, one branch of which communicates with the interior of the gas-pipe, so that the mercury therein is exposed to the pressure of the gas in the pipes, causing a slight depression of the mercury in the said branch and a corresponding elevation of the mercury

in the other branch of the siphon, which is not exposed to the gas-pressure. As the pipes for street-lamps have a very direct connection
55 with the main, and as the pressure is maintained with great uniformity in the mains by the regulating apparatus of the gas-works, any variations in the level of the mercury column that may arise in the normal operation of the gas apparatus will be extremely
60 small, so that the mercury in the higher branch of the tube will never rise above a predetermined point in the normal working of the gas-supplying apparatus. The said column
65 of mercury constitutes one member of the circuit-closer, and a suitable metallic contact normally insulated from the mercury contained in the tube and extending into the branch of the tube that is not exposed to gas-
70 pressure constitutes the other member, it being possible to place the said contact very close to the surface of the mercury without danger of accidental contact between the two, owing to the fact, as before stated, that the gas-
75 pressure never exceeds a definite maximum amount in the normal working of the apparatus. When, however, it is desired to close the circuit for the purpose of lighting or extinguishing the gas, the pressure in the main is in-
80 creased a slight amount, which can easily be done by shifting the weight of the usual pressure-governor at the gas-works for an instant, such increase in pressure being sufficient to depress the mercury in the branch of the si-
85 phon that communicates with the gas-pipe, producing a corresponding rise in the other branch, which will bring the mercury against the contact and close the circuit, and it will be understood that all circuit-closing devices
90 of this kind will be operated simultaneously, as the increase in pressure will be transmitted throughout the entire system of pipes.

Figure 1 is a sectional elevation of a lamp-post provided with gas-lighting appliances
95 embodying this invention. Fig. 2 is a sectional elevation on line *x x*, Fig. 3, of the circuit-closer; and Fig. 3, a horizontal section thereof on line *y y* of Fig. 2.

The apparatus is shown as employed in
100 connection with a lamp-post A, containing the gas-pipe *a*, leading from the street-main to the burner-tip *a*², which is provided with an electric gas-lighting device B, included in a

local circuit at and preferably inclosed within the lamp-post A, the said circuit being operated by a battery B², which is accessible through an opening in the base portion of the post A, said opening being provided with a cover or door A².

The gas-lighting instrument proper B is of the kind in which a single closure of the circuit actuates the electro-magnet in such manner as to turn on and ignite the gas, and a second closure of the circuit turns off the gas, the circuit remaining normally open, and the closures requiring to be maintained only for a very short period of time in order to effect the desired operation. A gas-lighting instrument adapted to operate in this manner is shown and described in Patent No. 382,249, dated May 1, 1888, and such instrument may be employed in the present apparatus, the specific construction of said instrument of itself constituting no part of the present invention, which relates, mainly, to the organization of the entire lighting apparatus in connection with the gas-supplying apparatus, and especially to the construction of the circuit-closing device C, which controls the local circuit of the gas-lighting instrument B and its battery B², which is operated by changes in pressure of the gas in the pipe *a*, so that, although the gas-lighting devices B at the several lamp-posts are included in separate circuits, all of those connected with one gas-main or one system of gas-supply may be operated simultaneously. The said circuit-closing device is applied to the gas-pipe *a*, which has a small hole cut in its side and screw-threaded to receive a nipple *b*, composed of hard rubber or other material, which also screws into the piece *c*, which may be of metal, iron, or brass, having a U-shaped passage *c*², which constitutes an inverted siphon. For convenience in construction the upper ends of the branches of the passage are open and are screw-threaded to receive screws *d* *e*, the former of which is of metal and makes metallic contact with the piece *c* and receives the wire 2, that constitutes one terminal of the wire of the circuit to be controlled by the device, so that the said screw *d* and piece *c* and mercury *f* in the siphon-passage *c*² constitute one terminal of the said circuit. The screw *e*, that closes the other branch of the siphon-passage, is a hollow screw or bushing and of insulating material and receives within it a metallic screw *d*², connected with the other terminal 3 of the circuit-wire, and thus constituting the other terminal of the circuit to be controlled by the device, the end of said screw *d*² extending into the branch of the U-shaped passage a short distance, as shown, but terminating a short distance above the normal level of the mercury *f* in said branch, so that the said screw *d*² normally is insulated from the screw *d* and metallic parts connected therewith, keeping the circuit connecting said screws *d* *d*² normally open. The branch pipe or nipple *b* communicates with the siphon-

passage *c*² just below the screw *d*, so that the mercury in the corresponding branch of said passage is exposed to the pressure of the gas therein, and consequently normally stands at a slightly lower level than the mercury in the other branch, the difference in level depending upon the slight pressure normally maintained in gas-piping above the atmospheric pressure. The other branch below the screws *d*² *e* may have a slight opening leading to the atmosphere, but is preferably closed, as the amount of air contained within the branch below the screw *e* and above the mercury may be compressed sufficiently to provide for the proper operation of the device.

When it is desired to close the circuit for the purpose of simultaneously lighting all the lamps provided with circuit-closing devices such as shown, the pressure in the main is temporarily increased somewhat above its normal amount—that is, the normal amount in excess of atmospheric pressure—causing a corresponding depression in the mercury in the branch below the screw *d* and passage *b* and a corresponding rise in the mercury in the other branch, which will bring it into contact with the screw *d*², and thus close the circuit. When the circuit has been closed a sufficient length of time to insure the turning on and lighting of the gas by the electric gas-lighting appliances included in the said circuit, the gas-pressure is restored to normal amount and the circuit-closing devices restored to normal condition.

When the lights are to be extinguished, the operation is repeated, the electrical appliances being of that kind in which alternate closures of the same circuit causes first the turning on and lighting of the gas and then turning off the gas.

The screw *d*² may be easily adjusted to afford sufficient space between its end and the surface of the mercury to insure that the circuit will remain open under the maximum pressure that the gas may have in the normal working of the apparatus, and as a further mechanical support for the screws *d* *d*² an insulating-bushing *e*² is provided for the screw *d*, the said bushings *e* and *e*² screwing into a cross-bar plate or yoke *h*, fixed upon the gas-pipe *a*. It is obvious that the construction of the circuit-closer may be varied greatly without departing from the essential principle of the invention, it being necessary only to provide a movable member or contact-piece that is acted upon by gas-pressure and normally stands disconnected from the other member of the circuit-closer, but is moved into contact therewith by variation in pressure beyond the greatest variation that ever occurs in the normal working of the gas-supply apparatus.

I claim—

1. The combination of a gas-supply pipe provided with a burner and a valve controlling the flow of gas to said burner with an electric circuit-closer having a movable mem-

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ber or contact portion constantly exposed to the pressure of the gas in the main and moving in response to a variation in said pressure from the normal amount, whereby it may be operated to close and open the same by a momentary variation in the pressure in the gas-main, substantially as described.

2. The combination, with a gas-supply pipe provided with a valve and burner, of an electro-magnet for operating said valve and circuit therefor and circuit-closer in said circuit, having a movable member exposed to the pressure of the gas in the pipe and operated by variations in gas-pressure, substantially as described.

3. The combination, with a gas-supply pipe, of an electric circuit-closer comprising a piece having a U-shaped passage, and a liquid contained in said passage and rising into both branches thereof, a connecting-passage from one branch of said passage above the liquid therein to the exterior of the gas-pipe, and a contact-piece extending into the other passage and co-operating with the liquid therein to change the condition of the electric circuit terminating in said contact-piece when the level of the liquid is changed by a change in pressure in the gas, substantially as described.

4. The combination of the metallic siphon-

piece *c*, having a U-shaped passage, with a screw *a*, entering and closing the end of one branch of said passage, a connecting-passage *b* from said branch to the interior of the gas-pipe, and a screw *d*, extending into the other branch of the U-shaped passage and insulated from the siphon-piece, substantially as described.

5. The combination of a gas-supply pipe provided with a burner and a valve controlling the flow of gas to said burner with an electric circuit-closer having a movable member or contact portion constantly exposed to the pressure in the main and moving in response to a variation in said pressure from the normal amount, and an electro-magnet and armature and contact-electrodes operated by said armature in circuit with the said circuit-closer, the said contact being located at the burner for igniting the gas by the sparks produced by the separation of said electrodes, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY H. CUTLER.

Witnesses:

JOS. P. LIVERMORE,

M. E. HILL.