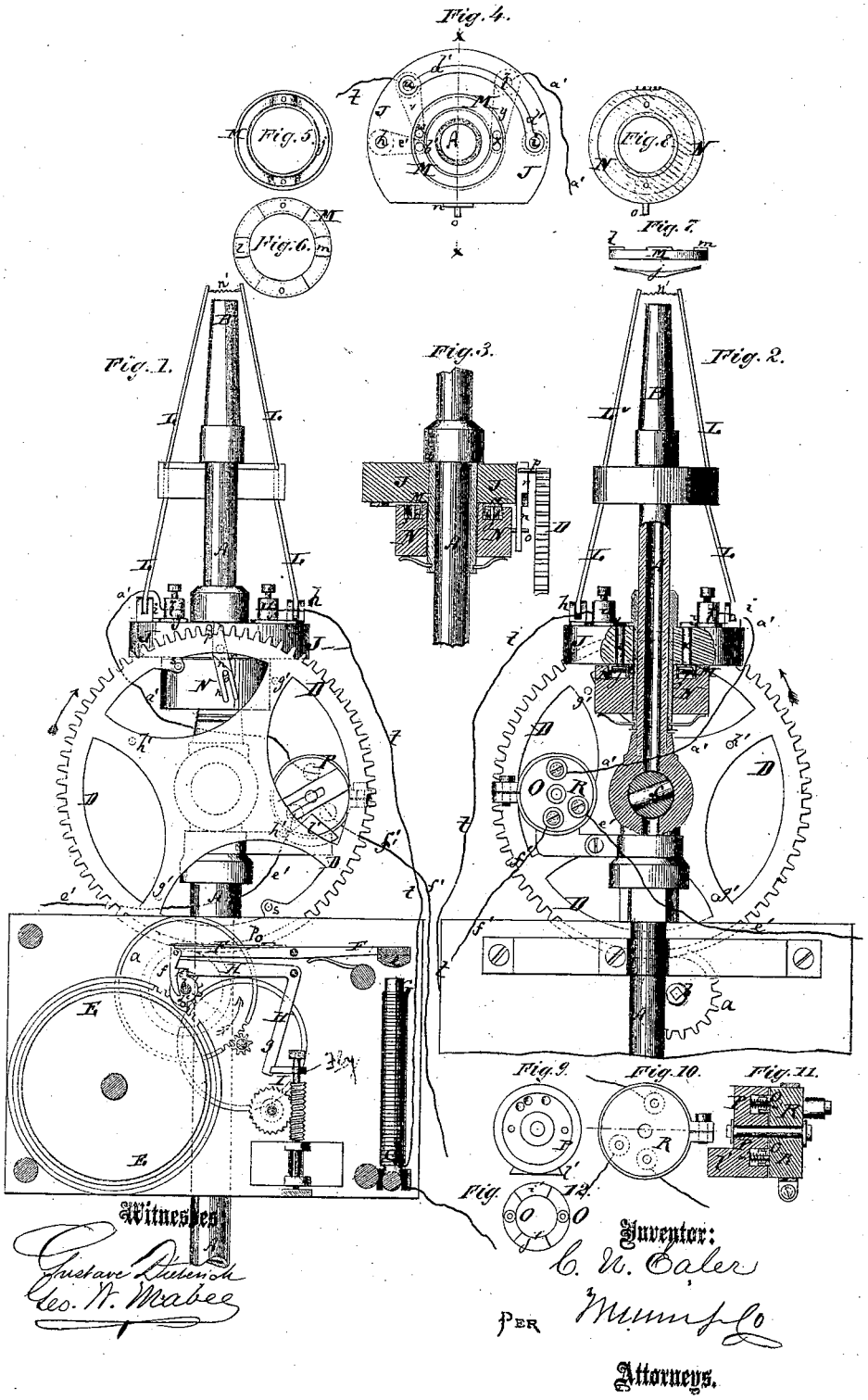
C. N. EALER.

Electric Gas Lighting Apparatus.

No. 107,465. Patented Sept. 20, 1870.



Witnesses:

Gustave Steinmetz

Geo. N. Mabee

Inventor:

C. N. Ealer

per Munn & Co

Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES N. EALER, OF OPELOUSAS, LOUISIANA.

IMPROVEMENT IN ELECTRIC GAS-LIGHTING APPARATUS.

Specification forming part of Letters Patent No. **107,465**, dated September 20, 1870.

To all whom it may concern:

Be it known that I, CHARLES N. EALER, of Opelousas, in the parish of St. Landry and State of Louisiana, have invented a new and Improved Electric Gas-Lighting Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 represents a side elevation, partly in section, of my improved gas-lighting apparatus. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a detail vertical section through the main switch, the plane of section being indicated by the line *x x*, Fig. 4. Fig. 4 is an inverted plan view of the main switch. Fig. 5 is an inverted plan view of the metallic circular conductor in main switch. Fig. 6 is a plan view of said conductor. Fig. 7 is an edge view of the same. Fig. 8 is a plan view of the swiveled non-conducting support of said conductor. Fig. 9 is a face view of the swiveled support of the secondary switch. Fig. 10 is a back view of the stationary part of said switch. Fig. 11 is a transverse section of the same. Fig. 12 is a face view of the metallic circular conductor of said switch.

Similar letters of reference indicate corresponding parts.

The object of this invention is to construct an apparatus for changing the course of a current of electricity without breaking the circuit and for lighting a number of gas jets or burners in succession.

The invention consists, first, in a novel catch for starting the apparatus when connection with an electric current is made.

The invention consists, also, in the application to each machine of an automatic switch, by means of which the current can for a short while be changed from the main channel to and through the platina wires, over the burners, and returned to the main channel without being arrested or broken.

The invention consists, finally, in the application to one machine, out of a number, of a secondary switch for throwing the current from the negative wire of one machine to the positive wire of the next. Thereby the current can first be confined to a limited number of machines, but will, after they have ignited the gas, be transmitted to another set of machines, passing merely through the main channels of the first.

A in the drawing represents the gas-pipe, carrying the burner B, to which one apparatus of my improved construction is to be applied. The pipe contains a cock, C, by means of which the gas is admitted to or kept away from the burner. Upon the cock is mounted a toothed wheel, D, which is, by means of intermediate gear-wheels *a a*, connected with a drum, E, containing a mainspring. The spring can be wound up to set the gear-wheels into motion, and to thereby cause the cock to be turned.

One of the shafts, *b*, of the clock-work carries a cam, *c*, which has a shoulder on one side and a pair of projecting pins, *d*, at the faces.

The gear-wheels are so arranged as to size that during one revolution of the shaft *b* the wheel D will make one-fourth revolution.

Within the clock-work is pivoted a lever, F, carrying at one end an armature-plate, *e*, above a fixed horseshoe, G, and at the other end a pivoted forked catch, *f*, with a spring over it to keep in position.

Under the lever F is pivoted to the case or frame of the clock-work an L-shaped lever or drop, H, of which the end of the horizontal arm is interposed between the cam *c* and the lever F, while the vertical arm *g* forms a stop for arresting the fly attachment I of the clock-work.

When the magnet draws down the armature, the hook-shaped catch *f* at the end of the lever F lifts the drop H and detaches the fly, allowing the machine to start.

After the shaft *b* has made part of one revotion the pins *d* strike the catch *f* and swing it off the lever H, which will drop upon the high edge of the cam. At the end of the revolution the end of the lever H drops down the shoulder of the cam, and brings thereby the arm *g* into the way of the fly for stopping the machine. The machine will then stop; but the armature will remain in contact with the horseshoe.

As soon as the current through the helix is broken the armature will swing off the horseshoe, and the catch *f* will drop again under the end of the lever H, ready for renewed action. Thus the machine is prevented from operating at one time more than one rotation of the shaft *b*, which produces one-fourth of the cock, being just enough to open the gas-pipe and admit the gas to the burner.

After this motion the clock-work is arrested by the drop H, while the current may continue to pass through the wires of the machine to those of the next until all the burners are lighted.

After having been once arrested by the drop, as aforesaid, the wheels cannot be again started unless the circuit through the helix around the horseshoe is first broken and again connected.

Around the pipe A is secured a disk or plate, J, made of ivory or some other non-conducting material. It supports on metal pins or points *h* and *i* the silver or platina wires L L, which extend up to and beyond the upper end of the burner, where the ends of L L are connected with a coil of fine platina wire, as shown in Figs. 1 and 2. Against the under side of the plate J is fitted a rotary switch, which consists of a metal ring, M, resting on a spring, *j*, with a grooved non-conducting plate, N, which can readily be turned. The ring M has two projecting studs, *l* and *m*, which serve to make the desired connection, with metallic pins passing through the plate J. To one edge of the plate J is pivoted a slotted lever, *n*, which embraces a pin, *o*, projecting from the ring N.

The wheel D has a series of projecting pins, *p p*, which, during the rotation of the wheel D, strike the lever *n*, or rather an inclined plane on a projecting V-shaped cam, *r*, of the same, and serve thereby to swing the lever and slightly turn the ring N and switch M. Other pins, *s*, on the wheel D serve to strike the cam *r* so as to swing the lever, switch, &c., in the direction opposite to that in which they were moved by the pins *p*.

When the clock-work is stopped the switch M is in a position for allowing the current to pass through the main channel. This main channel extends from the battery through the helix around the horseshoe G, and thence by the wire *t* to the post or screw-cup *u* on the plate J. From the post *u* the current passes over a plate, V, to a pin, *w*, which extends through the plate J. The lower end of the pin *w* is in metallic contact with the stud *l* of the switch N. The current passes therefore through the switch, and by the stud *m*, to a pin, *x*, which also traverses J. From *x* the current passes to a plate, *y*, and thence to a post or screw-cup, *z*, whence it is carried off by the negative wire *a'* to the next machine.

When the machine is set in action a pin, *p*, sets the switch so as to carry the stud *l* under a pin, *b'*, which is by a plate, *c'*, connected with the pin *h*. The stud *m* remains in contact with the pin *x*, which is enlarged for the purpose of being suited to the motion of the switch. The current passes then from the cup *u* over a copper wire, *d'*, from post *i* up wire L to and across on the platina wire *n'*, making it red hot, down the other wire L to post *h*, plate *c'*, pin *b'*, to stud *l*, across switch M to stud *m*, up *x* to *y*, thence to screw-cup *z*, whence it is carried to wire *a*. The turning of the switch by the pin *p* does therefore not break the current, but changes it merely, so as to light the gas. Immediately—*i. e.*, within one or two seconds after the switch was turned for conveying the current to the platina wire—the pin *s* strikes the lever *n* to carry the switch back to the former position for direct current. The pins *p s* on the next machine are so set on their wheel D as to operate the switch immediately after that on the preceding machine has been brought back to direct current, and so on until all burners are lighted.

The current is uninterrupted, but is merely so directed as to successively pass over the the several burners.

The spring *j* under the switch serves to keep the same at all times in contact with the metallic pins with which it is to connect.

Where a large number of machines are to be operated by the same battery, I propose to divide the same into groups of ten (more or less) machines to each group. Every tenth machine will then be provided with a secondary switch, O, for conveying the current from the negative wire *a'* of such machine to the positive wire *c'* of the next machine, which is the first of the next group. The switch O, in its ordinary position, connects the wire *a'* of the last machine with the ground-wire *f'*; but when it is turned by a pin, *g'*, on the wheel D it connects the wire *a'* with the wire *e'*, and retains this connection until the flames are again extinguished, when other pins, *h'*, on the wheel D change the current again to the ground-wire. The construction of the switch O is substantially like that of the switch M. It is made in form of a metal ring, with projecting studs *i'* and *j'*, and turns with a ring, P, which carries a V-cam, *l'*, for being acted upon by the pins *g' h'*. Springs *m'* hold the switch against a non-conducting plate, R, carrying the three posts of the wires *a'*, *e'*, and *f'*.

I will now recapitulate the general plan of operation.

If there are fifty burners, each having a machine, every tenth machine having a switch, O, and all the machines of each division or group being connected with each other by the wires *a'*, the current will, by attracting the armature *e* of all the machines in the first group, be brought down by the horseshoe as soon as connection with the battery is made, starting them at the same time. The first machine will have the cock C opened and the platina wire heated for igniting the gas in about eight seconds. The next will have the pins *p s* set back a few teeth, so that it will throw the current through the platina wire im-

mediately after the first has thrown it off, and so on to the tenth. Just before the tenth machine stops it operates the secondary switch, which takes the current from the ground-wire and causes it to pass to the next ten.

If the battery is strong enough to heat more than one platina wire simultaneously, the machines may be set up at corresponding intervals.

For extinguishing the lights, the machines are again set in operation for closing the cocks, and they will all start at the same time, and when the shaft *b* has made one revolution the cock will make the second quarter-turn, when the machine will stop, and the gas will have been cut off.

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

1. The combination of the cam *c*, pins *d*, catch *f*, and drop H, lever F, and magnet G, as shown and described, for the purpose specified.

2. The armature-lever F, provided with the catch *f*, and combined with the drop H and cam *c*, to operate substantially as herein shown and described.

3. The switch M, applied to the gas-lighting apparatus so that it will change the current from the direct channel to the platina wires without breaking the circuit, as set forth.

4. The lever *n*, carrying the cam *r*, and combined with the ring N and switch M, for operating said switch, in the manner herein described.

5. The combination of the wheel D, pins *q* and *s*, lever *n*, ring N, and switch M, substantially as described.

6. The ring-switch M, fitted into the ring N and held by a spring, *j*, against the plate J, substantially as herein shown and described.

7. The secondary switch O, applied to a gas-lighting apparatus for the purpose of changing the current from the negative wire of one machine to the positive of the next, substantially as specified.

8. The combination of pins *g' h'*, wheel D, and secondary switch O, as shown and described.

CHARLES N. EALER.

Witnesses:
J. F. KNOX,
JOS. D. RICHARDS.