(No Model.) 2 Sheets—Sheet 1.

A. WUNDERLICH.

ELECTRIC GAS LIGHTER.

No. 456,684. Patented July 28, 1891.

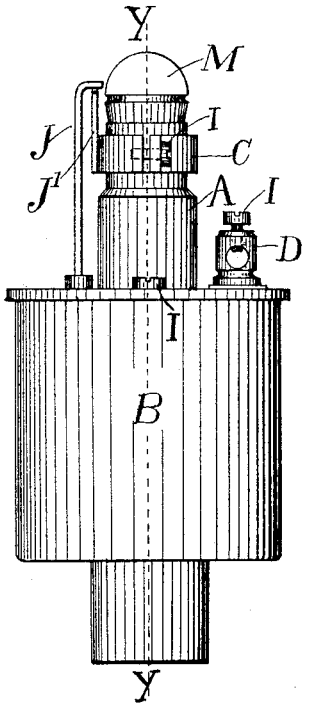

FIG. I.

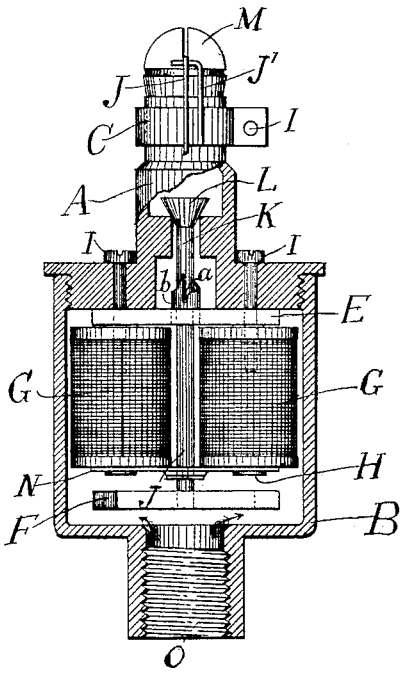

FIG. II.

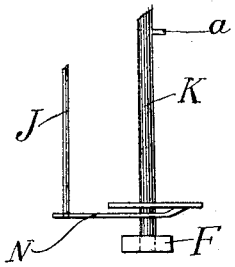

FIG. III.

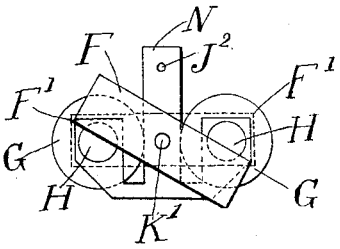

FIG. IV.

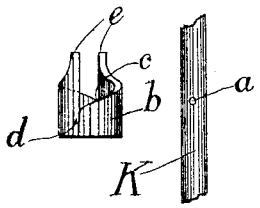

FIG. V.

WITNESSES.

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(No Model.) 2 Sheets—Sheet 2.

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ELECTRIC GAS LIGHTER.

No. 456,684. Patented July 28, 1891.

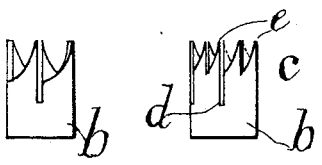

Fig. 6.

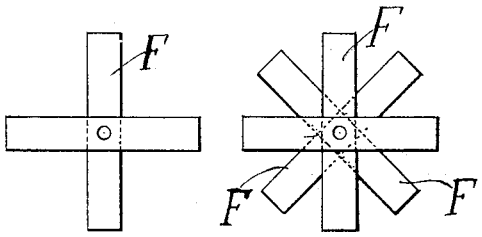

Fig. 7.

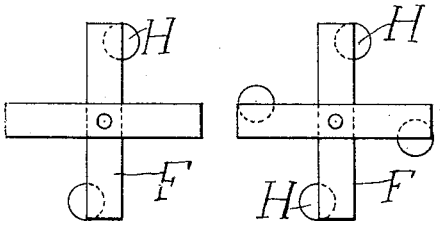

Fig. 8.

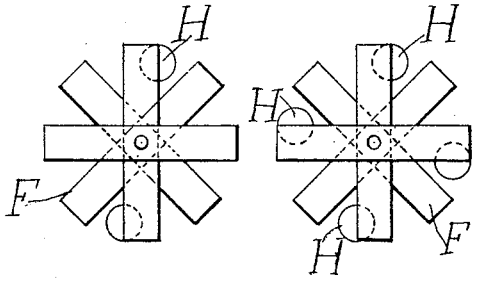

Fig. 9.

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UNITED STATES PATENT OFFICE.

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ELECTRIC GAS-LIGHTER.

SPECIFICATION forming part of Letters Patent No. 456,684, dated July 28, 1891.

Application filed April 7, 1890. Serial No. 347,007. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH WUNDERLICH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Automatic Electric Gas Lighting and Extinguishing Device, of which the following is a specification.

My invention relates to improvements in automatic electric gas lighting and extinguishing devices in which two electro or horseshoe magnets are connected up in two circuits that act singly and independently of each other, each circuit attracting the armature vertically and laterally, said armature carrying a valve-stem that operates a valve in accordance to an arranged lug and stop, in combination with said armature and in obedience to the acting electric circuit, and, further, igniting the gas by properly-arranged spark-producing electrodes; and the objects of my improvements are, first, to operate automatic electric gas lighting and extinguishing devices by a single electric circuit always flowing in the same direction; second, to provide the frame-work with a curvature-cam so arranged as to direct the rotation of the valve-stem and armature and to alternately hold open or let close the puppet-valve; third, to provide the valve-stem with a guide-pin slidable upon a curvature-cam and rotating the valve-stem and armature in obedience to said curvature-cam by its own weight or force of gravity. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure I is a vertical side view of an entire automatic electric gas lighting and extinguishing device. Fig. II is a vertical section of the burner-case, taken on the dotted lines Y Y of Fig. I and turned one-quarter toward you, showing a side elevation of the interior. Fig. III is a detached side elevation in detail of the valve-stem, pin, armature, vibrating spring, and movable electrode. Fig. IV is the bottom view in detail of the magnet's lower terminals, showing the dominant and actuated position of the armature. Fig. V is a detailed view of the detached parts comprising the invention.

Similar letters refer to similar parts throughout the several views.

The gas-pipe O, burner-case B, burner-cap A, binding-post D, insulated collar C, spark-producing electrodes J J′, electro-magnets G G, vibrating spring N, valve-stem K, armature F, puppet-valve L, and burner-tip M constitute parts in common with ordinary automatic electric gas lighting and extinguishing devices.

To the under side of the burner-cap A is secured the yoke-piece E and electro or horseshoe magnets G G by screws I I, (see Fig. II,) passing through the flange of said cap-piece A and yoke-piece E into correspondingly-threaded holes in the magnet-cores H H. On the top side and in the center of said yoke-piece E is provided a semi-curvature cam *b*, (see Figs. II and V,) that is secured by a driving fit into a corresponding hole through said yoke-piece E. The body of said curvature-cam *b* is hollow and has projecting points *e*, of altitudes that are equal in height and with perpendicular faces to the points *c* and *d* that are diametrically opposite to each other and unequal in depth, (see Fig. V,) the curvature-face of each point *e* developing against the opposite perpendicular face *d* or *c*, and referred to hereinafter. Onto the lower terminals of said magnet-cores H H is securely riveted a combined cross-piece and vibrating spring N, (see Fig. IV,) to which is secured by solder or otherwise at the point J^2 the movable electrode J, and referred to hereinafter. Through the hole K′ in said spring N plays a valve-stem K, (see Figs. III and IV,) that is let down through the hollow of the cap-piece A, (see Fig. II,) curvature-cam *b*, and spring N, above mentioned. Said valve-stem K has secured to its lower end by solder or otherwise an armature F and to its upper end a taper L, that corresponds to an opening in said cap-piece A and forms a puppet-valve L, that governs the flow of gas, and referred to hereinafter. Into the side of said valve-stem K, at a point below the puppet-valve L and in conformity with the face of the semi-curvature cam *b* and armature F aforementioned, is permanently secured a pin *a*, that projects upon the curvature-face and rotates said valve-stem and armature by its own weight or force of gravity to the extent of the curvature-face, which terminations alternately hold open or let close said puppet-

valve in obedience to the unequal depths *d* or *c* of the curvature-cam *b*, also bringing the armature F in every instance to within an attractable angle of the magnet-cores H H, as is shown in Fig. IV. The electric current enters the magnet-coils G G through the binding-post D, and continues by an extension of wire to the insulated collar C and electrode J′ into the movable electrode J to the burner-cap A, which, by forming contact with the gas-pipe, serves as the return-circuit or inversely. When the electric circuit is completed or closed, the magnets G G attract the armature F from the descended and angular position aforementioned and shown in Fig. IV up and into a straight position with the magnet-cores H H, as is shown by the dotted lines F′ in Fig. IV, and opens the puppet-valve L. The armature changing its position, as described, carries the guide-pin *a* over and past the altitude-point *e* of the curvature-cam *b*, and then, pressing against the spring N, carries the movable electrode J aforementioned upward, breaking contact between J and J′ (see Fig. I) and producing a spark that weakens the current until the force of attraction is lessened, which allows the armature to slightly descend and with it the spring N and movable electrode J, thus making closer contact between J and J′, which again strengthens the force of attraction, thereby creating intermittent vibrations of the movable electrode J and producing a rapid succession of sparks so long as the current continues to flow and with which the gas is ignited. So soon as the force of attraction is released, the armature F and valve-stem K drop down. The pin *a*, striking upon the curvature-face of the cam *b*, rotates the valve-stem and armature around and down into the terminations *d* or *c*, ready to be again attracted, the respective unequal depths of the terminations *d* or *c* holding the puppet-valve open or letting it close of its own weight. When a cam with four or more altitudes is used, (see Fig. VI,) the armature will likewise have more poles—that is, two or more armatures will be arranged crosswise at regular angles corresponding to the cam, (see Fig. VII,) in which case there may be (but not necessarily) two or more magnets. (See Figs. VIII and IX.)

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

1. The combination, in an automatic electric gas lighting and extinguishing device, of a single electric circuit, electro-magnets energized by said circuit, an armature attracted by said electro-magnets and fastened to a stem, a stem connected to a valve, a valve controlling the flow of gas, a cam operating said stem, valve, and armature, and a pin fastened to said stem, all substantially as described.

2. The combination, in an automatic electric gas lighting and extinguishing device operated by a single electric current, of a pair of electro-magnets, an armature rotatable on its axis, a stem holding said armature, a valve controlled by said stem, a cam guiding said stem, armature, and valve, and a projection sliding on said cam, all substantially as described.

3. The combination, in an automatic electric gas lighting and extinguishing device, essentially, of a cam *b*, and of a pin *a*, with the electro-magnets G G, the armature F, the stem K, the valve L, the vibrating spring N, and the movable or vibrating electrode J, substantially as set forth.

ADOLPH WUNDERLICH.

Witnesses:
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WILLIAM WUNDERLICH.