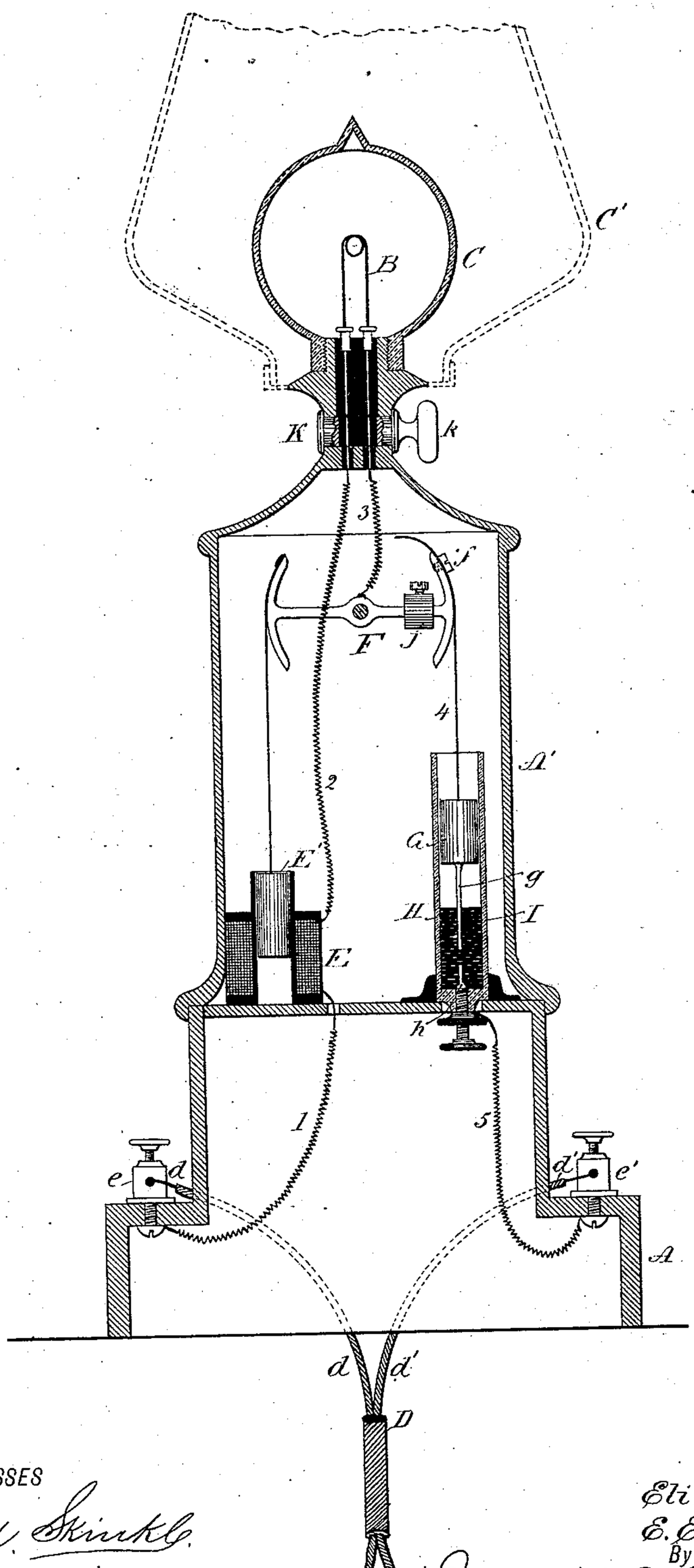
(No Model.)

E. T. & E. E. STARR.

AUTOMATIC REGULATOR FOR INCANDESCENT LAMPS.

No. 281,412. Patented July 17, 1883.



WITNESSES

Wm A. Skinkle

Wm D. Baldwin

INVENTORS

Eli. T. Starr,

E. Eugene Starr,

By their Attorneys.

Baldwin, Hopkins & Peyton.

UNITED STATES PATENT OFFICE.

ELI T. STARR AND E. EUGENE STARR, OF PHILADELPHIA, PA., ASSIGNORS TO SAID ELI T. STARR, WILLIAM J. PEYTON, OF WASHINGTON, D. C., AND H. M. LEWIS AND JAMES W. WHITE, OF PHILADELPHIA, PA.

AUTOMATIC REGULATOR FOR INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 281,412, dated July 17, 1883.

Application filed April 10, 1882. (No model.)

To all whom it may concern:

Be it known that we, ELI T. STARR and E. EUGENE STARR, both of the city and county of Philadelphia, in the State of Pennsylvania, have jointly invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

Our invention relates to electric lamps of the class having automatic regulation to govern or regulate the flow of current to the light-giving body, so as to avoid injury to the lamp by the passage through it of a current of electricity of too great strength or intensity.

The object of our invention is to provide a simple and effective electric lamp in which the regulation of the light-producing current is automatically attained in an improved and perfect manner.

The subject-matter claimed is particularly pointed out at the close of the specification.

In the accompanying drawing, the figure is a vertical central section through the improved lamp.

The lamp shown in the drawing is a portable lamp, and the light is given out therefrom by incandescence. Of course the lamp may be a stationary one. The lamp-base A is preferably hollow for lightness, while the standard or body A′ thereof is also hollow and contains the current-regulating devices. The base and standard or body of the lamp may have different shapes and varied ornamentations. At the top of the standard or body A′ the burner is mounted in well-known ways. Said burner consists, preferably, of a strip or filament of carbon or carbonized matter, B, which is rendered incandescent in a vacuum-globe, C, by the passage through it of a current of electricity, as usual, said carbon filament constituting a part of the electric circuit. It will be understood, however, of course, that the particular light-giving body constitutes no part of our present invention. A strip of platinum or other metal or combination of materials fusible only at a high temperature may of course be substituted for the carbon strip, while the vacuum in some cases may be dispensed with, and other changes in the form of the burner may be made.

The electric current is conducted to the lamp, which is portable in the example shown, as before stated, by means of flexible conducting wires or connections D, of well-known construction, such connections permitting the lamp to be freely moved about within certain limits without interfering with or interrupting the flow of current to the lamp. The current flows from the source of electricity over the wire *d* to the binding-screw *e*, and from thence passes through the wire 1, the helix of an electro-magnet, E, and the wire 2 to the carbon strip or filament B, and from said light-giving body B the current passes, by way of the wire 3, the pivoted lever or balance or rocking arm F, the metallic strip or ribbon 4, the weighted piston G, (having a projecting point or rod, *g*,) and a conducting-fluid, H, of comparatively high resistance—such as mercury—contained within a non-conducting cup or vessel, I—of glass, for example—to a metallic conducting point or screw, *h*, passing through the bottom of said non-conducting cup or vessel I, and from said conducting-point *h* the current passes by way of the wire 5 to the binding-screw *e′*, and from thence to the return-wire *d′* of the flexible connection D.

The weighted piston G, fitted to move in the cup I, and having an extension rod or point, *g*, to dip into the resistance-fluid contained in said cup, is suspended from one end of the balance arm or lever F by means of the metallic conducting strip or ribbon 4, so that upon the vibration or movement of said balance-arm F around its axis the lower end of the conducting-rod *g* will approach nearer to or withdraw farther from the opposing conducting point or screw *h*, and will consequently produce a variation in the resistance offered to the passage of the current through the lamp.

The electro-magnet E is preferably a tubular magnet to receive an armature-core, E′—of soft iron, for example—which is suspended from the end of the balance-arm F, opposite to that from which the weighted piston G is suspended. The weight of the piston G is preferably greater than that of the armature-core E′, so that when no current is passing through the connections D and the lamp the lower end

of the conducting-rod *g* of the piston G will approach near to or rest upon the end of the conducting-screw *h*. Upon the passage of an electric current through the circuit, however, the tubular magnet E will become excited, and its attractive action upon the armature-core E′ will depend upon the force or strength of the current. The said armature will consequently be drawn within the magnet to a greater or less degree, dependent upon the strength of the current, and will thereby, through the lever F and suspended piston G, determine the resistance to be offered to the passage of the current so as to protect the lamp and keep the effective current uniform. Should a current be thrown upon the line of a strength sufficient to injure or destroy the light-giving body B or other parts of the lamp, the magnet will attract the armature E′ to such an extent as to raise the piston and produce such resistance in the circuit to the passage of the current as to prevent the injurious action which would otherwise occur. Should the current reach such abnormal proportions as to draw the armature wholly within the magnet, the upward movement of the piston should be sufficient to carry its bar *g* entirely out of the mercury or semi-conducting fluid, so as to break the circuit and momentarily cut off all current to the lamp, the circuit being again immediately established by the cessation of the attractive action of the magnet upon its armature, due to the demagnetization of said magnet, and the return of the piston by its weight to enter the arm *g* in the conducting-fluid.

A weight, J, is mounted on the balance or rocking arm F, so as to be adjustable to vary the action of the piston G relatively to the magnet E and its armature E′, while we also preferably provide the conducting-strip 4 with a longitudinal slot or with a series of holes at its upper end, whereby to shorten or lengthen the strip between the lever F and piston G by a suitable set-screw, *f*. We have deemed it unnecessary to show such adjusting slot or holes in the drawing.

The circuit is made and broken at the lamp, to turn on or cut off the light, by means of a plug, K, controlled by a finger-piece or button, *k*, said plug, when in one position, completing the circuit through the carbon strip B, while when turned to another position the circuit is broken. Any of the usual forms of circuit making and breaking devices may of course be substituted for the one shown.

A second globe or shade, C′, is shown by dotted lines as surrounding the vacuum-globe C.

Instead of organizing the magnet E so that the whole current passing through the lamp must traverse its coils, said magnet obviously may be placed in a derived circuit or branch line, so that only a small portion of the current is made to traverse its coils. This would permit of a more delicate construction of the magnet, and less weighty construction of the balance-arm, suspended piston, and fluid-vessel, which would be desirable in portable lamps. Other changes may be made by skillful electricians without departing from our invention, and we will only mention one obvious change, which is that, instead of a piston or conducting rod being suspended and movable relatively to a vessel containing the resisting-fluid, said conductor might be fixed, and the vessel suspended and rendered movable relatively to said conductor.

We claim as our invention—

1. The combination, with an electric circuit, of an electro-magnet included in said circuit, an armature of said magnet, a rocking arm, a flexible connection by which said armature is suspended from one end of said rocking arm, a variable resistance device, also constituting part of said circuit, consisting of conducting devices in contact with a resistance medium, and a flexible connection by which one of said conducting devices is suspended from the end of said rocking arm opposite to that from which the armature of the magnet is suspended, so as to be capable of reciprocating in a straight line, notwithstanding the movement of the rocking arm on its pivotal connection, the combination being and acting substantially as described, whereby variations in the strength of the current traversing the coils of the magnet produce variations in the resistance offered to the passage of the current through the circuit.

2. The combination, with an electric circuit, of an electric lamp, the hollow base of which contains an automatic current-regulator, consisting of an electro-magnet included in said circuit, an armature of said magnet suspended from one end of a rocking arm by a flexible connection, a piston or conducting rod forming part of said circuit, and suspended by a flexible connection from the end of said rocking arm opposite to that from which said armature is suspended, a resistance medium in contact with said suspended conducting-rod, and another conducting-rod, also forming part of said circuit, and being in contact with said resistance medium, the combination being and acting substantially as described, whereby the flow of current to the burner or luminous part of the lamp is regulated and the lamp protected from injury.

In testimony whereof we have hereunto subscribed our names this 8th day of April, A. D. 1882.

ELI T. STARR.
E. EUGENE STARR.

Witnesses:
R. W. STARR,
JOHN URIAN.