

(No Model.)

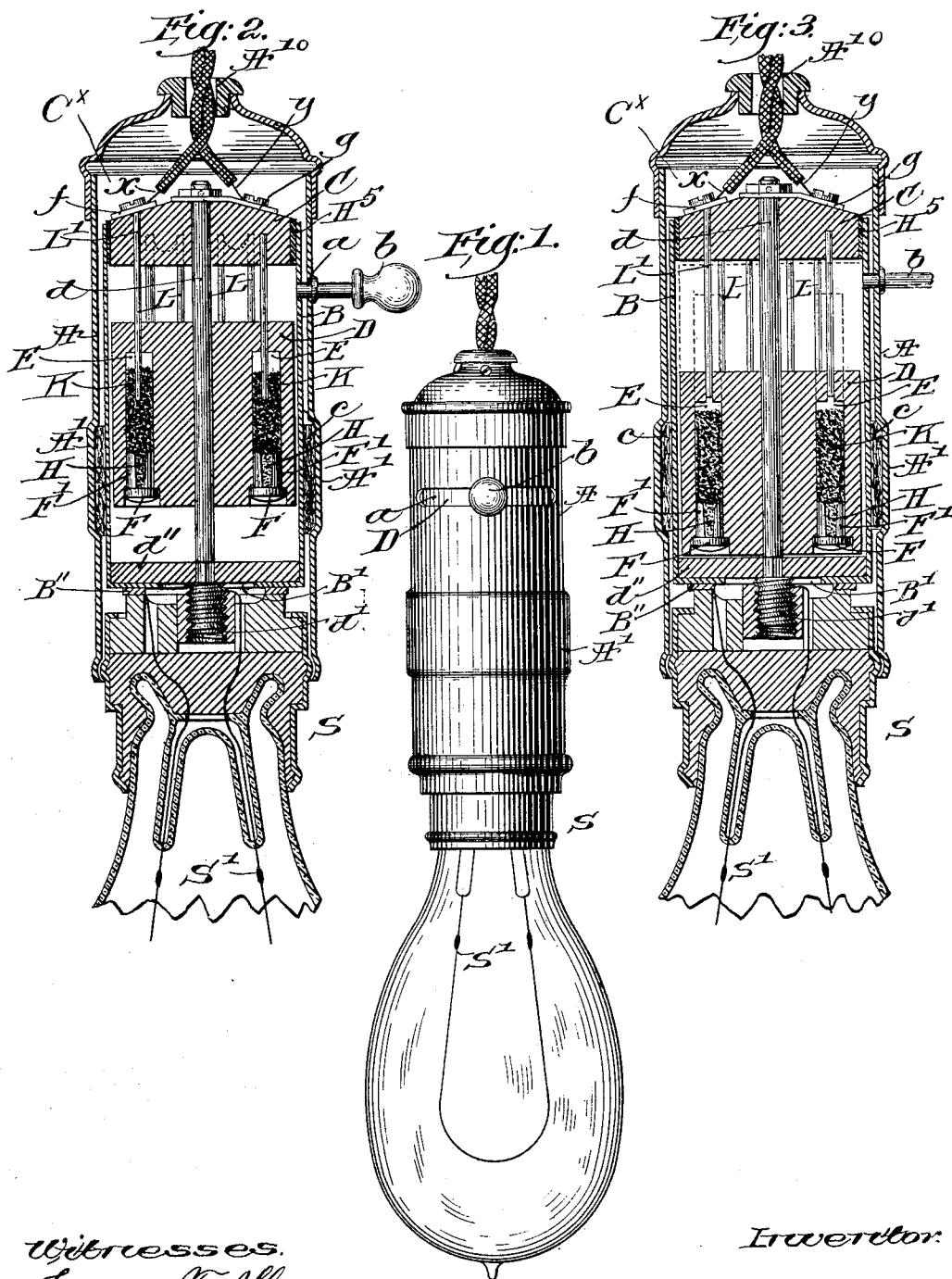
2 Sheets—Sheet 1.

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No. 596,582.

Patented Jan. 4, 1898.

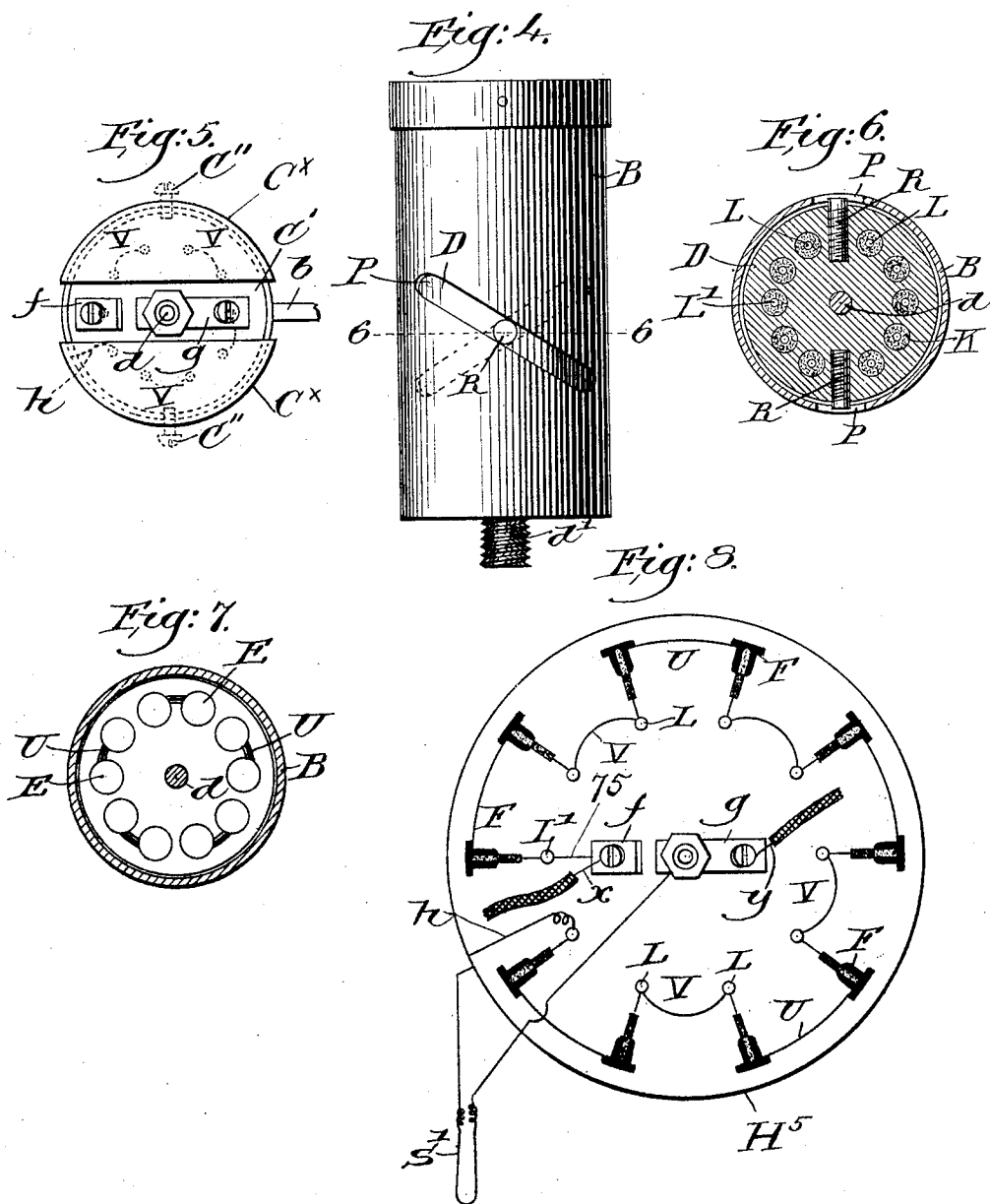


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Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES E. FELCH, OF NATICK, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO OLIVER A. FELCH AND WALTER L. FELCH, OF SAME PLACE.

MEANS FOR VARYING CANDLE-POWER OF INCANDESCENT ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 596,582, dated January 4, 1898.

Application filed June 21, 1897. Serial No. 641,551. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. FELCH, of Natick, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Means for Varying the Candle-Power for Incandescent Electric Lamps, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of novel means whereby by a local change in voltage not exceeding the rated voltage of the circuit the candle-power of an individual incandescent electric lamp may be varied irrespective of other lamps in the circuit, so that any desired degree of brilliancy may be attained within the rated candle-power of the lamp.

By my invention I am also enabled to increase the candle-power of the lamp above its rated power by using a lamp of lower rated voltage than the rated voltage of the circuit, though such increase of candle-power will decrease the life of the lamp.

In accordance with my invention I include in circuit between the line and the lamp-filament a permeable resistance medium adapted to be entered to a greater or less depth by an electrode also included in the circuit, means being provided to effect relative movement of the electrode and resistance medium to thus vary the resistance and thereby regulate the candle-power of the lamp.

Preferably I apply my invention to a lamp-socket as the most convenient and economical means of individually controlling the lamps.

Various novel features of my invention will be hereinafter fully described, and particularly pointed out in the claims.

Figure 1 is a front elevation of a socket for incandescent electric lamps embodying one form of my invention with a lamp applied thereto. Fig. 2 is an enlarged central vertical section with a portion of the lamp broken off. In Figs. 1 and 2 the parts are in such relative position as to give about one-half the full candle-power of the lamp. Fig. 3 is a similar view showing the parts in position assumed when the circuit is broken and the light turned off. Fig. 4 is an elevation of the

inner shell or casing removed. Fig. 5 is a top or plan view thereof. Fig. 6 is a horizontal sectional view taken on the line 6 6, Fig. 4. Fig. 7 is a lower end view of the carrier for the resistance medium and the inner casing, the latter being shown in section. Fig. 8 is a diagram illustrating the circuit connections in the socket and between the line and the lamp-filament.

Similar letters and figures of reference indicate corresponding parts.

A represents an external metallic shell or casing provided with a horizontal slot *a*, Figs. 1 and 2, and an inner metallic casing or shell B is mounted in and adapted to be partially rotated within the casing A by a handle *b*, extended through the horizontal slot *a* and secured to the inner casing B. A suitable annulus or washer *c*, of asbestos or other non-conductor of heat and electricity, is interposed between the two casings and is packed in an annular chamber formed by the recessed or outwardly-bent portion A' of the outer casing.

C and D are two members of non-conductive material, neither of which has a rigid connection with the inner casing B, but both of which are within it and separated from each other by a suitable space.

The upper member or holder C has rigidly secured to it a rod *d*, which extends down through the carrier D and through a disk *d''*, of non-conductive material, mounted on the lower end of the inner casing and covering a large opening B' in said end. The lower end of this rod is provided with an ordinary screw-thread *d'*, by means of which the lamp S is attached in usual manner.

The holder C is transversely recessed at its upper end to leave a passage C' between the upturned portions C^x of said holder, (see Figs. 2, 3, and 5,) the portions C^x occupying the space in the outer case above the holder, while the passage C' permits the wires X and Y, which connect with the line, to extend through a suitable opening A¹⁰ in the upper end of the outer casing down to binding-screws on contact-plates *f* and *g*, both of which are secured to the top of the holder C on the bottom of the passage, the plate *g* being in electrical connection with the rod *d*. Screws C'' connect the outer casing A with

the parts C^x of the holder C. (See dotted lines, Fig. 5.)

The non-conductive carrier D is bored from the under side upward preferably at a number of points, such bores or recesses E extending up vertically and part way through the carrier, ten such recesses being herein shown. (See Figs. 2, 3, 6, and 7.) At the lower end of each of these recesses a small metallic plug is inserted, consisting of a circular base F, from which extend upwardly a pair of spring-jaws F'. Between these jaws and resting on the base I prefer to place a loose mass of granulated copper II, while above the jaws and the granulated copper in each recess is a loose mass of permeable resistance material K, preferably granulated flake graphite, which extends to a point somewhat below the upper end of the recess.

Rigidly secured to the holder C are a number of vertical metallic rods or electrodes, ten being shown in the drawings. These rods correspond with and extend into the recesses E. The nine electrodes L have their upper ends secured within the holder C, and the electrode L' extends entirely through said holder and is electrically connected with the plate *f* by a short wire 75. (See Fig. 8.)

On opposite sides of the inner casing B are diagonal slots P, (see Figs. 4 and 6,) into which extend screws or pins R, which project horizontally from opposite sides of the carrier D.

It will readily be seen that if the handle *b* be moved laterally in the slot *a* of the outer casing it will rotate the inner casing B, to which it is secured, and the rotation of the latter will, by travel of the screws or pins R in the diagonal slots P, cause the carrier D to be raised or lowered in the casing B, according to the direction in which the handle *b* is moved. In Figs. 1 and 2 the handle *b* is about in the center of the slot *a*, and the rods L extend down into the resistance medium K to about one-half the depth of the same. If the handle *b* were moved to the right as far as the slot *a* will allow, the rotation of the inner casing in the same direction would lift the carrier D until the electrodes L penetrated the resistance medium a greater distance and their lower ends would contact with the granulated copper II between the jaws F'. Should, however, the handle *b* be moved as far as possible to the left, the inner casing would be rotated toward the left and lower the carrier D until the lower ends of the electrodes L would be lifted entirely out of the resistance medium.

The metallic plugs F are electrically connected in pairs—that is to say, a pair of plugs is connected together, the next pair of plugs is connected together, but not connected with the first pair, and so on, as shown by the wires U in Fig. 7 and diagrammatically in Fig. 8. The electrodes L L' are also electrically connected in pairs, but the pairs do not correspond or coincide with the connected

pairs of plugs—that is to say, one electrode over one of a pair of electrically-connected plugs is electrically connected with the adjacent electrode of the next pair of connected plugs, as seen by broken lines in Figs. 2 and 5 and the wires V in Fig. 8.

Now, supposing the parts to be in the position indicated in all the figures except Fig. 3 and the current passing from the line through the wire X, the current will pass from said wire through the contact-plate *f*, thence to and down through the electrode L' and through the resistance medium K below the end of said electrode to the copper II, thence through the corresponding metallic plug F and through a connecting-wire U to the next plug F, (see Fig. 8,) up through the powdered copper and resistance K and through a connecting-wire V to the next electrode L, and alternately through the electrodes L and resistance K to the last electrode L in the series of electrodes, and thence through a wire *h*, Fig. 8, to a metal ring II' (shown in section, Figs. 2 and 3) on the holder C in contact with the inner casing B. From the casing B the current passes to a metallic contact-ring or commutating-disk B' on the lower end of the inner casing and through the lamp-filament S' to the lower end of the rod *d*, and from said rod through the contact-plate *g* to the wire V. If the electrodes are out of the resistance medium, the current will not enter the socket and the light goes out. The deeper the electrodes extend into the resistance medium the less is the resistance to the current, while the less the electrodes enter therein the greater the resistance, inasmuch as the masses of graphite or other permeable resistance medium between the lower ends of the electrodes and the copper II are deeper and greater. Hence if the electrodes are extended into the resistance medium the light furnished by the filament will increase until they reach the copper II or the metallic plugs, when the candle-power is the greatest, the metal offering the least resistance to the current. As the electrodes are withdrawn the light decreases in intensity until, when the electrodes are entirely withdrawn, as in Fig. 3, the light will be extinguished. It is evident therefore that by moving the handle *b* in the slot *a* the light may be regulated with absolute exactness and the candle-power be made greater or less at will. As a consequence the consumer will pay for a low light only when such a light is desired, as the meter will only register the amount of electricity employed.

It will be obvious from the foregoing description that when the candle-power of the lamp is decreased there will be some heating of the resistance medium and the adjacent parts, and in order to prevent such heating from being noticed at the exterior of the socket I make use of a non-heat-conducting material, such as asbestos, surrounding the inner casing or shell at about the point where greatest heating would occur. The air-space

between the inner and outer casings also serves to dissipate or scatter the heat which may be generated within the socket.

The upper commutator-ring H⁵ maintains a continuous electrical connection between the inner casing B and the series of electrodes.

I prefer to use flake graphite as the permeable resistance medium, as it is cheap, and a less quantity is required to adapt the device to a greater range of voltage of the lamp-circuit than would be required with some other medium, such as mercury, wire, &c. The graphite is incombustible and practically non-fusible and it will not vary in density by use. Furthermore, when the candle-power of the lamp is decreased and the temperature of the resistance medium increased I have found that by using flake graphite such heating will not cause any appreciable change in the candle-power of the lamp. The lubricating character of the graphite also acts to practically reduce wear on the electrodes to zero. The graphite is readily entered by the electrodes, it is not liable to pack down, and it prevents a too sudden variation in brilliancy of the light when the same is regulated. As the circuit is broken in a number of places, as herein shown, there is little danger of sparking.

The split plugs F F' are so formed in order that they may yield safely under any expansion caused by heating of the adjacent parts.

The members C D may be of porcelain, fiber, or any other non-conductive and non-combustible material.

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

1. In a socket for incandescent electric lamps, a rotatable shell, a carrier of insulating material mounted therein and having a recess, a permeable resistance medium held in said recess, an electrode adapted to be extended into said medium, and means connected with and actuated by rotation of the shell to effect relative movement of said electrode and carrier within the shell, and thereby extend the electrode into the resistance medium to different depths, said medium and electrode being in electrical circuit with the lamp-filament, and the line.

2. In an electric-incandescent-lamp socket, a fixed outer shell, a rotatable inner shell, a carrier of non-conductive material longitudinally movable in said inner shell and provided with a plurality of recesses, permeable resistance material in said recesses, a non-conductive holder secured in the upper end of the inner shell, rod-like electrodes extending from the holder into the several masses of resistance material, connections between the carrier and inner shell, whereby rotation of the latter moves the carrier toward or from the holder, to thrust the electrodes into the resistance material to different depths and to withdraw them therefrom, and means to effect rotation of the inner shell, said electrodes and masses of resistance material be-

ing in electrical circuit with the lamp-filament and the line, whereby the current will pass through the electrodes and masses of resistance alternately.

3. In an incandescent-electric-lamp socket, a carrier of non-conductive material provided with recesses containing a permeable resistance medium; a non-conductive holder provided with a series of metallic pins or rods extending therefrom freely into said recesses in the carrier; and means supported by and operated from the exterior of the socket to effect relative movement of said carrier and holder, whereby all of said rods or pins may be simultaneously thrust into the resistance material to different depths or withdrawn therefrom, said resistance material and rods or pins being in electrical circuit with the filament of the lamp, substantially as described.

4. In an electric-incandescent-lamp socket, the carrier D of non-conductive material bored vertically from the under side to provide parallel recesses E; metallic spring-controlled plugs set in the lower portions of said bores and supporting portions of granulated copper; masses of powdered or granulated flake graphite within said bores and sustained by the plugs; a holder C of non-conductive material, electrodes formed as rods or pins extending from said holder through a portion of the carrier D and into the graphite; and means for reciprocating the carrier toward and from the holder, whereby said rods or pins may be thrust into the graphite to different depths and withdrawn therefrom, said rods and metallic plugs being in electrical circuit with the filament of the lamp and the line, substantially as set forth.

5. In an electric-incandescent-lamp socket, in combination, an outer casing A provided with a horizontal slot *a*; an inner casing B provided with diagonal slots P; a handle on the inner casing and extended outwardly through said slot *a* and adapted to rotate the inner casing; the carrier D of non-conductive material, recessed vertically from the under side to form a plurality of recesses; masses of resistance material sustained in said recesses; peripheral pins extending radially from said carrier D into the diagonal slots aforesaid, and the holder C made of non-conductive material and provided with downwardly-projecting electrode rods or pins extending into the resistance material, the holder and carrier being mounted within the inner casing, said electrodes and resistance material being in electrical circuit with the filament of the lamp and the line, substantially as described.

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

CHARLES E. FELCH.

Witnesses:

JOHN C. EDWARDS,
AUGUSTA E. DEAN.