No. 670,927. Patented Apr. 2, 1901.

C. R. CAMPBELL.

INCANDESCENT ELECTRIC LAMP.

(Application filed July 12, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

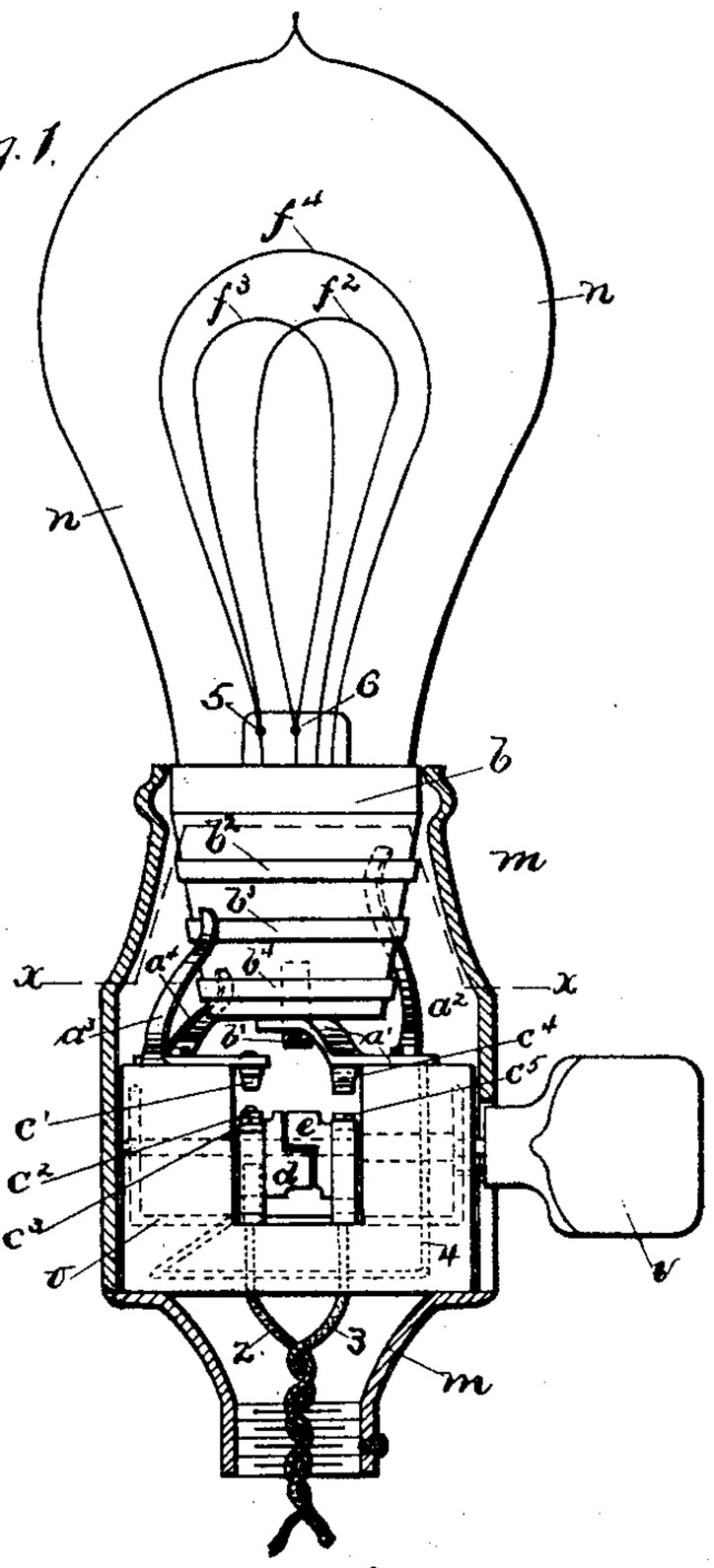


Fig. 3.

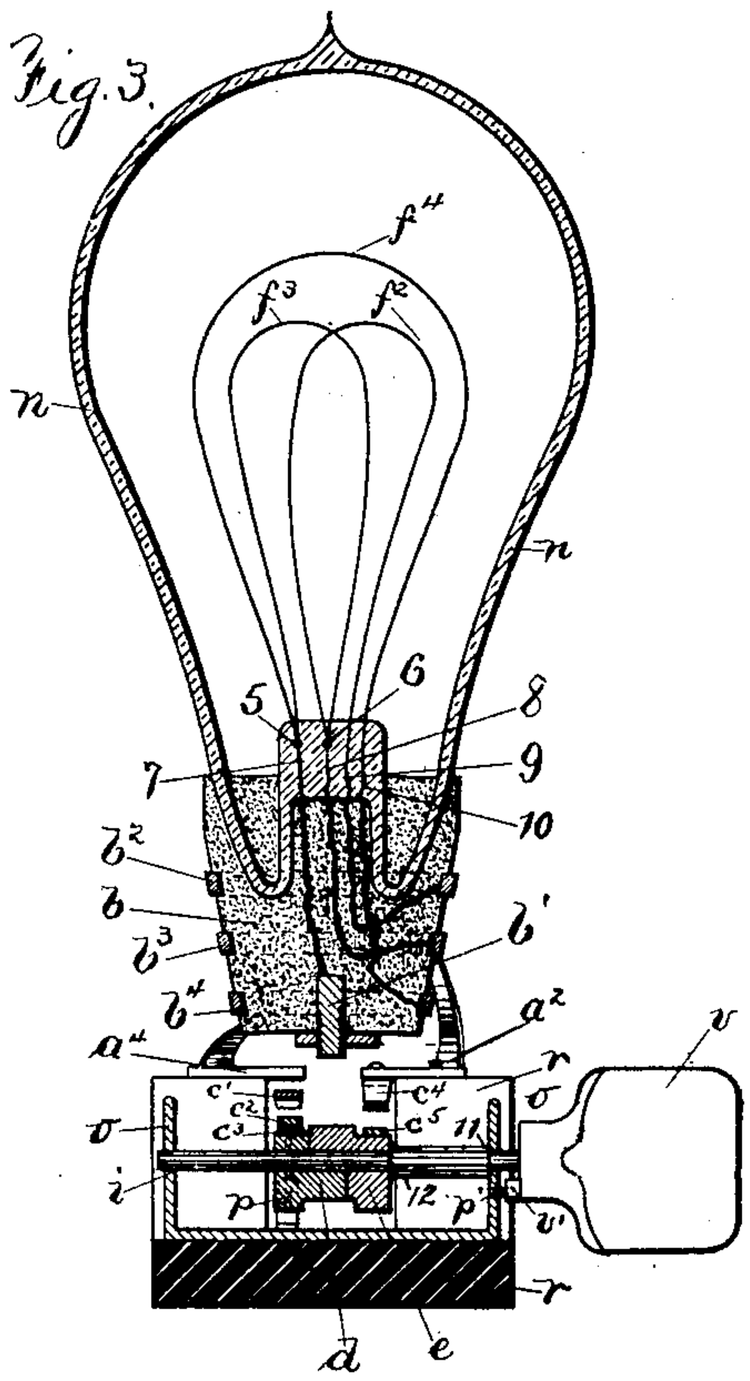


Fig. 2.

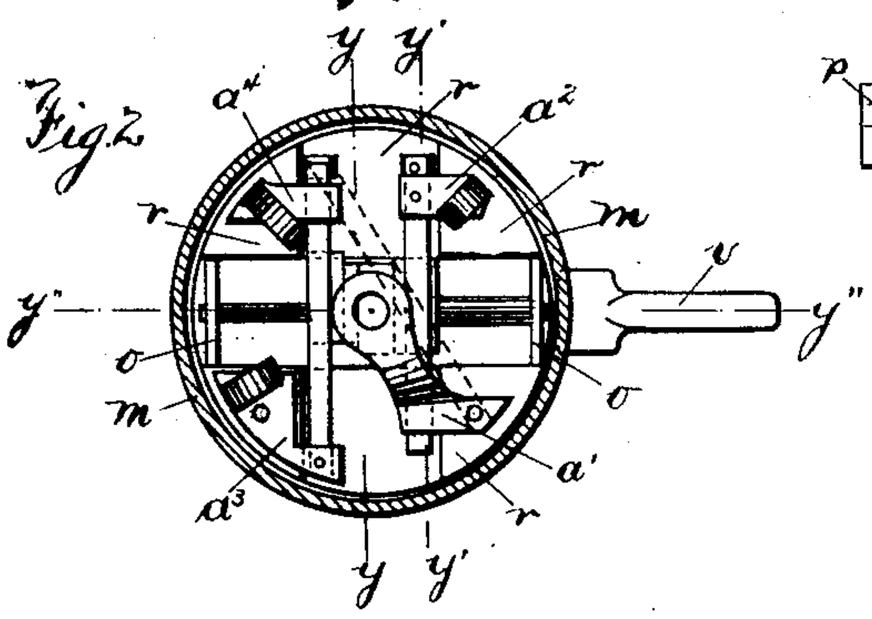


Fig. 4.

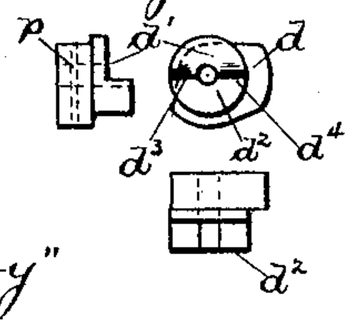
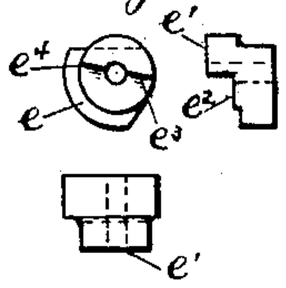


Fig. 5.



WITNESSES

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INVENTOR

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(No Model.) 2 Sheets—Sheet 2.

Fig. 6

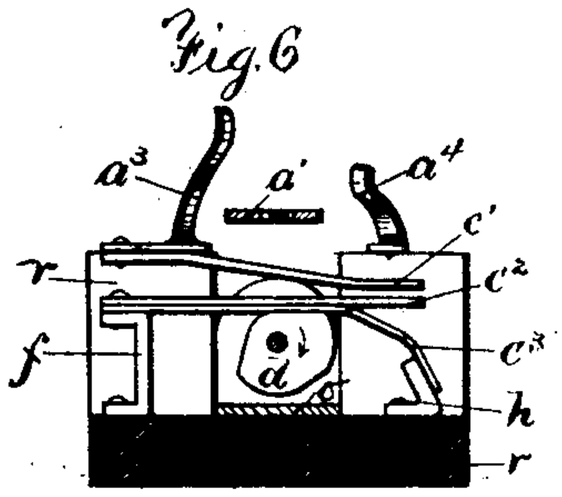


Fig. 7.

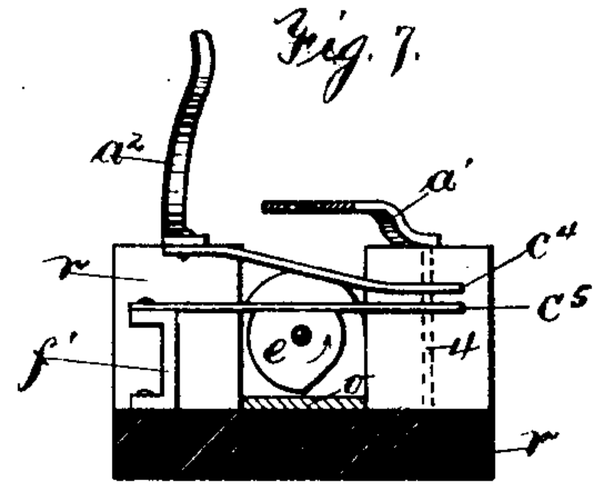


Fig. 8.

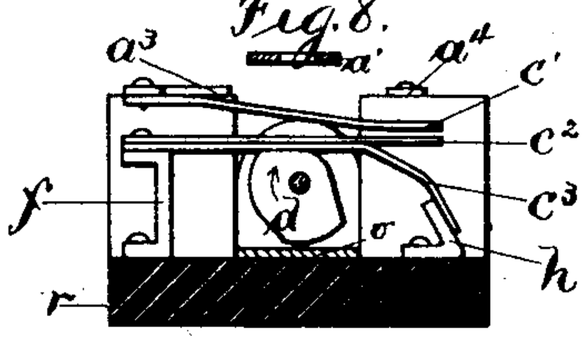


Fig. 9.

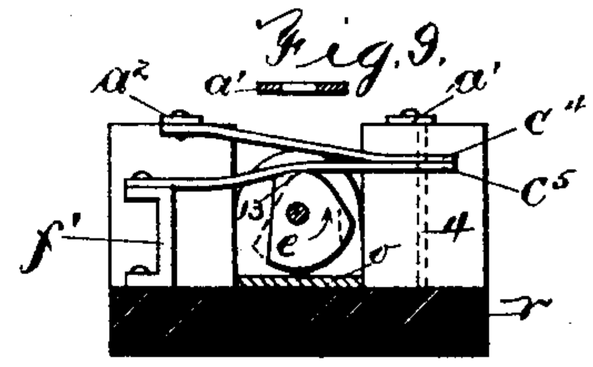


Fig. 10.

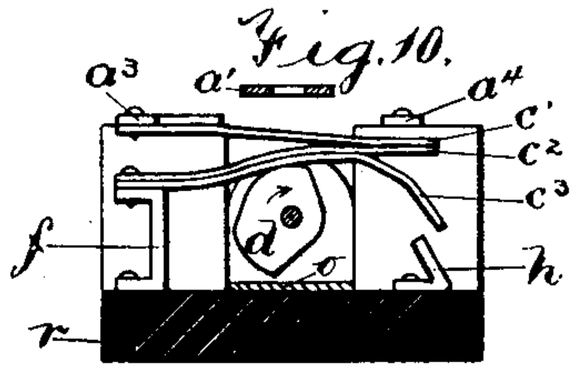


Fig. 11.

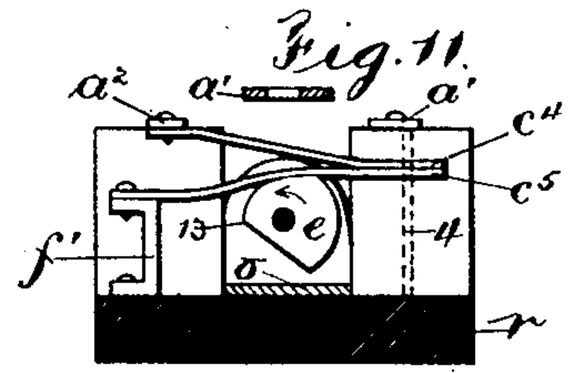


Fig. 12

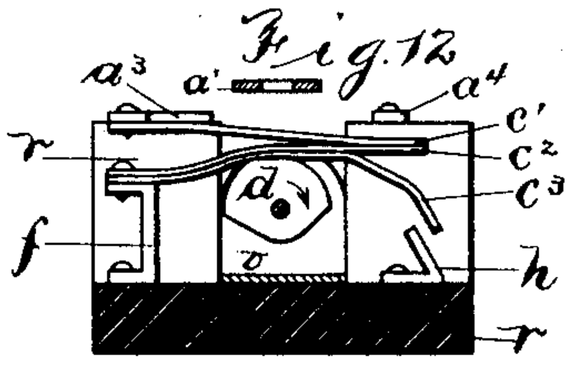


Fig. 13.

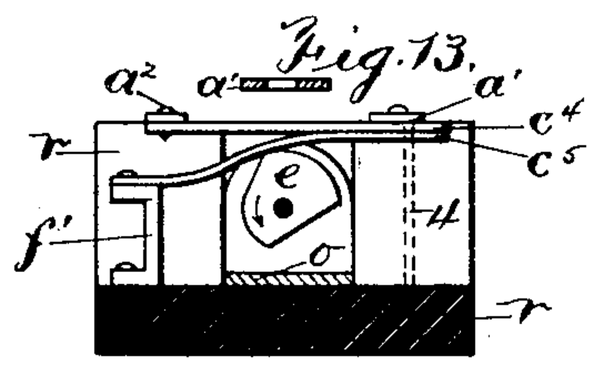


Fig. 14.

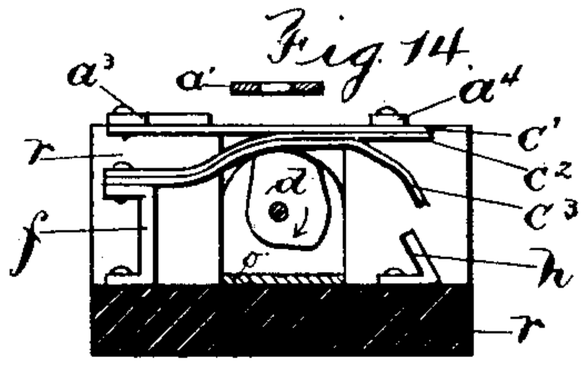
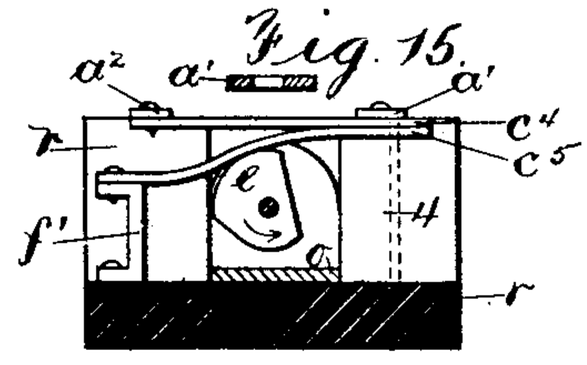


Fig. 15.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES R. CAMPBELL, OF HUGUENOT, NEW YORK, ASSIGNOR TO HIMSELF, AND HOWARD H. BUSH, OF NEW YORK, N. Y.

INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 670,927, dated April 2, 1901.

Application filed July 12, 1900. Serial No. 23,301. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. CAMPBELL, a citizen of the United States, residing at Huguenot, in the borough of Richmond, city and State of New York, have invented certain new and useful Improvements in Incandescent Electric Lamps, of which the following is a complete specification.

Heretofore in incandescent electric lamps, especially those wherein different intensities of light may be effected and two or more filaments are used, it has been customary to employ resistances to produce the different intensities of light, and, moreover, it has been necessary to break and remake the circuit every time the intensity of light was changed.

The object of my invention is to produce an incandescent electric lamp and socket therefor, using three or more filaments, wherein the intensity of the light may be varied from a dim glow through various stages to a very brilliant light without breaking the circuit through the lamp in passing from any one stage to the next.

In carrying out my invention I use the ordinary glass bulb, containing, preferably, three filaments. The bulb is secured to a sealed conical-shaped base of insulating material. Around said base and insulated from each other are bands of brass or other good conducting material to which the filaments are connected.

The socket-block consists of a cylindrical piece of insulating material. Two transverse central channels at right angles to one another are cut down into the insulating-material socket-block. Upon the top of the remaining upright portions of the said cylinder contact-arms are secured, said arms forming the socket proper. Within the channels of the cylinder are placed the posts, spring-contacts, cams, and shaft, with which, by means of proper electrical connections, the objects of my invention are accomplished, all of which are hereinafter more particularly described.

Referring to the drawings, Figure 1 is an elevation of my improved lamp and socket, showing the case in section. Fig. 2 is a plan on the line $x\,x$, Fig. 1, with lamp removed. Fig. 3 is a vertical section on line $y''\,y''$, Fig. 2. Figs. 4 and 5 are details showing the form of the cams. Figs. 6, 8, 10, 12, and 14 are vertical partial sections on line $y\,y$, Fig. 2, and Figs. 7, 9, 11, 13, and 15 are vertical partial sections on line $y'\,y'$, Fig. 2, showing the positions of the cams and spring-contacts which produce the different intensities of light.

Referring to the drawings, r represents the insulating-material socket-block, from which two transverse central channels at right angles to one another are cut, said channels extending down about two-thirds of the height of the block r, thus leaving four quadrant-shaped uprights. Upon these uprights the contacts $a'\ a^2\ a^3\ a^4$ are secured by means of screws passing through block r. The contacts a', a^2, a^3, and a^4 extend over the edges of the uprights of block r, and a^2, a^3, and a^4 have projecting arms of different lengths, which form the socket-contacts, while a' is bent inwardly and has a tapped opening which comes over the center of the block r and is adapted to receive the screw in the base of the lamp.

The frame o, which supports the cam-shaft i, is placed at the bottom of one of the channels cut from block r. The cam-shaft is turned to three different diameters, as seen in Fig. 3. The shoulder 11 on the cam-shaft abuts against one upright of the frame o, the end of shaft passing through o and into the button v. By means of lug v' on button v and the pin p', passing through frame o, the button v is prevented from turning all the way around. The companion cams are preferably made of gutta-percha or similar material and are of a peculiar shape, as seen in Figs. 4 and 5. When in position, the cam-faces d' and d^2 of cam d come in contact, respectively, with cam-faces e' and e^2 of cam e. It is to be observed that the adjoining circular portions of the cams are so fitted as to allow a slight rotary movement of cam e upon the shaft i, cam d being secured to the shaft by pin p in such a position as to allow cam e to abut against shoulder 12, the reason for which will be more fully explained hereinafter. On the bottom of the other channel cut from block r at one side are the post f and the contact-post h. On the other side is the post f'. To these

posts f and f' are connected the lead-wires 2 and 3, which, for convenience, we will say 3 is plus and connected to f', and 2 is minus and connected to f.

The spring-contact c' is secured to the projecting portion of contact a^3 and extends over cam d and under the projecting portion of contact a^4. The spring-contacts c^2 and c^3 are secured to each other and to the top of post f, both extending over and bearing on cam d, c^2 coming under spring-contacts c' and a^4 and spring-contact c^3 being bent down so as to come in contact with post h, as seen in Fig. 6.

Contact-spring c^4 is secured to projecting portion of contact a^2 and extends over cam e and under the projecting portion of contact a'. Contact-spring c^5 is riveted to the upper portion of post f' and extends over and bears on cam e and passes under spring-contact c^4 and contact a'. Figs. 6 and 7 represent the spring-contacts in their open or normal position.

To facilitate illustration, I have shown in the drawings the contact a' and the post h electrically connected by the wire 4, which is led from contact a' down through block r to a point in the periphery of block r and near the bottom, from whence it runs in a groove around the periphery of block r to a point opposite post h, where it is taken to post h; but in practice I prefer to connect contact a' and post h by means of a strip of metal embedded in the bottom of block r, as shown by dotted lines, Fig. 2, and screws pass through and are in contact with said strip to contact a' and post h, respectively, to secure the same to block r.

The bulb n is the ordinary glass bulb and is secured to the conical base b, base b being made of any good insulating material. The conical base b is provided with bands of metal b^2, b^3, and b^4, extending around the conical portion of the base and having no electrical connections with each other.

b' is a metal screw in the center of the bottom of base b, said screw being adapted to enter the tapped opening in contact a'.

Preferably I employ three filaments f^2 f^3 f^4, with suitable electrical connections, as shown in Fig. 2, because in so doing the usefulness of the lamp is not totally impaired by the burning out of any one filament. One end of filament f^2 is connected to filament-terminal 6. The other end of f^2 is connected to band b^2 by means of wire 9. The ends of filament f^3 are connected to terminals 5 and 6, respectively. One end of filament f^4 is connected to terminal 5, and the other end is connected to bond b^4 by means of wire 10. Terminal 5 is connected to screw b' by means of wire 7, and terminal 6 is connected to bond b^3 by means of wire 8.

It will be evident that the contact-arms of a^2, a^3, and a^4, together with a', form the lamp-socket, and these are so constructed that when the lamp is screwed down into place the arms of contacts a^2, a^3, and a^4 will come into contact with bands b^2, b^3, and b^4, respectively, and screw b' is of necessity in contact with contact a'. A suitable casing for the socket-switch and lamp-base is represented by m, Fig. 1.

As a matter of convenience I have illustrated a lamp in which I produce four different intensities of light, although I do not wish to confine myself to this number. The operation of the lamp will be easily understood by reference to Figs. 6 to 15, inclusive. Figs. 6 and 7 represent the positions of the cams and contact-switches in their normal or open relations. In turning the button in direction shown by arrow it is evident the cam e will not begin to turn until the edge d^3 of cam d comes in contact with edge e^3 of cam e, in which relation the cams remain until the button is reversed. Now by turning the button through seventy-eight degrees approximately the cams and the spring-contacts operated thereby are brought into the positions shown in Figs. 8 and 9. In this position the contacts c', c^2, and c^3 have not changed position, but contact c^5 has been brought up against contact c^4. In this position, taking 3 as the plus lead, the path of the current will be from 3 through f' c^5 c^4 a^2 b^2, wire 9, filaments f^2 and f^3, wire 7 b' a', wire 4 h c^3 f, and to the minus lead 2. In this position filaments f^2 and f^3 are in series and a glow-light is produced. By turning the button through about seventy-five degrees more the cams and spring-contacts are brought into the positions shown in Figs. 10 and 11. As will be seen, the contacts c^4 and c^5 have not been changed, but c^2 and c^3 have been raised, so that c^2 has come in contact with c', and the contact between c^3 and h has been broken. In this position the path of the current is from plus lead 3 through f' c^5 c^4 a^2 b^2, wire 9, filament f^2, wire 8, b^3, a^3, c', c^2, and f to minus lead 2. In this position one filament f^2 is used and a dim light is produced. By turning the button through another seventy-five degrees, about, the cams and spring-contacts are brought into the positions shown in Figs. 12 and 13. In this position the spring-contacts c', c^2, and c^3 are the same as in the last, but spring-contacts c^4 and c^5 still being in contact with each other are now brought into contact with the projecting portion of contact a', and the path of the current is from plus lead 3 through f' c^5, where the current is shunted, part passing through c^4 a' b', wire 7, filament f^3 to 6, the other part passing through c^4 a^2 b^2, wire 9, and filament f^2 to 6. The currents coming together again at 6 pass to the minus lead by means of wire 8, b^3, c', c^2, and f. In this position the filaments f^2 and f^3 are in multiple and produce a bright light. The cams and spring-contacts are brought to the last position, as shown in Figs. 14 and 15, by turning the button through another seventy degrees, approximately. In this position the relations of spring-contacts c^4 and c^5 and a' are not changed, but c', c^2, and c^3 have been raised together, so that c' is

in contact with the projecting portion of a^4. The path of the current now is from plus lead 3 through f' c^5 c^4, where it is shunted, part going through a^2 b^2, wire 9, and filament f^2, the other part through a' b', wire 7 to terminal 5, where this shunt is again shunted, part through filament f^3 to 6, where it is joined by the shunt starting through a^2 and passed to wire 8 b^3 a^3 to c'. Here the combined shunts through f^2 and f^3 are joined by shunt through filament f^4, which passed by way of f^4, wire 10 b^4 a^4 to c', and the current passed to the minus lead by c', c^2, and f. In this position the filaments are all in multiple, and the effect is a very bright light. In this last position the lug v' on button v is brought against the pin p', thus preventing the further turning of the button, and consequently making it impossible to turn the lamp out without turning the button in the opposite direction and passing through the various stages to the normal position. In this normal position the other side of the lug v' bears against the pin p' and prevents the lamp being turned on in any but the proper way.

It is evident that in starting to turn the light out, no matter to what position the button may have been turned, the cam e will not move until the edge d^4 of cam d comes in contact with edge e^4 of cam e, in which relation the cams will remain until the circuit through the lamp is broken. When the "glow" stage is reached in turning out the lamp, cam e will be in the position shown by the dotted lines, Fig. 9. The instant the corner 13, cam e, Fig. 9, passes under contact c^5 by means of its play on the shaft and the tension of spring-contacts c^5 and c^4, the cam e is brought to the normal position with a snap, thus insuring the absence of all dangerous sparking in breaking the circuit. Moreover, it will be noticed from the construction and operation of the cams and spring-contacts that the circuit through the lamp is only broken in turning out the light, the circuit not being broken in passing from one intensity of light to another. In reality the contacts for any one intensity of light are made before the preceding contacts are left, this being the case in either making the light brighter or dimmer.

I claim as my invention—

1. The combination in an electric lamp, with a series of filaments, of a conical lamp-base of insulating material, metal contacts spaced apart on said conical base, electrical connections between said bands and the filaments, a cylindrical socket-block of insulating material having two transverse central channels at right angles to one another, and electrical connections and means, substantially as specified, for progressively bringing said filaments into the circuit in series, singly and in multiple whereby the filaments are brought to a condition of partial incandescence and progressively therefrom to complete incandescence and vice versa without breaking the circuit through the lamp for varying the intensity of the light, substantially as set forth.

2. The combination in an electric lamp, with a series of filaments, an insulated conical base and metal contacts secured thereto and spaced apart, of electrical connections between the filaments and said metal bands, a cylindrical socket-block of insulating material having two transverse central channels at right angles to one another, means for securing the lamp and base to the socket-block, metal contact-arms upon said socket-block bearing upon the metal bands of the lamp-base, spring-contacts within said channels and means for operating the same whereby said filaments are brought into the circuit in series, singly and in multiple without breaking the circuit through the lamp, substantially as set forth.

3. The combination in an electric lamp, with a series of filaments, a conical base of insulating material, bands of metal spaced apart around said base and electrical connections from said filaments to said bands, of a cylindrical socket-block having two transverse central channels at right angles to one another, electrical contacts, a shaft in one of said channels and companion cams and cam-faces mounted thereon, and electrical spring-contacts operated by said cams, whereby said filaments are progressively brought into the circuit in series, singly and in multiple whereby the filaments are brought to a condition of partial incandescence and progressively therefrom to complete incandescence and vice versa without breaking the circuit through the lamp for varying the intensity of the light, substantially as set forth.

4. The combination in an electric lamp, with a cylindrical socket-block of insulating material having metal contact-arms and electrical connections, of a conical lamp-base of insulating material, circumferential metal bands spaced apart on the periphery of said conical base, a plurality of filaments in electrical connection with said metal bands, means for securing said lamp-base to said socket-block, and metal arm socket-contacts bearing upon the different metal bands on the lamp-base to complete the electrical connections, substantially as set forth.

5. The combination in an electric lamp, with an insulating socket-block and electrical devices connected therewith for making and breaking the circuit, of a plurality of filaments, a conical lamp-base of insulating material supporting said filaments, metal contacts spaced apart on said lamp-base, electrical connections between said contacts and the filaments, metal arm-contacts secured to, rising from and spaced apart upon the socket-block and bearing upon said base-contacts, and means for completing the circuit through the lamp whereby the filaments are brought into the circuit in series singly and in multiple without breaking the circuit through the lamp in passing from one stage to the next, substantially as set forth.

6. The combination in an electric lamp, with an insulating socket-block and electrical devices connected therewith for making and breaking the circuit, of a plurality of filaments, a conical lamp-base of insulating material supporting said filaments, metal arm-contacts spaced apart upon and rising from the socket-base and electrical devices therewith connected, circumferential metal bands upon the conical lamp-base contacting with said arms, and wires from the bands to the filaments, substantially as set forth.

7. The combination in an electric lamp, with a plurality of filaments, a conical base of insulating material, peripheral metal bands spaced apart thereon and electrical connections therefrom to said filaments, of a socket-block of insulating material having two transverse channels cut therein, metal contacts and socket-arms integral therewith, metal posts in one of said channels, metal spring-contacts secured to said metal contacts and said posts as specified, companion cams of insulating material, a suitable shaft and frame therefor in the other channel, and means for preventing the cams from being turned through a complete revolution, substantially as and for the purposes set forth.

8. The combination in an electric lamp with a plurality of filaments, a conical base of insulating material, peripheral metal bands spaced apart thereon and electrical connections therefrom to said filaments, of a socket-block of insulating material having two transverse channels cut therein, metal contacts and socket-arms integral therewith, metal posts in one of said channels, metal spring-contacts secured to said metal contacts and said posts as specified, a cam-shaft and frame therefor in the other channel, companion cams of insulating material upon said shaft, one cam being secured to the shaft and the other cam being loose thereon and the adjacent portions of the cams being cut away and overlapping so as to allow a slight rotary movement of the loose cam upon the shaft, means for preventing the cams being turned through a complete revolution and means for keeping the cams in proper relation with the spring-contacts, substantially as and for the purpose set forth.

9. The combination in an electric lamp, with a plurality of filaments and electrical connections therefrom to the lead-wires, of a socket-block of insulating material having two transverse channels cut therein, a cam-shaft, a button attached thereto and a suitable frame therefor in one of said channels, companion cams upon said shaft, one of said cams being securely pinned to said shaft, and the other cam loose upon said shaft and the adjoining portions of said cams cut away and overlapping so as to allow a slight rotary movement of the loose cam upon said shaft, a lug upon said shaft-button and a pin in said shaft-frame in such a position as to come in contact with said lug and prevent the cam-shaft from being turned through a complete revolution, and suitable shoulders upon said shaft to hold the cams in position and to keep the shaft in its frame, substantially as and for the purposes set forth.

Signed by me this 6th day of July, 1900.

CHARLES R. CAMPBELL.

Witnesses:
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BERTHA M. ALLEN.