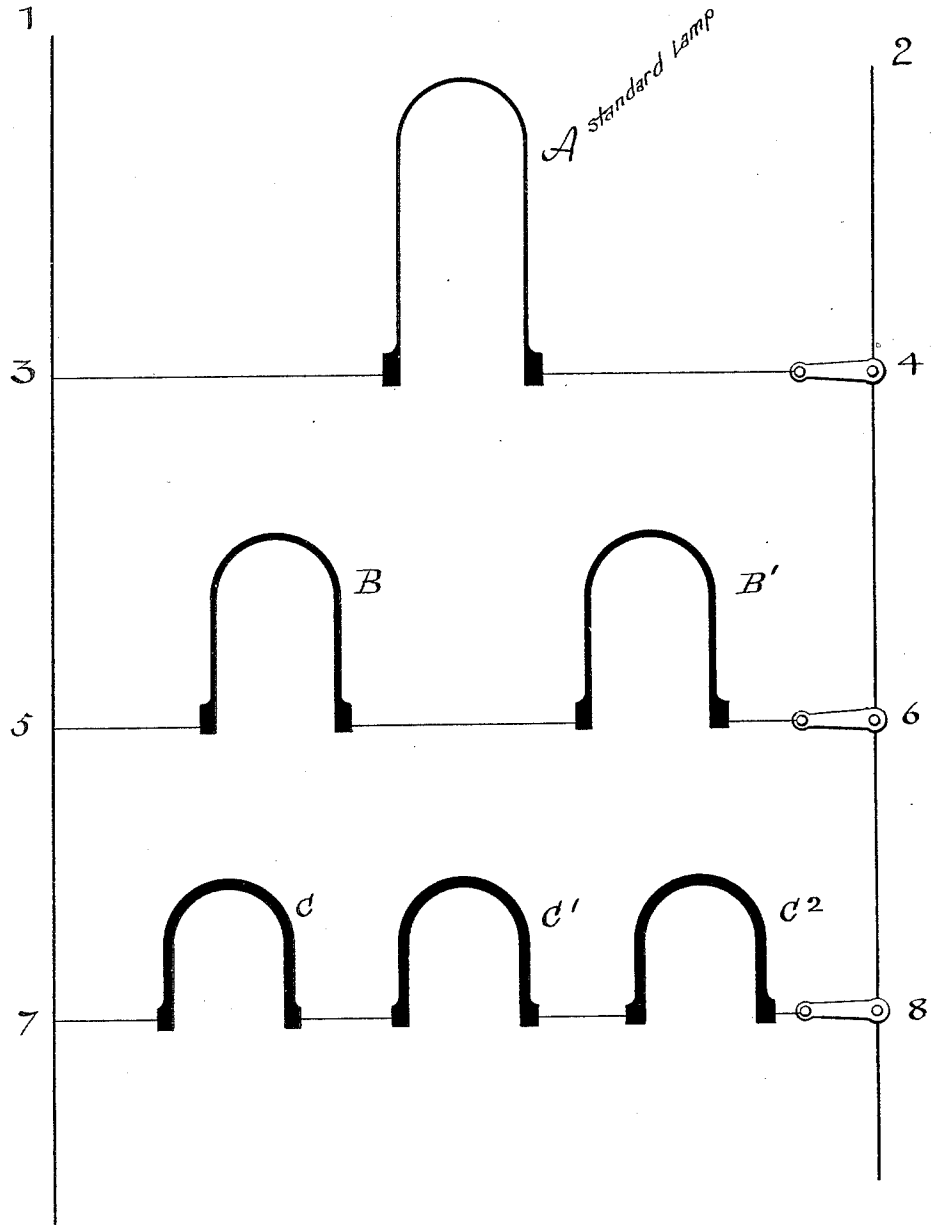
(No Model.)

T. A. EDISON.

ELECTRIC LIGHTING SYSTEM.

No. 439,389. Patented Oct. 28, 1890.



WITNESSES:

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THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 439,389, dated October 28, 1890.

Application filed August 30, 1881. Serial No. 40,998. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Electric Lighting; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon.

In my system of electric lighting in which incandescent electric lamps are arranged in multiple-arc or derived circuits from the main circuit it has been usual to place in each circuit one lamp, all the lamps having approximately the same resistance and radiating-surface, and therefore all producing about the same candle-power of light. It may be sometimes desirable, however, to place in the same multiple-arc circuit a number of lamps each of which will give the same amount of light as the standard lamp of the system—as, for instance, in a chandelier, where it is desired to control all the lamps by a single key or circuit-controller.

The object of this invention is to furnish means for accomplishing this.

In order that a lamp shall give the same amount of light as the standard lamp, its incandescing-conductor should have the same radiating-surface, and it should be raised to about the same temperature or degree of incandescence. If it is desired to place in one derived circuit two lamps each of which will give the usual standard amount of light, this may be done by decreasing the length and increasing the cross-section of the incandescing-conductor of each of such lamps until their combined resistance is about equal to one-half the resistance of the standard carbon, while the radiating-surface of each is approximately the same as that of the standard. Either a decrease of length or an increase of cross-section of course results in an increase of conductivity, and therefore both operations acting together will produce a double effect on the resistance, while at the same time the radiating-surface is kept constant. Thus a carbon of about one-half the length and twice the area in cross-section of the standard carbon will have approximately one-fourth the resistance of the standard, while it is apparent that their radiating-surfaces will be nearly the same. If two such carbons are placed in the same derived circuit, the entire resistance of such circuit will be about one-half that of a circuit containing a single standard lamp, and therefore twice as much current will pass through the former as through the latter circuit, thus allowing each lamp in the two-lamp circuit a sufficient amount of current and energy to raise it to the standard candle-power of light, it, as above stated, having about the standard radiating-surface. If three lamps are placed in one circuit, each must approximately be one-third as long and have three times the area in cross-section, and therefore have one-ninth the resistance of the standard, and so on with any desired number.

The accompanying drawing represents diagrammatically a system of lamps arranged in the above manner.

A B B′ C C′ C^2 are lamps of the Edison pattern. (Represented here by the carbon conductors alone for the sake of clearness.)

A represents the standard lamp. It is placed in a derived circuit 3 4 from the main circuit 1 2. In the derived circuit 5 6 are placed two lamps B B′, the carbon of each of which has about twice the cross-section and one-half the length of the carbon in A. In the circuit 7 8 are placed three lamps, each of which is one-third as long, while the area of cross-section of each is three times as great as that of A. In order to obtain these relations of resistance, length, and radiating-surface, the standard filament A may be considered as one of great breadth in proportion to its thickness. Suppose its perimeter to be 1, distributed as follows: each side or breadth .4, each edge .1. Then if its area in cross-section be doubled by increasing breadths to .8 its perimeter or radiating-surface will be 1.8 to each unit of length; and if length be reduced one-half the entire radiating-surface will be .9 of the standard, an approximation near enough for practical results. All these carbons are, as nearly as possible, of the same density, and therefore have the same or nearly the same degree of conductivity or resistance. The carbons used

are preferably natural fibers or shapes of wood, paper, or other carbonizable substance cut or molded into the proper size and shape.

What I claim is—

1. In an electric-lighting system, the combination of a main circuit having multiple-arc branches containing one and two lamps, respectively, the filament in branches containing but one lamp being of standard resistance and length, while the filaments in branches containing two lamps have approximately one-half the standard length, but have an area in cross-section approximately twice that of the standard filament, whereby the radiating-surfaces of the filaments are the same in the several lamps, substantially as described.

2. In an electric-lighting system, the combination of a main circuit having multiple-arc branches containing one or more lamps, respectively, the filaments in branches containing but one lamp being of standard resistance and length, while the filaments in branches containing two lamps have approximately one-half the standard length, but have an area in cross-section approximately twice that of the standard filament, the length and cross-section of the filaments being varied in a corresponding proportion in branches containing a larger number of lamps, whereby the radiating-surfaces of the filaments are the same in the several lamps, substantially as described.

This specification signed and witnessed this 1st day of July, 1881.

THOS. A. EDISON.

Witnesses:
H. W. SEELY,
RICHD. N. DYER.