L. ARONS & M. FUSS.

SERIES LIGHTING SYSTEM.

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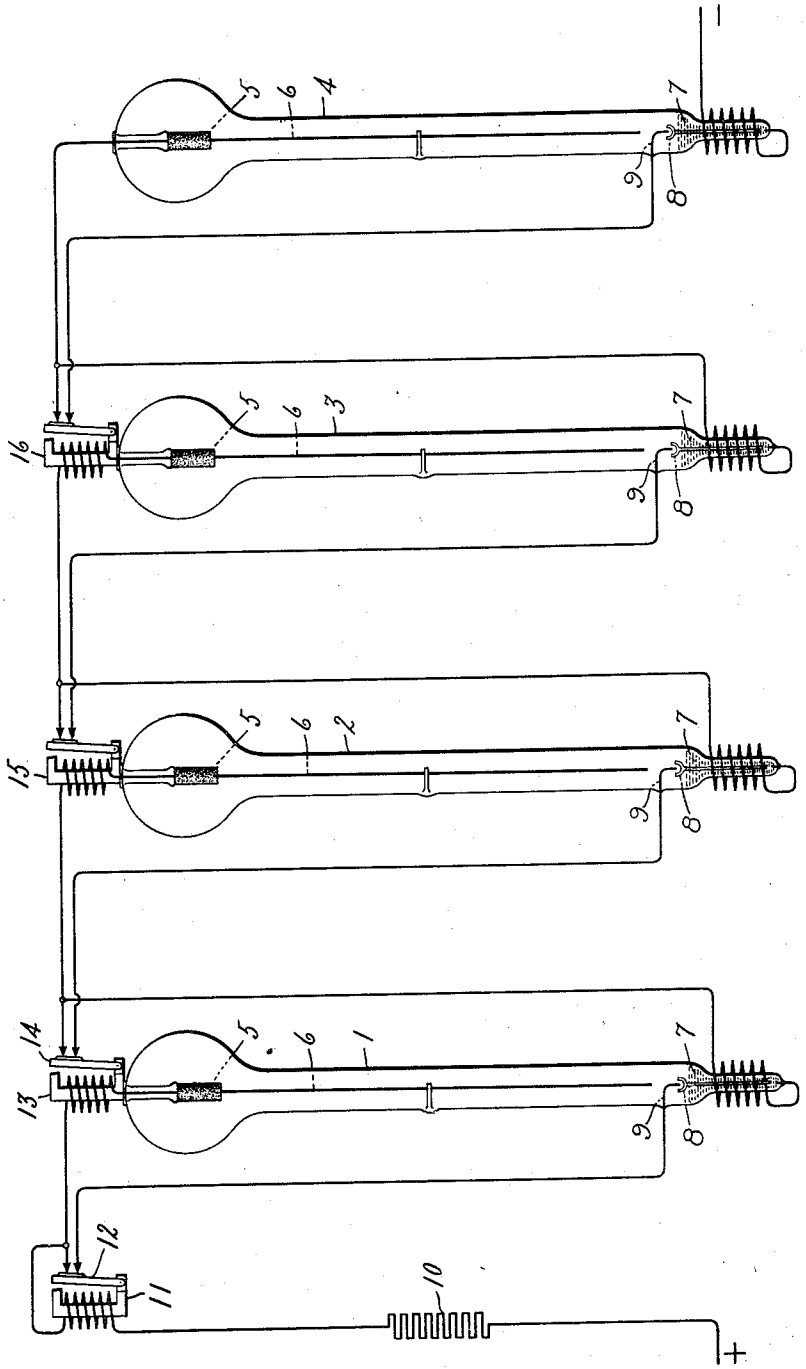
1,023,289. Patented Apr. 16, 1912.



Witnesses:

George W. Tilden

J. Ellis Glen

Inventors:

Leo Arons,

Max Fuss,

by Albert G. Davis

Att'y.

UNITED STATES PATENT OFFICE.

LEO ARONS AND MAX FUSS, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SERIES LIGHTING SYSTEM.

1,023,289. Specification of Letters Patent. Patented Apr. 16, 1912.

Application filed December 28, 1906. Serial No. 349,819.

To all whom it may concern:

Be it known that we, LEO ARONS and MAX FUSS, subjects of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in Series Lighting Systems, of which the following is a specification.

This invention relates to a method of connection which permits the lighting of mercury arc lamps connected in series, this being accomplished by the lighting of each succeeding lamp only after lighting of the preceding one. Such an arrangement affords a starting potential across the lamp considerably higher than the normal running potential, and insures the starting of the lamp even though many lamps are connected in series, and even though the lamps themselves are in a condition offering the greatest resistance to starting.

To accomplish the ends above set forth, each lamp, with the possible exception of the last, is provided with an electromagnet whose armature short circuits completely or partially the succeeding lamp, so long as the elements are not burning. If the circuit for the lamps is closed, the first lamp is first lighted, the magnet connected in series with it attracts its armature, and thereby opens the circuit for the next lamp, the latter lights, the magnet pertaining thereto operates, and this is repeated until all the lamps are lighted. The lighting of the lamps is performed in such rapid succession that the time interval is hardly perceptible.

In order that our invention may be better understood, we have shown in the accompanying drawing forming a part of this specification, one system of series connected lamps arranged to effect the results above set forth.

In the drawings each of the four mercury arc lamps 1, 2, 3 and 4 comprises an anode 5 from which depends a high resistance carbon filament or conductor 6. Each lamp is also provided with a mercury cathode 7 in which floats a magnetizable plunger 8 and an auxiliary or starting anode 9 making electrical connection with the magnetizable plunger and serving as means for starting the lamp into operation. The group of lamps is connected to a source of direct current through a resistance 10, and this circuit also includes an electromagnet 11 with a movable armature 12, the latter being so disposed that when the lamps are not lighted it completes a circuit to the starting anode 9, and thus serves as a shunt for lamp 1. A second electromagnet 13 is interposed between the source and the anode of lamp 1 so that when the lamp starts and current flows through the tube from the main anode, the armature 14 of this electromagnet will open a shunt across lamp 2, and thus transmit an effective starting potential to that lamp. Similarly lamp 2 is provided with a cut-out 15 controlling the voltage across lamp 3, and lamp 3 is provided with a cut-out 16 for controlling the voltage across lamp 4.

At the instant current is first turned on it flows through resistance 10 and electromagnet 11 and then through armature 12 to the starting anode 9, and so on through the starting coils of all the lamps in series. This current almost instantly causes movement of armature 12 and throws a high starting voltage across tube 1 and thus starts the main arc through the lamp, simultaneously causing movement of armature 14 and thereby transferring a relatively high starting potential to the second lamp. In a similar manner the other lamps of the series are successively lighted by opening the low resistance paths with which they were initially shunted. This lighting of the lamps always occurs in the order mentioned and the lamps light in such rapid succession that the time interval may be hardly perceptible.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. A system comprising vapor electric devices disposed in series, and automatic means whereby the lighting of one starts the next succeeding one.

2. In a lighting system, the combination of a plurality of mercury vapor lamps disposed in series, means for shunting each of said lamps before starting, and automatic means in circuit with one lamp for changing the voltage across the succeeding lamp to start the lamps successively.

3. In an electric lighting system, the combination of a plurality of mercury vapor lamps disposed in series, and a movable element controlled by current through one of said lamps for effecting automatically an increase in the voltage across the succeeding lamp after said first named lamp has started.

4. The combination of the plurality of vapor electric devices disposed in series, and starting means for the same operating to impress successively on the devices voltages higher than the normal running voltage.

5. The combination of the plurality of vapor electric devices in series, and means for starting each device in response to the starting of the preceding device in the series.

6. In a series lighting circuit containing a plurality of vapor electric lamps, means for successively starting said lamps, said means acting to automatically increase the voltage of each lamp succeeding the first in response to the passage of current between the electrodes of the preceding lamp.

7. In a series lighting circuit containing mercury vapor arc lamps, means for supplying a high voltage to the first lamp of the series until it starts and means for successively and automatically supplying a high voltage to each of the other lamps in response to the starting of its preceding lamp until the lamps have thus all started.

In witness whereof, we have hereunto set our hands this fifth day of December, 1906.

LEO ARONS.
MAX FUSS.

Witnesses:
JULIUS ZUMLAND,
OTTO BOROWIKS.