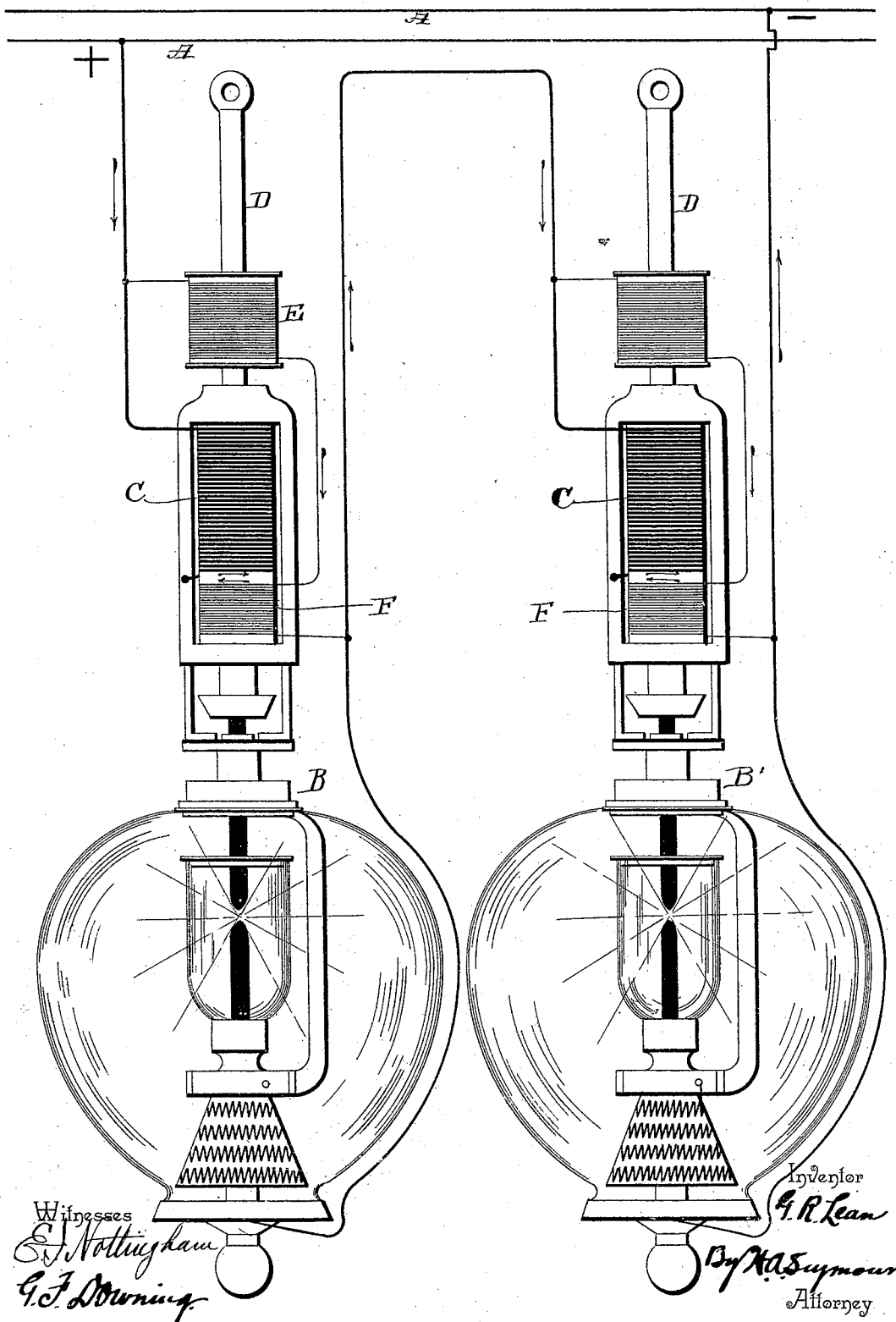


(No Model.)

G. R. LEAN.
ELECTRIC ARC LIGHTING SYSTEM.

No. 553,920.

Patented Feb. 4, 1896.



UNITED STATES PATENT OFFICE.

GEORGE R. LEAN, OF CLEVELAND, OHIO, ASSIGNOR TO THE JANDUS
ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 553,920, dated February 4, 1896.

Application filed September 27, 1895. Serial No. 563,907. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. LEAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and
5 useful Improvements in Electric-Arc Light-
ing; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and
10 use the same.

My invention relates to an improvement in electric-arc lighting, and more particularly to means for operating electric-arc lamps in series in multiple-arc circuits of high voltage and constant potential.
15

It is the object of my present invention to provide means whereby two or more lamps, not in themselves adapted to burn in series, can be successfully operated in multiple-arc
20 series on high-voltage constant-potential circuits.

With this object in view, the invention consists in the combination, with a multiple-arc circuit, of two or more arc lamps, each
25 having a carbon separating and feeding magnet included in series therein, a resistance-coil included in a shunt-circuit between the terminals of each lamp, each resistance-coil being adapted to compensate for increase in
30 voltage of the arc of the lamp between the terminals of which it is connected, and a reverse winding on the magnet of each lamp included in series with said resistance-coil.

The invention further consists in certain
35 features of construction and arrangements of parts, as hereinafter set forth and pointed out in the claims.

The accompanying drawing illustrates an embodiment of my invention.

40 My improvements are intended more particularly for use with arc lamps such as described in the patent to William Jandus, No. 543,445, in which a long arc of correspondingly-high voltage is employed, and I have
45 illustrated my improvements in connection with such lamps.

A A represent two mains, between which two arc lamps B B' are shown connected in multiple-arc series. Each lamp is provided
50 with a separating and feeding magnet C, and

the frame of each lamp is preferably made with a stem or upward extension D, which serves as a means whereby to suspend the lamp and also to receive and hold in position a coil E of resistance, the terminals of which are
55 connected in a shunt-circuit between the terminals of the lamp. The shunt-circuit also includes a reverse or differential winding F on the magnet C of the lamp, but this reverse or differential winding is so constructed
60 as not to be sufficiently strong to raise the armature in case of an interruption of the current in the coil of the magnet C.

When two or more arc lamps, such as the Jandus lamp above referred to, are placed in
65 multiple-arc series, (without the provision of the shunt-resistance coils E and the reverse or differential windings F,) each lamp will draw its arc through the agency of the magnet C, but if one lamp should draw a longer
70 arc than the other both lamps would be affected equally instead of correcting only the lamp which has drawn the excessive arc. Each coil E is so constructed that when there
75 is any increase of the length of the arc beyond the normal, and consequent rise in voltage at the terminals of any one of the series of lamps, the excess will flow through the shunt-coils E F of that particular lamp and thus weaken its magnet by robbing it of that
80 amount of current and also weakening it by the differential effect of the coil F and cause the lamp to feed, owing to the weakened magnet C, and thus correct the length of the arc without affecting the other lamps in the series.
85

Each shunt-circuit, including the coils E and F, is of such comparatively low resistance as to permit an amount of current to be shunted through it commensurate with the
90 increase of voltage at the lamp-terminals caused by the lengthening of the arc. In other words, the resistance-shunt circuit of one lamp will compensate for any increase of voltage caused by the lengthening of the arc of that lamp, rob the magnet C of such
95 excessive current and further weaken the magnet by the differential effect of the coil F, so as to permit the carbon to feed and the length of the arc to right itself without affecting the
100 other lamp or lamps in the circuit.

My improvements may also be used in connection with single lamps in multiple and also with regular series lamps.

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

1. In an arc-lighting system, the combination with a multiple-arc circuit, of two or more arc lamps included in series in said multiple-arc circuit, a shunt-circuit around the terminals of each lamp, a resistance-coil in each shunt-circuit, and a reverse or differential winding on the magnet of each lamp and included in said shunt-circuits in series with said resistance-coils, substantially as set forth.

2. In an arc-lighting system, the combination with a multiple-arc circuit, of two or more arc lamps, each having a carbon separating and feeding magnet, included in series therein, a resistance-coil included in a shunt-circuit between the terminals of each lamp, each resistance-coil being adapted to compensate for increase in voltage of the arc of the lamp between the terminals of which it is connected, and a reverse winding on the magnet of each lamp included in series with said resistance-coil, substantially as set forth.

3. In an arc-lighting system, the combina-

tion with two or more arc lamps, each having a separating and feeding magnet, of a shunt-circuit between the terminals of the lamp including a resistance, and a differential winding on the magnet of each lamp and included in said shunt-circuits, said differential winding not being sufficient to cause the armature of the magnet to be raised in case of an interruption of the current in the coil of said magnet, substantially as set forth.

4. In an electric-lighting system, the combination with two or more arc lamps, each having a carbon separating and feeding magnet, of a resistance included in the shunt-circuit between the terminals of each lamp, each resistance-coil being adapted to compensate for increase in voltage of the arc of the lamp between the terminals of which it is connected, and a reverse winding on the magnet of each lamp included in series with said resistance-coil, substantially as set forth.

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

GEORGE R. LEAN.

Witnesses:

W. H. MUSSER,
MARVIN B. JENKINS.