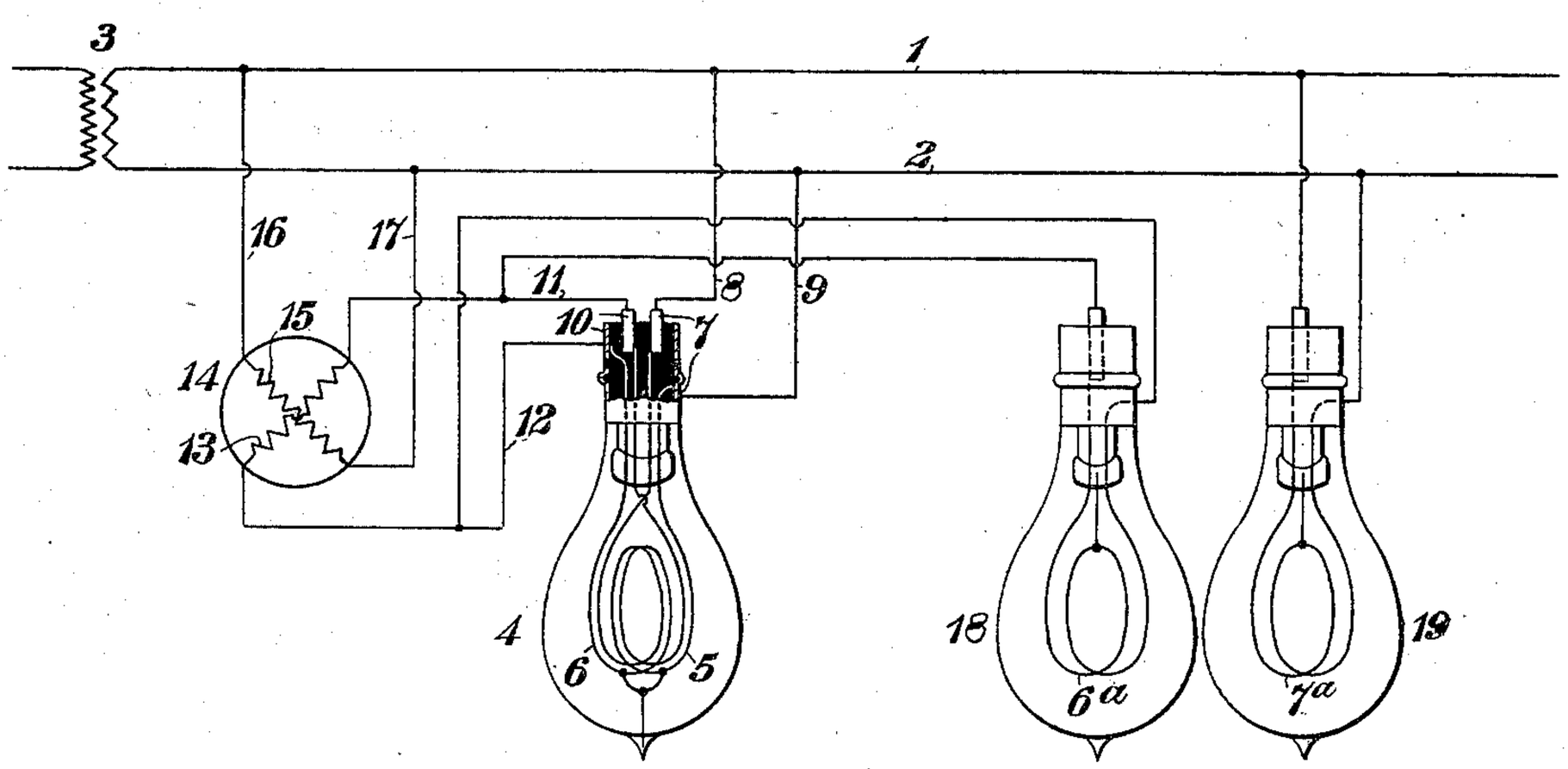
No. 731,467. PATENTED JUNE 23, 1903.

B. G. LAMME.

ELECTRIC LIGHTING APPARATUS.

APPLICATION FILED SEPT. 29, 1902.

NO MODEL.



WITNESSES:

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No. 731,467. Patented June 23, 1903.

UNITED STATES PATENT OFFICE.

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ELECTRIC-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 731,467, dated June 23, 1903.

Application filed September 29, 1902. Serial No. 125,225. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric-Lighting Apparatus, of which the following is a specification.

My invention relates to the art of electric lighting, and has special reference to the lighting of railway-vehicles which are operated by single-phase alternating-current energy.

The object of my invention is to provide a means for effectively and satisfactorily lighting vehicles from a source of alternating-current energy the rate of alternations of which is so low that in the use of the means generally employed in the art the fluctuations of light due to current reversals would be so objectionable as to be practically prohibitive.

In an application for patent, Serial No. 87,316, filed by me December 26, 1901, I have set forth a system whereby single-phase alternating-current energy of very low frequency may be efficiently utilized for propelling railway-vehicles at the variable speeds demanded in practical commercial operation, and it is in connection with such a system that my present invention is intended to be used.

It is obviously desirable to employ electric lamps for illuminating vehicles which are propelled by electric motors, and it is, furthermore, inexpedient to employ special generating means for producing the necessary current. The problem to be solved, therefore, in a system such as that above mentioned is to utilize the very low frequency alternating-current energy in such manner that it will provide substantially steady non-fluctuating illumination. In order to effect this result, I propose to utilize the low-frequency alternating-current energy of the system, preferably at a reduced potential, by transforming it into energy having a plurality of displaced phases and supplying the current of the different phases to different filaments in a single lamp or in different lamps located in proximity to each other, so that the maximum illumination of one filament will occur at the same time as the minimum illumination from an adjacent filament, or, if there be more than two filaments and two phases of current, that the phases will overlap so as to make the resultant illumination substantially constant.

Referring to the drawing, the single figure of which illustrates my invention and which is mainly diagrammatic, the circuit 1 2 is supplied with alternating-current energy of very low frequency—such, for example, as approximately two thousand alternations per minute, though not necessarily restricted to this rate, but in all cases probably less than three thousand alternations per minute and having a voltage which is adapted to the lamps employed. In case the lamps are all connected in parallel the voltage must obviously be much lower than if a number of them are connected in series in the circuit; but my invention is not restricted to either method of connection.

The voltage desired, if not procured directly from the circuit which supplies the motors, may be obtained from that circuit by means of a suitable step-down transformer 3. At 4 I have indicated an incandescent lamp provided with two filaments 5 and 6, the former of which is connected by the usual contact-making terminals 7 and conductors 8 and 9 to the circuit 1 2. The filament 6 is connected by means of the usual contact-terminals 10 and conductors 11 and 12 to one winding or portion of winding 13 of a phase transformer or adjusting device 14, the other winding or portion of winding 15 of this device being connected to the circuit 1 2 by means of conductors 16 and 17. This phase-transforming device may be an induction-motor, a two-phase synchronous motor, or a motor-generator so constructed and arranged that when one of its windings is connected across the single-phase circuit 1 2 the other winding will generate a current that is approximately in quadrature with that of the circuit 1 2. In describing this device 14 as a means for providing current the phase of which is in quadrature with that of the circuit 1 2 it is

to be understood that the description is merely illustrative and that a properly constructed and connected device may be utilized to produce a greater number of phases of current which are displaced with reference to each other and with reference to the current in the circuit 1 2, and that a corresponding number of lamp-filaments may be connected to the different circuits, so as to be supplied with the currents of displaced phases, and thus secure substantially the same result.

As has been heretofore suggested, the filaments, which are supplied with currents of displaced phases, may be located in separate bulbs instead of in one, provided such bulbs are located in close proximity to each other, so that the fluctuations of light due to the low rate of alternations may overlap each other, and thus produce a resultant which is substantially constant.

I have shown at 18 and 19 two lamps, having, respectively, filaments 6^a and 7^a, which are connected in circuit in the same manner as the filaments 5 and 6 of the lamp 4.

It is to be understood that the number of lamps employed in any vehicle, whether connected in series or in parallel, will be such as the conditions in any particular case demand, the arrangement of circuits and the voltage-supply being made to correspond thereto.

I claim as my invention—

1. The combination with a single-phase, alternating-current-supply circuit having a very low rate of alternations, of a phase-displacing device having a portion of its winding which corresponds to one phase connected to said circuit, and a plurality of incandescent-lamp filaments one of which is connected to said supply-circuit and the others of which are respectively connected to those portions of the winding of said phase-displacing device which correspond to the other phases.

2. The combination with a single-phase, alternating-current-supply circuit having a very low frequency and a phase-displacing device having a portion of its winding which corresponds to one phase connected to said circuit, of an incandescent lamp having a plurality of filaments one of which is connected to said supply-circuit and the others of which are respectively connected to those portions of the winding of said phase-displacing device which correspond to the other phases.

3. The combination with a single-phase, alternating-current-supply circuit of very low frequency and a device for providing a current of displaced phase having the portion of its winding which corresponds to one phase connected to said circuit, of two incandescent-lamp filaments one of which is connected to said supply-circuit and the other of which is connected to that portion of the winding of said phase-displacing device which corresponds to the other phase.

4. The combination with a single-phase, alternating-current-supply circuit and a dynamo-electric phase-displacing device having one winding connected to said circuit, of two incandescent-lamp filaments one of which is connected to said supply-circuit and the other of which is connected to the winding of the phase-displacing device which corresponds to the displaced phase.

In testimony whereof I have hereunto subscribed my name this 25th day of September, 1902.

BENJ. G. LAMME.

Witnesses:
JAMES B. YOUNG,
BIRNEY HINES.