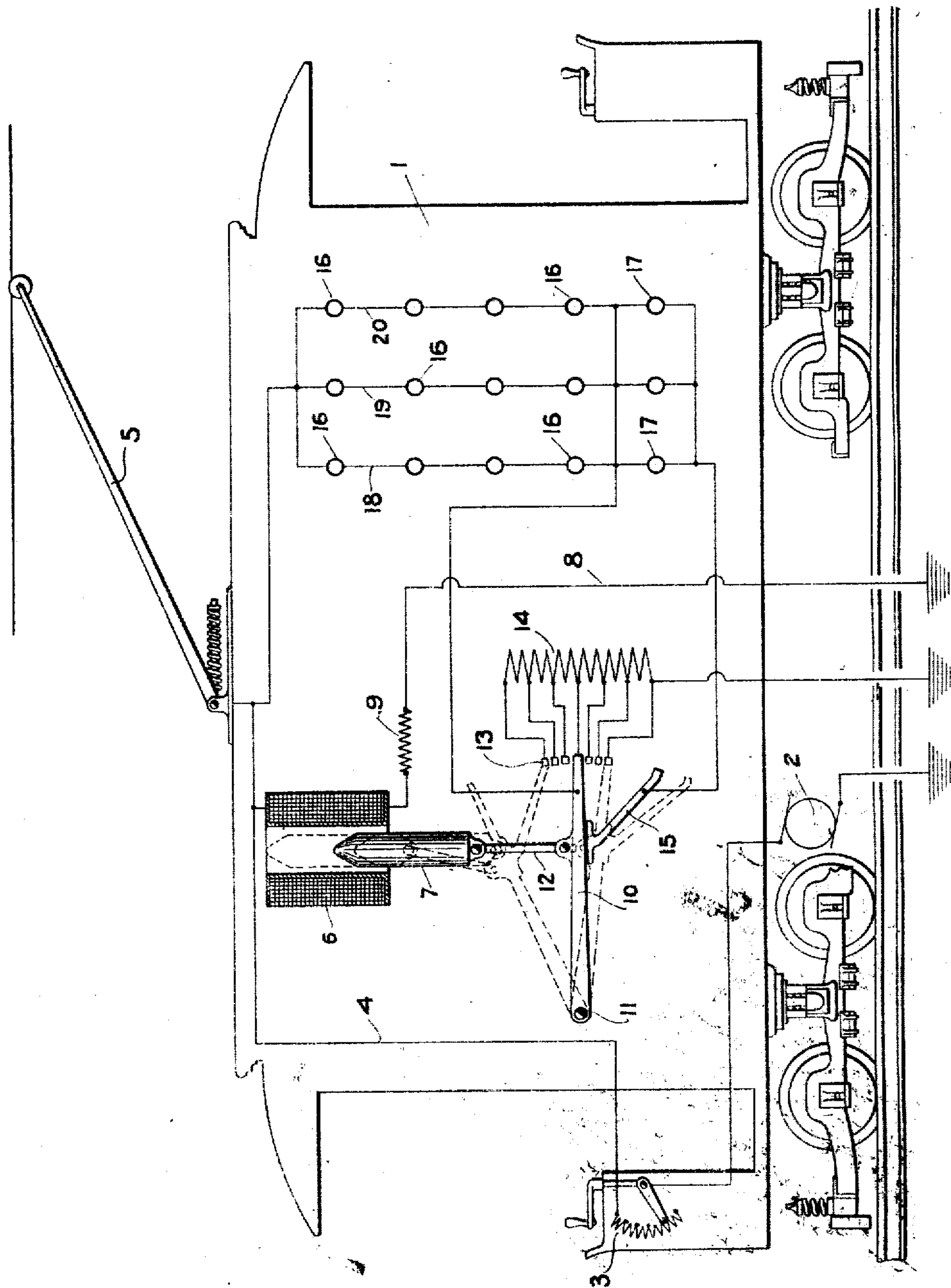


No. 814,364.

PATENTED MAR. 6, 1906.

A. L. DRUM.  
LAMP REGULATOR.  
APPLICATION FILED MAR. 28, 1905.



WITNESSES:

*J. Clyde Ripley.*  
*Charles H. Wilson.*

INVENTOR:

*A. L. Drum*  
BY  
*Warfield & Dwyer*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

ALPHONSUS L. DRUM, OF LAKE FOREST, ILLINOIS.

## LAMP-REGULATOR.

No. 814,364.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed March 28, 1905. Serial No. 252,483.

*To all whom it may concern:*

Be it known that I, ALPHONSUS L. DRUM, residing at Lake Forest, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Lamp-Regulators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to lighting systems, and more specifically to means for maintaining a constant intensity of electric lamps.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention consists in the features of construction, combination of elements, arrangement of parts, utilization of principles, which will be exemplified in the apparatus hereinafter described and the scope of the application of which will be indicated in the following claims.

The accompanying drawing represents one of various possible embodiments of my invention.

Preliminary to a description of this embodiment of my invention, it may be noted that in many lighting systems now in general use there exists a disagreeable dimming and brightening of the lamps during the opening and closing of the circuits through other current-utilizing devices where said current-utilizing devices and lamps are connected with the same source of electric supply. The above and other defects are eliminated in constructions of the nature of that hereinafter described.

Referring to the drawing, the electrically-propelled vehicle 1 is provided with a motor 2 for propelling the same and a controller 3 for regulating the current of the motor from the source of supply through the conductor 4 and the trolley 5. This part of the apparatus may be of any desired type and for the purpose of making complete the disclosure of my invention need not be specifically described.

A solenoid 6, having an armature 7, is connected in shunt-circuit 8, which leads from the source of supply through a suitable resistance 9 to ground. A rheostat-arm 10 is pivoted at 11 and connected intermediate of its length by a link 12 to the armature 7 and is adapted to pass over a series of contact-points 13 of the rheostat 14. Attached to and extending from the rheostat-arm 10 and insulated therefrom is a second rheostat-arm

15, adapted also to pass over the contact-points 13. The ends of the rheostat-arms 10 and 15 are spaced apart to such an extent that but one of said arms can engage the contact-points 13 at the same time and are so arranged that when one is in engagement with the first of the series of contact-points the other will be just out of engagement with the last of said contact-points. The electric lamps 16 and 17 are connected in series parallel in the circuit which comprises conductors 18, 19, and 20, which circuit extends from the source of supply through the lamps 16, the rheostat-arm 10, and thence through the rheostat 14 to ground. A second circuit leads from the lamps 17 through the rheostat-arm 15, thence through the rheostat 14 to ground.

With the several parts arranged substantially as described the operation of this embodiment of my invention is as follows: Assuming that the operative mechanism of the electrically-propelled vehicle is at rest and the motor-circuit open, steady and unvarying currents will flow through the shunt-circuit 8 and the lamps 16 and 17. The armature 7 will then be in the position shown in the dotted lines in the drawing, with the rheostat-arm 15 engaging the uppermost series of contact-points 13 of the rheostat 14, and when the armature is in this position it will be noted that all the resistance of the rheostat 14 is in the lamp-circuit. Assuming now that the motor 2 be started by means of controller 3, the consequent drain on the source of current-supply through the motor-circuit will cause a corresponding decrease of current in the shunt-circuit and the lamp-circuit due to the resulting drop in the potential of the source of current-supply, and this diminishing of current in the lamp-circuit would ordinarily cause a momentary dimming of the lamps in the arm-circuit. The diminishing of the current-supply to the shunt-circuit 8 simultaneously and proportionately to that in the lamp-circuit will cause the armature 7 to withdraw by gravity from the solenoid, and by reason of the link connection between the armature 7 and the rheostat-arms 10 and 15 the arm 15 will move along the contact-points 13 of the rheostat 14, thereby cutting out some of the resistance in the lamp-circuit. The resistance thus cut out from the lamp-circuit is adjusted so as to be sufficient to compensate for the diminishing of the potential due to the start-



ing of the motor. Now, however, supposing that the controller should be suddenly turned to the position shown in the drawing, the consequent drain on the source of current-supply might not be entirely compensated for by the cutting out of the whole resistance of the rheostat 14, and the armature 7 in its downward movement may force the rheostat-arm 15 out of engagement with the lowermost of said contact-points 13; but in this event the rheostat-arm 10 will simultaneously engage with the uppermost of said contact-points. This, it will be noticed, will cut out the lamps 17 and the current will flow only through the lamps 16. Inasmuch as the cutting out of the lamps 17 will still further diminish the resistance in the lamp-circuit, the candle-power of the lamps 16 will not be varied or diminished and any further variation of the current will be compensated for and corrected by the movement of the rheostat-arm 10 over the contact-points 13 of the rheostat 14.

It will thus be seen that I have provided a simple and inexpensive apparatus whereby the current-supply of the lamps in an electrically-propelled vehicle is maintained uniform during the gradual or sudden starting or stopping of the operating-motor, and it has for its further object also to provide a new and improved resistance-varying mechanism adapted to be used in relations of the above nature. The employment of the invention is, however, not limited to an electrically-propelled vehicle, but is equally applicable in any apparatus where the lamps or current-utilizing devices are connected to a source of supply of varying potential.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention could be made without departing from the scope thereof, I intend that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense. I desire it also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

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

1. In a regulator for electric lamps, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a shunt-circuit, a rheostat in the lamp-circuit a second lamp-circuit, and means located in the shunt-circuit for maintaining a constant current in either lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

2. In a regulator for electric lamps, the

combination of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat in the lamp-circuit, a movable rheostat-arm operating upon the rheostat, a shunt-circuit, means located in the shunt-circuit for operating the movable rheostat-arm, and a second lamp-circuit, the means in the shunt-circuit being adapted to operate upon the first-named lamp-circuit to maintain a uniform current in the same and simultaneously to close the second circuit and maintain a uniform current in that circuit during the opening and closing of the circuit comprising the current-utilizing devices.

3. In a regulator for electric lamps, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat in the lamp-circuit, a movable rheostat-arm operating upon the rheostat, a second lamp-circuit, a rheostat-arm extending from the movable rheostat-arm and adapted to operate upon the rheostat, a shunt-circuit, and means located in the shunt-circuit to cause the movable rheostat-arm and the rheostat-arm to operate upon the rheostat for maintaining a uniform current in either lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

4. In a regulator for electric lamps, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat in the lamp-circuit, a second lamp-circuit, a movable rheostat-arm operating upon the rheostat, a rheostat-arm extending from the movable rheostat-arm and insulated therefrom, a shunt-circuit, and means in the shunt-circuit for operating the rheostat-arm upon the rheostat to maintain uniform current in the first lamp-circuit, said means being adapted to disengage the rheostat-arm from the rheostat and simultaneously to engage the movable rheostat-arm with the rheostat, thereby opening the first lamp-circuit and closing the second lamp-circuit to maintain a uniform current during the opening and closing of the circuit comprising the current-utilizing devices.

5. In a regulator for electric lamps, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat located in the lamp-circuit, a pivoted rheostat-arm adapted to operate upon the rheostat, a rheostat-arm extending from the pivoted rheostat-arm and insulated therefrom, a shunt-circuit, a solenoid located in the shunt-circuit, and means connecting the armature of the solenoid with said pivoted rheostat-arm such that a movement of said armature will be communicated to said first-mentioned rheostat-arm to cause said second-mentioned rheostat-arm to move over the rheostat to maintain a uniform current in the lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.



6. In a regulator for electric lamps, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat located in the lamp-circuit, a pivoted rheostat-arm operating upon the rheostat, a rheostat-arm extending from the movable rheostat-arm and insulated therefrom, the ends of the pivoted arm and the rheostat-arm being spaced apart, a shunt-circuit, a solenoid located in the shunt-circuit, a link connecting the armature of the solenoid with the pivoted arm whereby a movement of the armature will cause a corresponding movement of the rheostat-arm over the rheostat to maintain a constant current in the lamp-circuit, and a second lamp-circuit adapted to be closed by the contacting of the movable rheostat-arm with the rheostat whereby the first lamp-circuit is closed, thereby causing a constant current in the second lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

7. The combination in a controller for electric lamps of a circuit comprising current-utilizing devices, a lamp-circuit, a rheostat in the lamp-circuit, a shunt-circuit, means in the shunt-circuit for automatically controlling the lamp-circuit, and a second lamp-circuit adapted to be controlled by the means in the shunt-circuit, the means in the shunt-circuit being adapted to open the first lamp-circuit and simultaneously to close the second lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

8. The combination in an electrically-propelled vehicle of a circuit comprising current-utilizing devices, lamp-circuit and a shunt-circuit connected with a common source of supply, a movable rheostat-arm, a rheostat-arm extending from the movable rheostat-arm and insulated therefrom, a second lamp-circuit, and means in the shunt-circuit for controlling both lamp-circuits, the means in the shunt-circuit being adapted to open the first lamp-circuit and simultaneously to close the second lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

9. In an electrically-propelled vehicle, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a second lamp-circuit, and means for automatically opening the first lamp-circuit and simultaneously closing the second lamp-circuit, the said means being adapted to maintain a uniform current in one of said lamp-circuits during the opening and closing of the circuit comprising the current-utilizing devices.

10. In an electrically-propelled vehicle, the combination of a circuit comprising current-utilizing devices, a lamp-circuit, a second lamp-circuit, and a rheostat arranged to be inserted in either lamp-circuit for maintain-

ing a uniform current in either lamp-circuit during the opening and closing of the circuit comprising the current-utilizing devices.

11. In apparatus of the class described, in combination, a plurality of lamps serially connected to a source of electric supply of varying potential, and automatic means connected with said source of supply adapted upon a fall in potential of said source of supply to cut out a certain number of said lamps.

12. In apparatus of the class described, a plurality of lamps serially connected to a source of electric supply of varying potential, and means connected with said source of supply adapted upon a fall in potential of said source of supply to cut out a certain number of said lamps.

13. In apparatus of the class described, in combination, a plurality of lamps serially connected to a source of electric supply of varying potential, and automatic means for maintaining a uniform current in said lamps upon a fall in potential of said source of supply, said means being adapted to operate to cut out a certain number of said lamps.

14. In an apparatus of the class described, in combination, a plurality of lamps serially connected to a source of electric supply of varying potential, a certain number of lamps adapted to be connected to said source of supply, and means adapted to be automatically connected with said source of supply and adapted upon a rise in potential of said source of supply to connect said second-mentioned lamps with the first-mentioned lamps.

15. In apparatus of the class described, in combination, a plurality of lamps serially connected to a source of electric supply of varying potential, a second plurality of lamps and automatic means connected with said source of supply adapted upon a rise in potential of said source of supply to connect said second-mentioned plurality of lamps with the first-mentioned lamps, said means being adapted to maintain a uniform current in all of said lamps.

16. In apparatus of the class described, in combination, a plurality of lamps serially connected to a source of electric supply, means connected with said source of supply for maintaining a uniform current in the lamps, said means being adapted upon a fall in potential of said source of supply to cut out one or more lamps and also to maintain a uniform current in the remainder of said lamps.

17. In an apparatus of the class described, a variable-potential source of supply, a circuit connected therewith embodying a plurality of lamps, means adapted upon a change of potential of said source of supply to maintain a constant current through said lamps, means adapted upon a further change in potential of supply to cut out a certain number of said lamps, and means adapted upon a



still further change of potential of the source of supply to maintain a uniform current in the remainder of said lamps.

18. In an apparatus of the class described, a variable-potential source of supply, a plurality of lamps connected in a circuit therefrom, means adapted to compensate for initial change in the potential of the supply to maintain a uniform current through said lamps, upon a further change in the potential of the supply to cut out certain of said lamps and to compensate for a still further change in the potential of the supply to maintain a uniform current through the remainder of said lamps.

19. In an apparatus of the class described, a source of supply, current-utilizing devices and a lamp system connected therefrom, means adapted upon a variation of the potential of the current-supply caused by the operation of the current-utilizing devices to maintain a constant current through said lamp system, means adapted upon a different operation of said current-utilizing devices to cut out a part of said lamps and upon further operation of said utilizing devices to maintain a constant current through the remainder of said lamps.

20. In an apparatus of the class described, a source of supply, current-utilizing devices and a lamp system connected in shunt therefrom, means adapted upon a variation of the potential of the current-supply caused by the operation of the current-utilizing devices to maintain a constant current through said lamp system, means adapted upon a different operation of said current-utilizing devices to cut out a part of said lamps and upon further operation of said utilizing devices to maintain a constant current through the remainder of said lamps.

21. In an apparatus of the class described, a source of power-supply, power-utilizing devices connected therewith, supplementary power-utilizing devices connected with said power-supply, means adapted upon operation of said main current-utilizing devices to determine the operation of said supplementary current-utilizing devices, upon a further operation of said main current-utilizing devices to cut out a part of said supplementary utilizing devices and upon a still further operation of said current-utilizing devices to determine the supply to the remainder of said supplementary utilizing devices.

22. In apparatus of the class described, a source of current-supply, current-utilizing devices connected therewith, a lamp system also connected therewith, and means depending upon the operation of the current-utilizing devices adapted to determine the number of lamps connected with said source of current-supply and the amount of current supplied thereto.

23. In apparatus of the class described, a source of current-supply, current-utilizing devices connected therewith, a lamp system also connected therewith, and means adapted upon the operation of the current-utilizing devices initially to determine the current supplied to said lamp system secondarily to determine the number of lamps in said system and further to determine the current supplied to the final number of said lamps.

In testimony whereof I affix my signature in the presence of two witnesses.

ALPHONSUS L. DRUM.

Witnesses:

GEO. W. MILLER,  
W. F. WANATKE.