No. 783,876. PATENTED FEB. 28, 1905.

J. LINDALL.

SYSTEM OF ELECTRIC LIGHTING.

APPLICATION FILED OCT. 17, 1904.

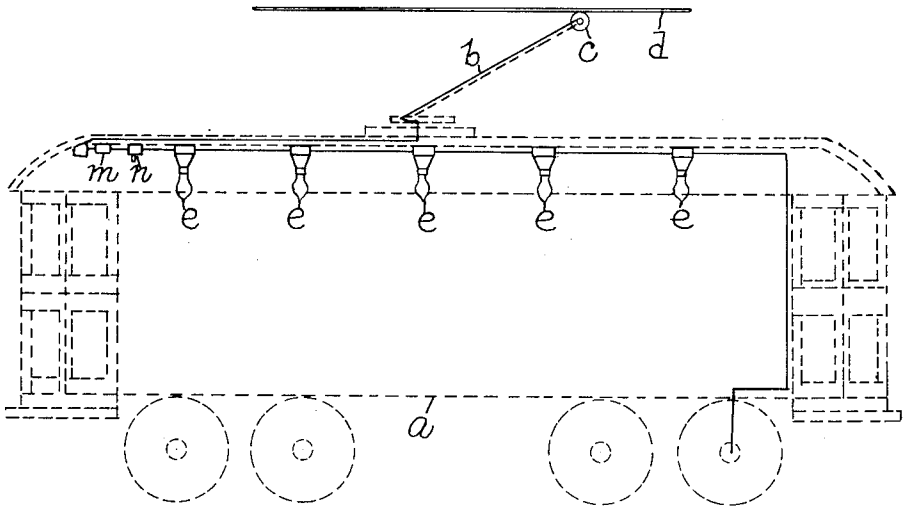


Fig. 1.

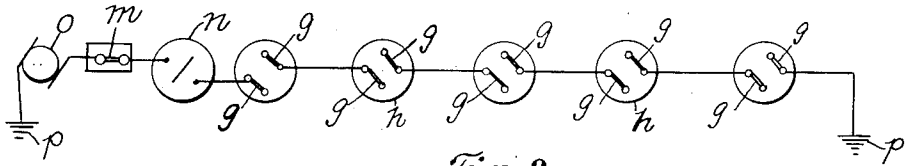


Fig. 2.

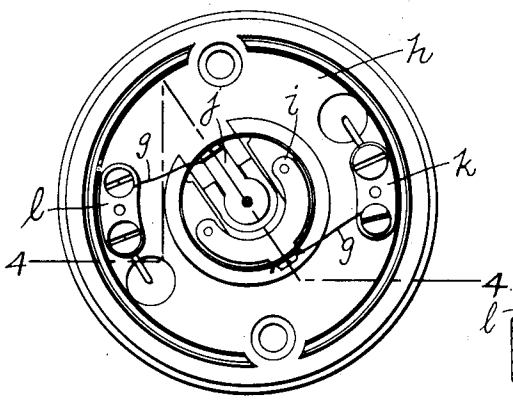


Fig. 3.

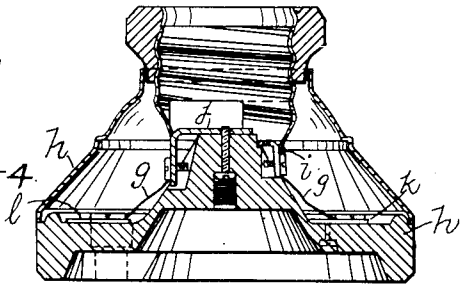


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

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SYSTEM OF ELECTRIC LIGHTING.

SPECIFICATION forming part of Letters Patent No. 783,876, dated February 28, 1905.

Application filed October 17, 1904. Serial No. 228,832.

To all whom it may concern:

Be it known that I, JOHN LINDALL, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Systems of Electric Lighting, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel system of lighting by means of electricity which is especially designed and adapted, among other uses, to be employed on electric railways in which the power-current is employed to light the cars and stations.

The present invention has for its object to provide a system of lighting in which currents of substantially high voltage—such, for instance, as the power-current of electric railways, which is usually about five hundred and fifty volts—may be used with comparative safety from fire caused by the formation of arcs in the incandescent lamps within the car-body or stations. To this end I employ a system which includes a plurality of incandescent lamps arranged in series circuit and each provided with a thermostatic fuse which responds to external heat and by which the circuit may be interrupted substantially in an instant at any one of the lamps where an arc should happen to form, but which fuse is of sufficient capacity to readily carry a current in excess of the normal amperage employed for lighting the lamp. I also prefer to employ in said circuit a fuse which is responsive to a current whose strength or amperage is less than that at which the fuses in the lamps respond, so that in case an excess of current gets onto the lamp-circuit the line-fuse will respond to said excessive current and interrupt the lighting-circuit substantially in an instant and before opportunity is afforded for the lamp-fuses to be destroyed, thereby avoiding serious delays and interruptions in the lamp-circuit, while at the same time safeguarding the car by preventing fires, which have been caused in lighting systems for cars as heretofore constructed and arranged and known to me, by arcs forming within the lamp-sockets and in time setting fire to the woodwork of the car. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents in outline an electric-railway car provided with a lighting system embodying this invention; Fig. 2, a diagrammatic view illustrating the lighting system represented in Fig. 1; Fig. 3, a plan view of one of the lamp-bases shown in Fig. 1; and Fig. 4, a vertical section on the irregular line 4 4, Fig. 3.

In the present instance I have represented the invention as applied to an electric-railway car *a*, such as commonly used on surface railroads, which is provided with the usual trolley-pole *b* and trolley-wheel *c*, which makes contact with the overhead trolley-wire *d*; but it will be understood that I do not desire to limit myself in this respect, as the invention is equally applicable for use on electric-railway systems in which the power-current is taken from a third rail or other conductor, as in the manner now commonly employed on electric-railway systems employing the third rail.

In accordance with this invention the car or other structure *a* is lighted by a plurality of incandescent electric lamps *e*, arranged in series circuit and of a number sufficient to enable the power-current taken from the trolley wire or conductor *d* to be utilized for lighting the car. The power-current usually employed is of a voltage of about five hundred and fifty and the number of lamps employed in series is five, as herein shown. The lamps *e* are provided with one or more thermostatic fuses *g*, located in their bases *h*, which connect the socket-terminals *i j* with the line-terminals *k l*, as represented in Figs. 3 and 4. The thermostatic fuses *g* are of a carrying capacity sufficient to carry a current in excess of the normal amperage of the current employed on the lamp-circuit, yet is such as will respond to external heat and be melted thereby at a predetermined temperature, so that in case an arc should accidentally be formed within the lamp-socket the heat from such arc would melt the fuse *g* in said socket, and thereby open the

lighting-circuit at that particular lamp, thereby safeguarding the car or other structure from danger of fire from this source.

In order to safeguard the lighting system from excessive currents and avoid interruptions of the circuit at the lamps with the consequent inconveniences and delays, the lighting-circuit is provided with a fuse *m*, which is responsive to a current whose strength or amperage is less than that at which the lamp-fuses *g* respond. The line-fuse *m* may be interposed in the lighting-circuit between the power-supply conductor *d* and the lamps *e*, as shown in Figs. 1 and 2, and said lighting-circuit may also include a switch *n*, which may be of any suitable, desired, or usual construction.

By reference to Fig. 2 it will be seen that the five lamps are connected in series with each other and with the switch *n* and line-fuse *m*, the source of current being represented as a dynamo *o* and the opposite ends of the circuit being represented as connected with the ground *p*. It will be understood from an inspection of Fig. 2 that when a current in excess of the normal strength flows onto the lighting-circuit the line-fuse *m*, which melts at a lower amperage than the lamp-fuses *g*, responds to the excess current and opens the lighting-circuit before the current can affect the lamp-fuses, thereby safeguarding the lighting-circuit and avoiding the delays and inconvenience which would arise if the lamp-fuses should also be destroyed. So, also, it will be seen that the danger of the car being set on fire by reason of an arc being accidentally formed in the lamp-sockets, which danger is augmented by the high voltage of the power-current, is avoided by the thermostatic fuses in the lamp sockets or bases, which respond to the external heat caused by such arc and are melted thereby, thus opening the lighting-circuit at the defective lamp and destroying the arc. Prior to this invention experience has demonstrated that arcs have been formed in lamp-sockets which have not been provided with thermostatic fuses and have in time set fire to the woodwork of the car to which the sockets of the lamps have been secured.

I have herein represented the lighting system as employed on an electric-railway car; but I do not desire to limit my invention in this respect, as it may also be used in other structures employing currents of substantially high voltage for the lighting-current, such as the stations along the line of the railroad.

I claim—

1. In a system of lighting by electricity, in combination, a circuit, a source of current of substantially high voltage connected with said circuit, a plurality of incandescent lamps provided with thermostatic fuses and connected in series in said circuit, and a line-fuse included in said circuit and of less carrying capacity than the fuses of said lamps, substantially as described.

2. In a system of lighting by electricity, in combination, a car provided with a plurality of incandescent lamps arranged in series circuit and provided with fuses responsive to external heat, a source of current for operating said car and with which the lamp-circuit is connected, and a fuse in said lamp-circuit exterior to said lamps and responsive to an excess of current in said lamp-circuit, substantially as described.

3. In a system of lighting by electricity, in combination, a car provided with a plurality of incandescent lamps arranged in series circuit and each provided with a thermostatic fuse responsive to external heat, and a line-fuse included in circuit with said lamps and of less current-carrying capacity than said thermostatic lamp-fuses, substantially as described

4. In a system of lighting by electricity, in combination, a circuit, a source of current of substantially high voltage connected with said circuit, and a plurality of incandescent lamps arranged in series in said circuit and provided with thermostatic fuses which respond to external heat to open the lighting-circuit, substantially as described.

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

JOHN LINDALL.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.