

No. 744,261.

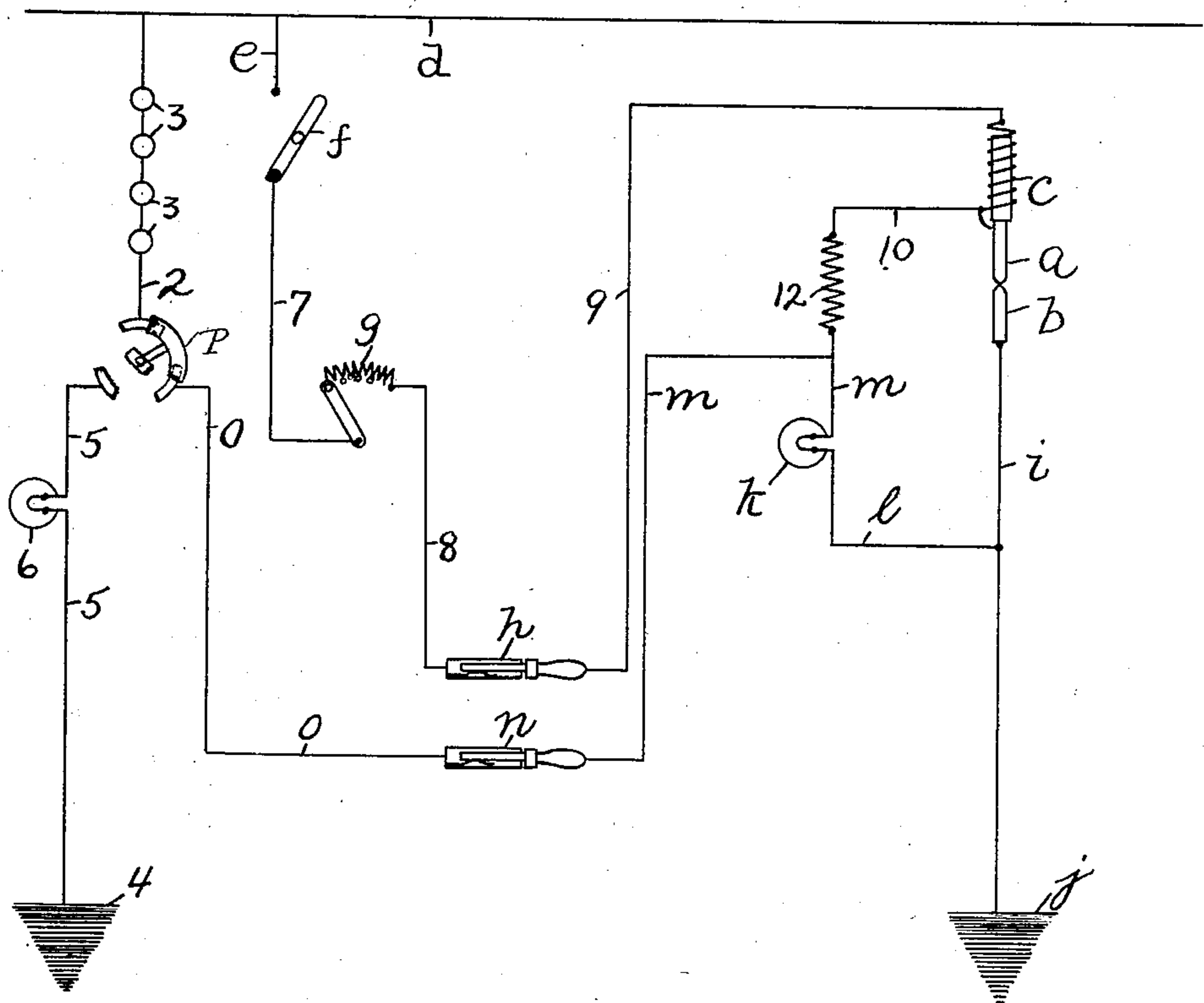
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SYSTEM OF ELECTRIC LIGHTING FOR CARS.

APPLICATION FILED JULY 30, 1903.

NO MODEL.



Witnesses.

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SYSTEM OF ELECTRIC LIGHTING FOR CARS.

SPECIFICATION forming part of Letters Patent No. 744,261, dated November 17, 1903.

Application filed July 30, 1903. Serial No. 167,540. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. TOLMAN, 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 for Cars, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to a system of electric lighting especially designed and adapted, among other uses, to be employed in headlights on electrically-propelled cars.

In accordance with this invention the system referred to includes an arc-lamp and an incandescent lamp, which are designed in practice to be employed for lighting the road-bed, and both lamps may and preferably will be inclosed in a single casing, which may be of any suitable or desired construction.

The invention has for its object to provide a simple, efficient, and economical system in which either lamp may be employed and in which the incandescent lamp is automatically lighted in case the arc-lamp should be accidentally deranged or should fail to work for any cause except loss of current. To this end the arc-lamp and the incandescent lamp are included in two circuits, which may be independently controlled by the operator and which are so connected, as will be described, that the incandescent lamp is automatically brought into service upon failure of the arc-lamp to operate.

The particular features of this invention will be pointed out in the claims at the end of this specification.

The drawing represents in diagram a system of lighting embodying this invention.

Referring to the drawing, *a b* represent the upper and lower carbons of an arc-lamp, which may be of any suitable or desired construction, and *c* represents the coil of the lifting-magnet for the upper carbon *a*. The coil *c* is included in circuit with the trolley-wire *d* through the usual trolley-pole, herein represented by the line *e*, the said circuit also including, as herein shown, a manually-operated switch *f*, a rheostat *g*, and a plug-switch *h*, all of which may be of any suitable or de-

sired construction. The arc-lamp circuit also includes the wire *i*, connecting the negative carbon *b* with the ground *j*. The trolley-wire *d* has connected with it a circuit containing an incandescent lamp *k*, which has one terminal connected by wire *l* with the ground-wire *i* and the other terminal of which is connected by wire *m* with the movable contact member of a plug-switch *n*, which has its stationary contact member connected by wire *o* with one terminal of a three-way switch *p*, of any usual or suitable construction, the said switch being connected with the trolley-wire *d* by the conductor 2, which includes a plurality of incandescent lamps 3, which may be employed to light the interior of the car. The switch *p* may also be connected with the ground 4 by a conductor 5, including an incandescent lamp 6.

The circuit of the arc-lamp is controlled by the switch *f*, and when said switch is closed the circuit of the arc-lamp under normal conditions is completed. This circuit may be traced as follows: from the trolley-wire *d* by wire *e*, switch *f*, wire 7 to rheostat *g*, thence by wire 8 to plug-switch *h*, thence by wire 9 to magnet-coil *c*, carbons *a b*, and wire *i* to the ground *j*.

The circuit of the incandescent lamp may be traced as follows: from the trolley-wire *d*, through the lamps 3 in the car, thence by switch *p* and wire *o* to the plug-switch *n*, thence by wire *m*, incandescent lamp *k*, and wires *l i* to the ground *j*. The circuit of the incandescent lamp is normally open at the switch *p* when the arc-lamp circuit is closed at the switch *f*.

Provision is made for automatically lighting the incandescent lamp *k* in case of accident to the arc-lamp, and for this purpose the incandescent lamp *k* is included in a shunt-circuit around the arc-lamp, which shunt is provided with a suitable resistance. In the present instance, one terminal of the incandescent lamp is connected by the conductor *l* with the ground-wire *i* beyond the lower carbon *b* of the arc-lamp, while the other terminal of the incandescent lamp is connected by conductors *m 10* with the coil *c* of the lifting-magnet of said arc-lamp, the conductor 10 including a resistance 12. Under nor-

mal conditions the resistance of the shunt for the arc-lamp is sufficiently high to prevent interference with the arc-lamp and to prevent the incandescent lamp being lighted.

- 5 If, however, the resistance of the arc-circuit should become abnormal—as, for instance, by the breaking of one of the carbons *a b* or by the failure of the feed mechanism of the arc-lamp to operate or for other cause—the
 10 current flowing through the arc-circuit passes through the shunt around the carbons *a b* and lights the incandescent lamp. It is to be observed that both lamps are independently controlled under normal conditions, so that
 15 the incandescent lamp may be used to light the road-bed when the car is within city limits and the arc-lamp used when the car is outside of the city limits or when traveling over an abnormally dark portion of the route.
 20 When the incandescent lamp *k* is used with the arc-lamp in its normal or operative condition, the incandescent lamp is included in series with the lamps 3, employed to light the car, and by means of the switch *p* the incan-
 25 descent lamp *k* may be cut out of circuit with the lamps within the car and the circuit of the latter maintained by turning the said switch so as to connect the lamps 3 with the ground-wire 5, including the lamp 6. It is
 30 further to be observed that in case it is so desired both lamps may be simultaneously used.

I claim—

1. In a system of electric lighting for cars, in combination, an arc-lamp, a circuit in which
 35 said lamp is included, a circuit-controller in said circuit, an incandescent lamp, a separate circuit in which said incandescent lamp is included, a circuit-controller in said separate circuit, and a conductor connecting the said
 40 circuits intermediate their ends to include the incandescent lamp in a shunt around the arc-lamp and thereby enable the said lamps to be used separately or simultaneously, for the purpose specified.
 45 2. In a system of electric lighting for cars, in combination, an arc-lamp, a circuit in which said lamp is included, a circuit-controller in

said circuit, an incandescent lamp, a separate circuit in which said incandescent lamp is included, a circuit-controller in said separate
 50 circuit, and a conductor connecting the said circuits to include the incandescent lamp in a shunt around the arc-lamp, and a resistance in the conductor forming part of said shunt, substantially as described. 55

3. In a system of electric lighting for cars, in combination, an arc-lamp, a trolley-wire, a circuit connected with said trolley-wire and including said arc-lamp, a switch in said circuit controlling the passage of current from
 60 the trolley-wire through said arc-lamp, an incandescent lamp, a circuit connected with said trolley-wire and including said incandescent lamp, a three-way switch in said incandescent-lamp circuit, a plurality of incan-
 65 descent lamps included in the incandescent-lamp circuit between said three-way switch and the trolley-wire, a ground-circuit cooperating with said three-way switch and connected with the series of incandescent lamps
 70 when the incandescent lamp beyond said switch is cut out of circuit, and a conductor connecting the incandescent-lamp circuit with the arc-lamp circuit to form a shunt around the arc-lamp, substantially as de- 75
 scribed.

4. In a system of electric lighting for cars, in combination, an arc-lamp, a circuit in which said lamp is included, an incandescent lamp, a separate circuit in which said incandescent
 80 lamp is included, and a conductor connecting the said circuits intermediate their ends to include the incandescent lamp in a shunt around the arc-lamp and thereby enable the said
 85 lamps to be used separately or simultaneously, for the purpose specified.

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

CHARLES P. TOLMAN.

Witnesses:

JAS. H. CHURCHILL,
 J. MURPHY.