(No Model.)

I. A. TIMMIS & S. C. C. CURRIE.

APPARATUS FOR LIGHTING RAILWAY CARS BY ELECTRICITY.

No. 383,502. Patented May 29, 1888.

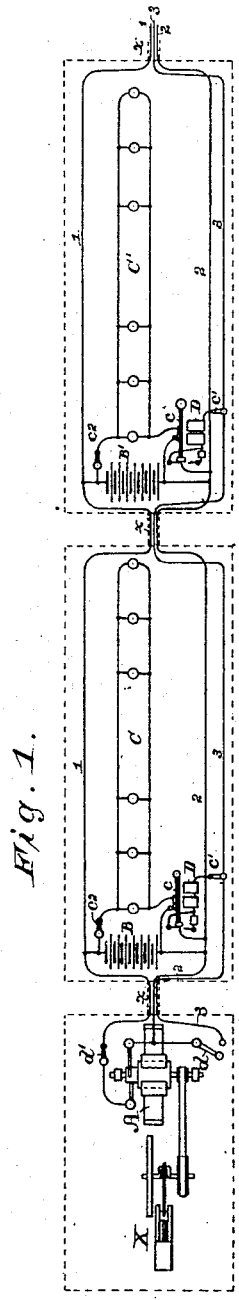

Fig. 1.

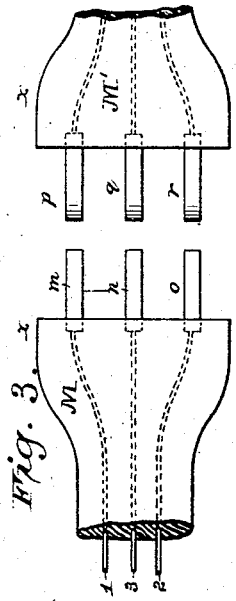

Fig. 3.

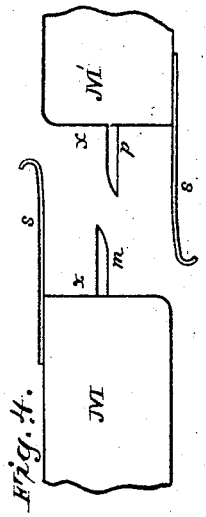

Fig. 4.

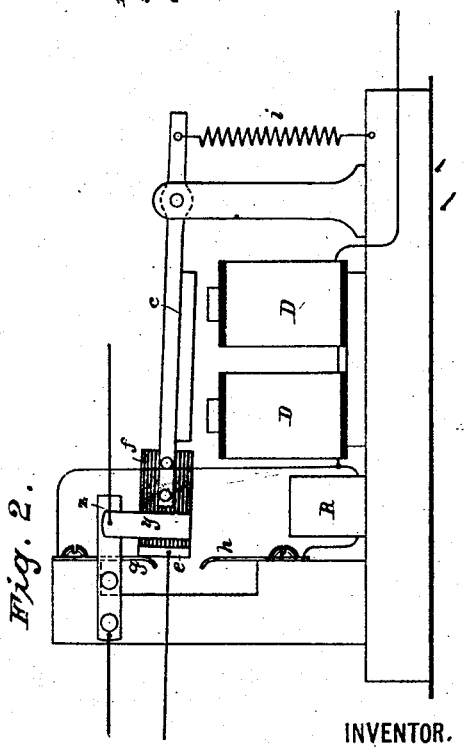

Fig. 2.

WITNESSES.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR LIGHTING RAILWAY-CARS BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 383,502, dated May 29, 1888.

Application filed July 29, 1887. Serial No. 245,622. (No model.)

To all whom it may concern:

Be it known that we, ILLIUS AUGUSTUS TIMMIS and STANLEY CHARLES CUTHBERT CURRIE, both subjects of the Queen of Great Britain, residing at London, in the county of Middlesex, England, jointly have invented certain new and useful Improvements in Apparatus for Lighting Railway-Cars by Electricity, of which improvements the following is a specification.

The objects of our invention are to provide an economical, effective, and simple system of lighting railway-cars, by which the lights can be controlled at will, either by the engineer, guard, or brakeman, and whether the cars are coupled to the locomotive or separate from each other. These ends we attain by mounting a dynamo or generator on a locomotive-engine, but driving it independently thereof, either by a separate engine or by steam derived therefrom. A charging-circuit leads from this generator to the various cars of the train, being provided with automatically-detachable couplings, which are disconnected by the separation of the various cars of the train, and automatically-connected when the cars are coupled together. Each car is provided with a secondary battery intended to remain permanently in the car and to be charged from the generator, all these batteries being connected in multiple arc in the charging-circuit, so that any inequality in their condition would soon be equalized, as the one fully charged would offer more resistance to the charging-current than the one less charged, which latter would consequently receive the greater proportion of the current until properly charged. The lamps in each carriage are arranged in multiple arc, connected at each side of the secondary battery, so that when the generator is working they may take part of the current while the battery at the same time is being charged.

A circuit-controlling device or switch in the circuit between the battery and lamps in each car is controlled by an electro-magnet or other suitable device in a controlling-circuit which normally holds the lamp-circuit closed—that is to say, the lamps remain lighted when no current is passing through the controlling-magnet. We prefer to arrange these controlling-magnets in multiple arc, and that they should automatically switch in resistances when their armatures are home, thus economizing current, and at the same time allowing extra current for any particular magnet which may be sluggish in action. The controlling-circuit can be opened by a circuit-controlling switch on the locomotive, which at once releases all the circuit-closing armatures in the car and allows the lamps to be lighted. The controlling-circuit may also be regulated by an ordinary switch in the car itself.

In the accompanying drawings, Figure 1 represents a theoretical diagram of an apparatus embodying all our improvements, some of which may be used without the others, and in apparatus differing somewhat in detail of construction from that herein shown. Fig. 2 is an elevation of the controlling-magnet, resistances, and circuit-connections. Fig. 3 is a side view of the automatic couplings of the circuit-wires, and Fig. 4 is a top view of the same.

The diagram, Fig. 1, represents a locomotive and two cars, these being sufficient to illustrate the invention. It is deemed unnecessary to describe in detail the construction of the apparatus herein referred to, as it is of usual well-known construction, the invention herein claimed not resting on such detail.

A dynamo or generator, A, mounted upon the locomotive, but driven by its own special engine X, supplies the current to a charging-circuit, the wires 1 and 2 of which run the whole length of the train, being provided with suitable couplings or connections, *x*, between the cars to permit of their ready connection or disconnection when the cars are separated or united. Each car is provided with a secondary or storage battery, B B', connected with the charging-circuit in multiple arc. Groups of lamps C C' are likewise arranged in multiple-arc circuit, the terminals of which are connected at opposite sides of the storage-battery. An armature or switch lever, *c*, in the lamp-circuit serves to open and close it. The storage-battery charging-circuit remains permanently closed when the dynamo is running. It may be opened by a switch, *d'*, when the dynamo is at rest.

In order to control the lamp-circuit automatically, a controlling-circuit, 3, from the generator is provided with electro-magnets D, preferably in multiple arc, as shown, which act upon the switch-levers or armatures *c* and hold them open when lamps are not required to be lighted.

Fig. 2 shows the electro-magnets on an enlarged scale and the preferred way of running the circuits. The circuit-wire 2 from the dynamo is electrically connected with a metallic plate, *e*, secured to an insulating-block, *f*, on the end of the armature-lever *c*. The circuit first runs from plate *e* to spring contact-finger *g*, to coils of electro-magnet D, and thence through switch *c'* to circuit-wire 3. The electro-magnet, being energized, will attract the armature *c* and break the electrical connection between *e* and *g*; but at the same time electrical connection is made between the plate *e* and the spring contact-finger *h*. The circuit then runs from plate *e* to contact-finger *h* through resistance R and coils of electro-magnet D to circuit-wire 3. The armature is held normally raised by a spring, *i*. It should be observed that the initial current is of full strength and energizes the electro-magnet with sufficient power to draw the armature "home;" but then the circuit is shifted through a resistance, thus diminishing the consumption of current while permitting a sufficient current to flow to hold the armature home, it being well understood that a much weaker current will hold the armature home than is required to attract it from a distance. The lamp-circuit terminates in contact-arms *y* and *z*. The arm *y* is carried on the insulating-block *f* on the end of the armature *c*, and the arm *z* is secured to the frame of the apparatus in such a position that when the armature is raised the arms will make electrical contact and the lamp-circuit will be closed. When the armature is drawn home, the lamp-circuit is broken.

A switch, *d*, on the engine enables the engineer or attendant there to open and close the controlling-circuit and thus light or extinguish all the lamps at will. The circuit in each car may be opened and closed by switch *c'*.

We prefer to use one of the charging-conductors as the return-wire for the controlling-circuit, as this enables us to do the work required with three wires instead of four. The controlling-circuit is also provided with disconnecting-couplings between the cars, as heretofore explained.

We preferably employ a coupling for the charging and controlling circuits, such as illustrated in Figs. 3 and 4 of the drawings. As illustrated, the three wires are run to three separate coupling-fingers, *m n o*, mounted in a head-piece, M, and are suitably insulated from each other. The fingers are arranged in a vertical plane one above another, and are beveled at their outer ends, so as to readily unite with corresponding fingers, *p q r*, on the opposite head-block, M'. Springs *s* on the sides of the head-blocks serve to press the fingers together and insure a firm connection.

The coupling-fingers being arranged in a vertical plane, there is no danger of mixing the circuits in coupling. For instance, if the top fingers be selected for charging wire No. 1, the bottom fingers for No. 2, and the middle fingers for controlling wire No. 3, the couplings will always correspond, however the cars may be arranged.

In operation we obtain a steady charging-current from the generator, irrespective of the stopping or starting of the train, which current we utilize in charging the secondary batteries, whether the lights are in use or not. When using the lights, they may be thus run partly from the generator and partly from secondary batteries, or from the secondary batteries alone. As before explained, the controlling-circuit holds the lamp-circuit automatically opened, when desired, and thus keeps the lamps unlighted. By this means it will be seen that all the secondary batteries, being in multiple arc and at the same time on the lighting-circuits, act as one large battery from which each lamp-circuit is supplied. Thus, supposing some of the batteries are not as fully charged as others, provided the main circuit-wires are sufficiently large the lamps throughout the whole train will be supplied from all the batteries acting as one. Thus, in the event of any particular set of cells being empty, the lamps in that particular car will not necessarily be affected, for each and every lamp is dependent upon the sum total or united force of all the batteries. When the cars are separated, the lights are fed from the secondary batteries alone, so that in no case, under our system, is a car necessarily left unlighted. The lights can also be controlled by hand by means of switches *c'* in the lamp-circuit in each car.

We are thus by our improvements enabled to procure a steady charging-current, to avoid the necessity of removing and replacing the secondary batteries, to control the lighting from the engine or from any other part of the train, and to keep the lights burning, whether the cars be coupled together or detached.

We are aware that it has heretofore been proposed to light railway-trains either by a generator driven independently or from some moving part of the train. We are also aware that electric lights have been used in multiple-arc circuits and in connection with storage-batteries and circuit-controlling devices for lighting or extinguishing them, and do not broadly claim these features, but limit our claims to the subject-matter set forth in the claims.

Having thus fully described the construction and operation of our improved apparatus for lighting railway-cars by electricity, what we jointly claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as here-

inbefore set forth, of an independently-driven dynamo or generator of electricity mounted upon a locomotive, an electric charging-circuit running from the generator through all the cars, a secondary battery in each car and in said circuit, lamps in the car in multiple-arc circuit with the charging-circuit and secondary battery, and a circuit-controlling device which simultaneously cuts out and lets in both the generator and storage-battery.

2. The combination, substantially as hereinbefore set forth, of an independently-driven dynamo or generator of electricity mounted upon a locomotive, an electric charging-circuit running from the generator through all the cars, a secondary battery in each car and in said circuit, lamps in the car in multiple-arc circuit with the charging-circuit and secondary battery, an electro-magnetic circuit-controlling device which cuts the lamps in and out of circuit, and a controlling-circuit which regulates the circuit-controlling device, whereby the lamps may be lighted or extinguished from the locomotive as well as from the car.

3. The combination, substantially as hereinbefore set forth, of a railway-train, a dynamo or generator, an electric charging-circuit running from car to car, a secondary battery in each car in multiple arc with said circuit, lamps in each car, also in multiple arc with said circuit and secondary battery, a circuit-controlling device which holds the lamps out of circuit in an independent circuit, and detachable circuit-connections between the cars, whereby the lamps are automatically lighted by the separation of the cars and the consequent breaking of the circuit.

4. The combination, substantially as hereinbefore set forth, of a train of cars carrying secondary batteries, a generator and a charging-circuit, and lamps all in multiple arc in the same charging-circuit with the secondary batteries, so that any inequality in condition of the storage-batteries is rapidly compensated when the train is coupled up.

5. The combination, substantially as hereinbefore set forth, of the generator, the charging-circuit, the storage-batteries and lamps in multiple arc in the charging-circuit, their electro-magnet circuit-controllers, the actuating mechanism thereof, and a controlling-circuit of which one of the charging-wires constitutes a portion.

In testimony whereof we have hereunto subscribed our names.

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STANLEY C. C. CURRIE.

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Witnesses to signature of S. C. C. Currie:
JOHN H. GEIL,
THOS. J. HUNT.