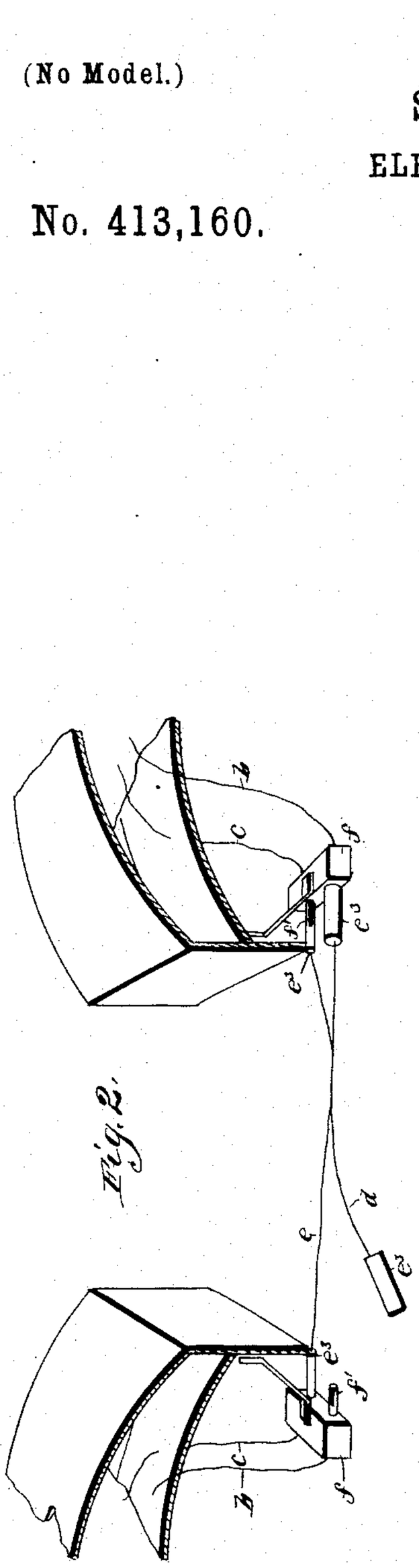
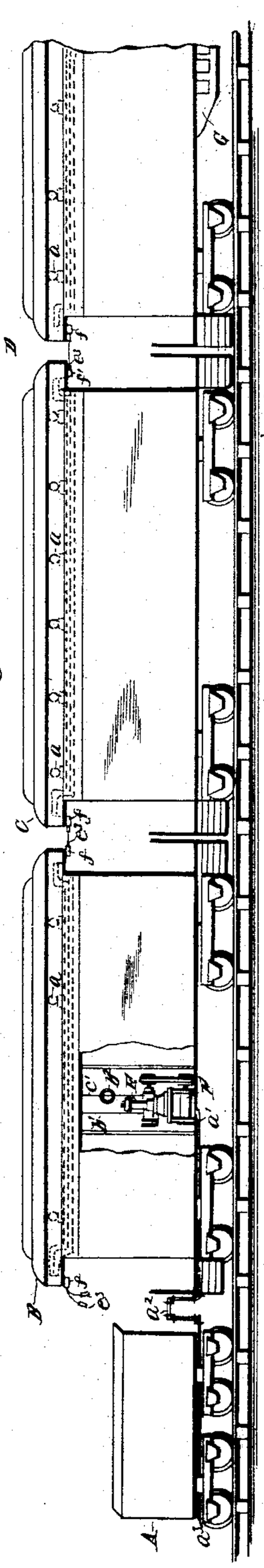
(No Model.) 2 Sheets—Sheet 1.

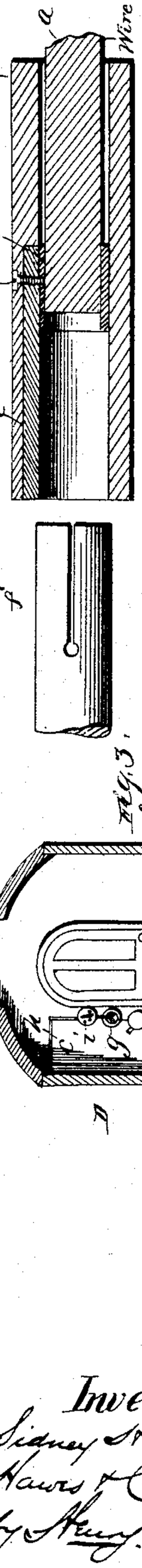
# S. H. BARRETT.

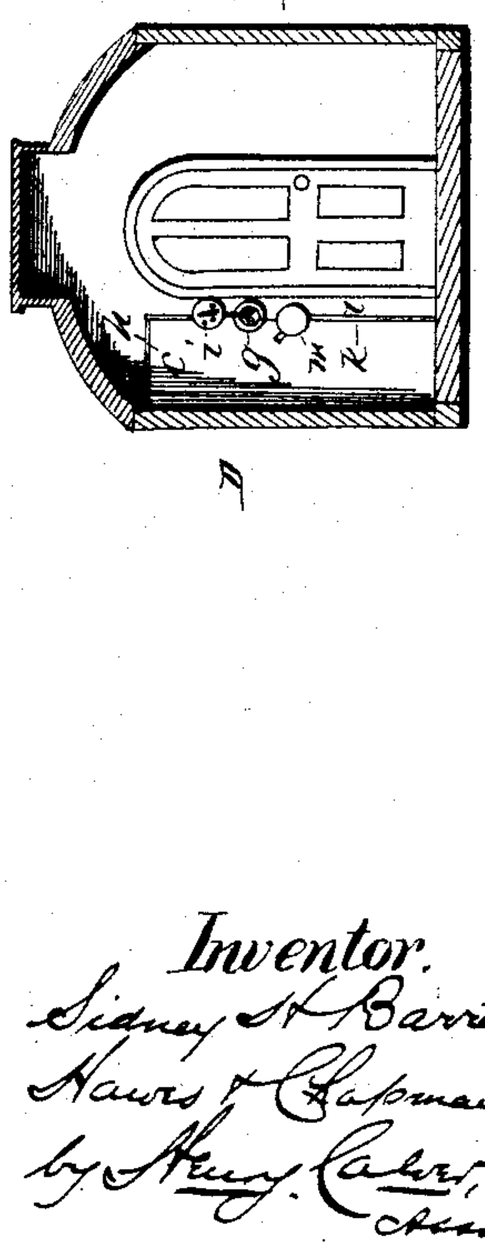
## ELECTRIC CAR LIGHTING.

No. 413,160. Patented Oct. 22, 1889.




Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

# S. H. BARRETT.

## ELECTRIC CAR LIGHTING.

No. 413,160. Patented Oct. 22, 1889.

Fig. 4.

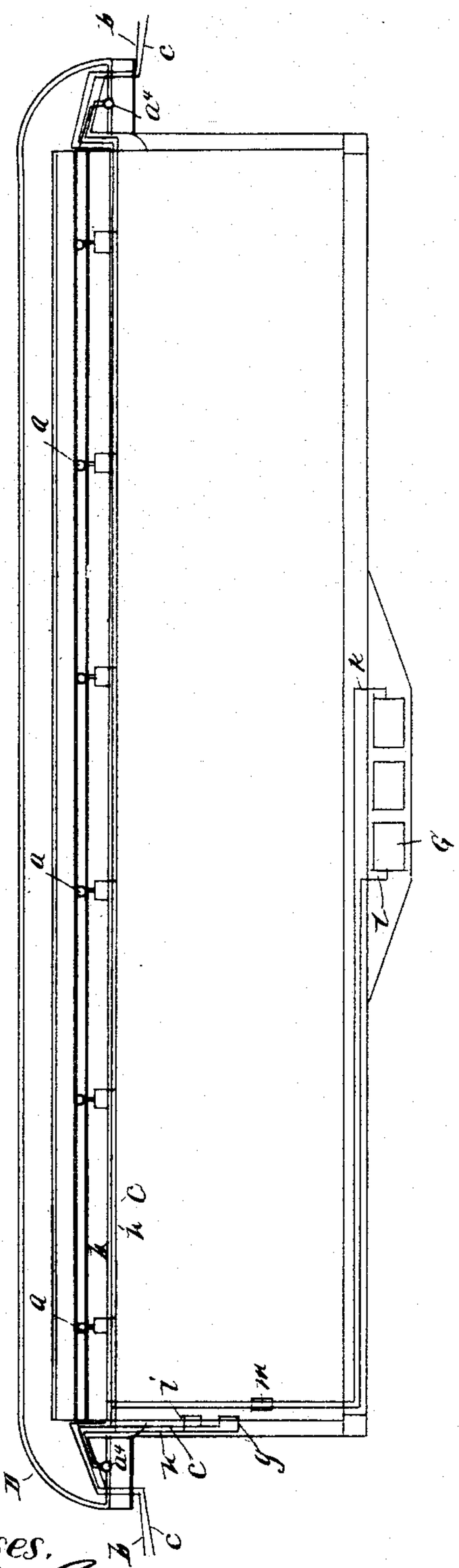
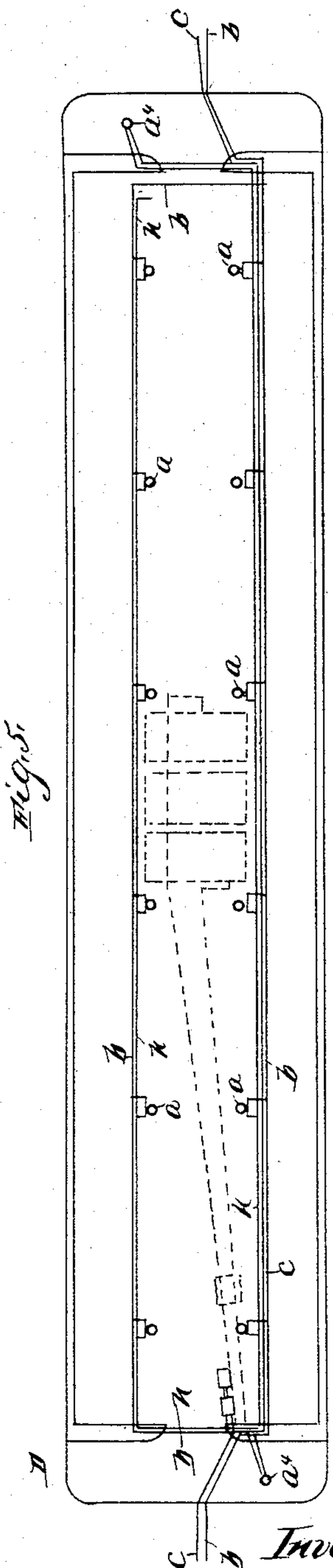



Fig. 5.

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# UNITED STATES PATENT OFFICE.

SIDNEY H. BARRETT, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO DWIGHT HOLLAND, OF SAME PLACE.

## ELECTRIC CAR-LIGHTING.

SPECIFICATION forming part of Letters Patent No. 413,160, dated October 22, 1889.

Application filed February 24, 1888. Serial No. 265,096. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. BARRETT, of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful System of Lighting Railway-Trains by Electricity, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

The object of my invention is to provide a system by means of which the lighting of railway-trains by electricity can be economically accomplished in such manner that the current which supplies the lights can be taken alternately from a dynamo-electric machine operated by steam taken from the locomotive, and from a storage-battery charged from said dynamo-electric machine when the latter is in operation.

To this end my invention consists in the combination, with a railway-train having in the several cars thereof a series of electric lamps connected in continuous circuit, of a dynamo-electric machine and a steam-engine for operating the same located in one of the cars, said steam-engine being connected by pipes with the locomotive-boiler, whereby it is operated by steam taken from the latter, and a storage-battery also located upon one of the cars of the train, said dynamo-electric machine and storage-battery being connected by switches with the lamp-circuit in such manner that either can be thrown into or out of said circuit independently of the other, as hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like letters designate like parts in the several figures, Figure 1 is a representation in side elevation of a railway-train provided with the system of electric lighting devised by me, one of the cars thereof having a portion of its side broken away to show the location of the dynamo and the engine for operating the same. Fig. 2 is a vertical section of the hoods of two adjoining cars, showing the means for connecting the wires of the two cars together. Fig. 3 is an interior end view of one of the cars. Fig. 4 is a vertical longitudinal section of one of the cars. Fig. 5 is an inverted plan of the roof of said car. Fig. 6 is a longitudinal section of one of the members of the coupling by which the cars are electrically connected together, and a view in side elevation of the second member thereof.

In Fig. 1 the letter A designates the locomotive-tender, B and C two of the cars, and D a portion of the third car of a railway-train, which will be sufficient to illustrate the application of my invention to trains of any length. The cars are each provided with a series of incandescent lamps *a*, preferably numbering six upon each side of the car, which are connected in circuit by two wires *b c*, extending through the car from end to end, as hereinafter described.

In one of the cars, and preferably in the baggage-car, I locate a dynamo E, which may be of the ordinary construction, and which will have a generating capacity equal to or greater than that required for the greatest number of lamps with which the train is likely to be provided. Adjacent to said dynamo I locate a steam-engine F, which likewise may be of any of the usual forms of engines, combining considerable power-producing capacity with slight bulk. I prefer to use one of the smaller sizes of the well-known Colt disk engine, and to locate it directly beneath the dynamo, as shown, as I am thereby enabled to inclose both the engine and dynamo within a space not exceeding thirty inches square, and thus leave the greater portion of the interior of the car unobstructed.

The shafts of the engine and dynamo are connected by a belt, as shown, whereby power is transmitted from the former to the latter, and the engine is connected by pipe $a'$ and coupling $a^2$ with pipe $a^3$ on the tender A, which latter pipe is or may be the one by which steam is conducted from the boiler of the locomotive to the cars for heating the latter. I am thus enabled to operate the engine F by steam taken from the locomotive, and avoid the use of an independent boiler and furnace upon the car. Wires $b'$ $c'$ connect the wires *b c* of the car containing the dynamo with the positive and negative poles of the latter, a switch $b^2$ being located in one of said branch wires, as shown, whereby the circuit to and from the dynamo can be broken

at will, for a purpose which will be presently described.

The wires *b c* of the car containing the dynamo are connected to the similar wires of the succeeding car, and of that car with those of the next, and so on throughout the entire train, by means of short wires *d e*, extending between the cars, and coupling devices, which are preferably constructed as follows: To the inner side of the hood at each end of the cars is secured a bracket *f*, (see Fig. 2,) and in each of said brackets are seated two nipples *f'*, preferably made of brass, each of said nipples being permanently connected to one of the main wires *b c*, extending through the car. The nipples *f'* are preferably of different diameters, and are slitted at their outer ends, as shown, to permit said ends to be slightly compressed. To the ends of the wires *d e* are secured brass tips *e'*, which are inserted within the inner ends of brass links $e^2$, seated within insulating-handles $e^3$, preferably made of wood, a set-screw $e^4$ holding said parts in position, as shown in Fig. 6, and enabling the end of the wire to be withdrawn from the handle $e^3$ when for any purpose it may be desirable to do so. The handles $e^3$ and tubes $e^2$ are made of different diameters to correspond with those of nipples *f'*, and are applied to the latter by forcing the tubes $e^2$ upon said nipples, thereby compressing the outer ends of the latter and making a tight connection, which, however, can be readily broken by simply withdrawing the handle and tube from the nipple. I thus provide a coupling one member of which can be almost instantly applied to and detached from the second member, and which, when connected, cannot be loosened by the jar incident to the movement of the train. Inasmuch as the wires *b c* of the several cars when thus coupled to those of the adjoining cars form practically one positive and one negative wire extending continuously from the dynamo to the end of the train, it is essential that in making the connections between the cars the positive wire—for example, wire *b*—of each car shall be connected to the same wire of the adjoining cars, and also that the negative wires, as *c*, of the several cars shall be connected with each other, and in order to render it impossible to couple the cars together in any other manner I make the positive and negative nipples of each car of a different diameter, as previously described, and make the tubes $e^2$ of one of the wires *d e* of a diameter to fit one of said nipples and those of the other wire of a diameter to fit the second nipple.

To prevent the wires *d e* from being separated when not in use, I prefer to secure them together between their ends, as shown, each of said wires being thoroughly insulated by a suitable covering, in the usual manner.

One of the main wires of each car—for example, wire *b*—is provided with a branch wire connected thereto at each end of the car, which branch wire extends along the car upon the side opposite to the main wires *b c*, as shown in Figs. 4 and 5, whereby the current passes through said wire *b* upon both sides of the car simultaneously. A switch *g* is located in wire *c* at some convenient point in the car—for example, beside the door at one end, as shown in Fig. 3—and an additional wire *h*, also connected with said switch, extends along both sides of the car. The lamps *a* are connected to wires *b* and *h*, and therefore by connecting said wire *h* to and disconnecting it from wire *c* by means of switch *g* the entire series of lamps upon both sides of the car can be instantly lighted and extinguished without affecting the lamps in either of the other cars, the continuous current through the main wires *b c* not being disturbed thereby. A suitable resistance-coil *i* for regulating the current will be employed in the usual manner.

The storage-battery may be of the usual construction and may be located at any point on the train; but I prefer to locate it beneath the floor of the last car of the train, or one near the rear end of the train. As shown in the drawings, the storage-battery (designated by the letter G) is connected to car D, (see Figs. 1, 4, and 5,) and is connected by wires *k l* with main wires *b c* by means of a switch *m*. By means of said switch the current can be permitted to pass from wires *b c* to the storage-battery in charging the latter, and from said battery to said wires in discharging the battery, or can be cut off from passing either to or from the battery.

In practice I connect the storage-battery to the main wires as soon as I start the dynamo, and thus charge the battery at the same time that the dynamo is lighting the train, and after the battery becomes charged I cut out the dynamo by means of switch $b^2$, stop the engine F, and light the train from the storage-battery alone until it is discharged, when the dynamo is again put in operation as before. I am thus enabled to save much wear on the engine and dynamo without detracting from the quality of the lights. The storage-battery also serves as a resisting medium to the current when the dynamo is in operation and equalizes the action of the latter and increases the steadiness of the lights. Another advantage gained by locating the storage-battery near the rear end of the train, as described, lies in the fact that should the train be divided between its ends, either accidentally or purposely, the dynamo will light one section thereof and the battery the other section until the latter is discharged. It is equally obvious that upon detaching the locomotive from the train the storage-battery will light the entire train until the former is discharged, thus permitting an exchange of locomotives to be made without affecting the lights.

In Figs. 4 and 5 I have shown platform-

lamps $a^4$, which are connected to wires $b$ $h$, and are lighted and extinguished simultaneously with lamps $a$ within the car.

It will be observed that by means of switches $b^2$ and $m$ provision is made for extinguishing all of the lights in the entire train at once, the former being employed when the current is being taken from the dynamo and the latter when it is taken from the storage-battery, in addition to the provision made for extinguishing the lights in each car independently by means of its switch $g$.

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

The combination, with a railway-train the cars composing which are provided with the main wires $b$ $c$, of wires $d$ $e$, connecting said main wires of the several cars in a continuous circuit, wires $h$ within each car, connected by switch with said main wire $c$, lamps $a$, connected to wires $b$ $h$, dynamo E, located in one of the cars and connected with the main wires thereof, engine F, operatively connected with said dynamo, pipes $a'$ $a^3$ and coupling $a^2$, connecting said engine with the locomotive-boiler, storage-battery G, and wires $k$ $l$, connecting said battery with the main wires of one of the cars through switch $m$, arranged and operating substantially as and for the purpose set forth.

SIDNEY H. BARRETT.

Witnesses:
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J. E. CHAPMAN.