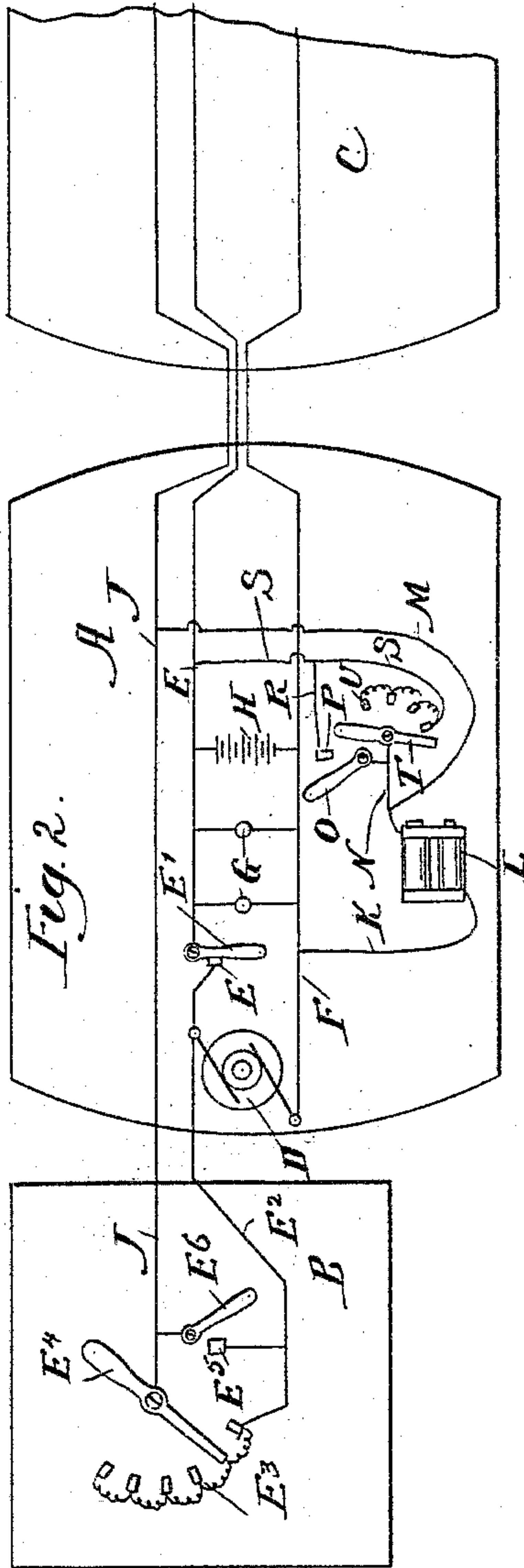
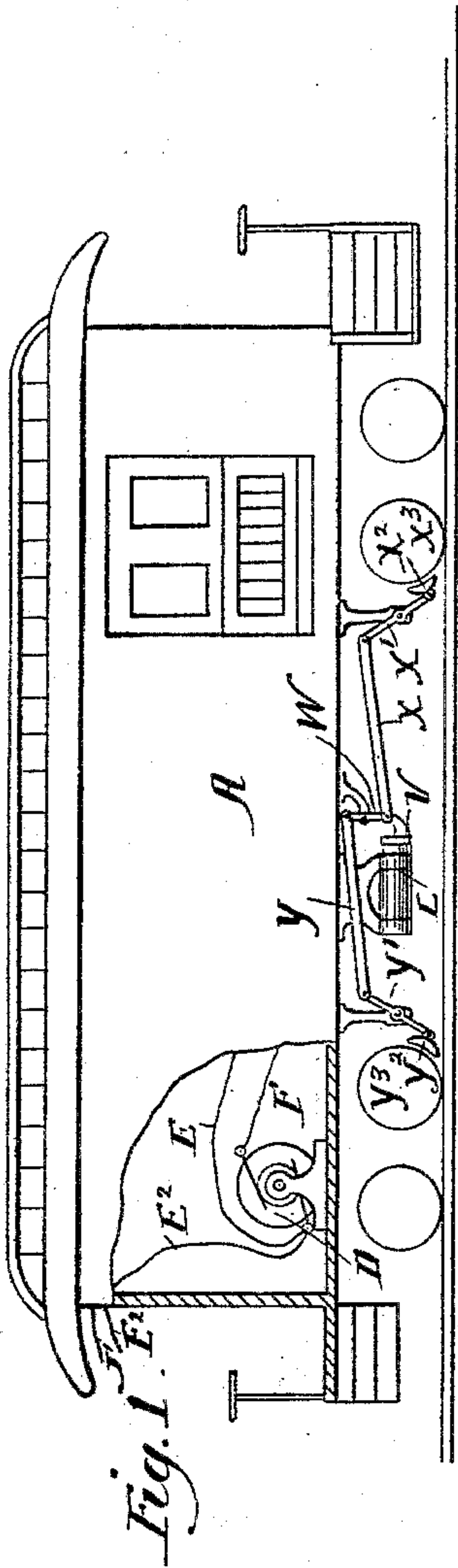


(No Model.)

H. W. LEONARD.  
ELECTRIC TRAIN BRAKE SYSTEM.

No. 414,418.

Patented Nov. 5, 1889.



Witnesses:

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# UNITED STATES PATENT OFFICE.

HARRY WARD LEONARD, OF CHICAGO, ILLINOIS.

## ELECTRIC TRAIN-BRAKE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 414,418, dated November 5, 1889.

Application filed February 7, 1889. Serial No. 299,011. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY WARD LEONARD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Combined Train Lighting and Brakes, of which the following is a specification.

My invention relates to an improved system for lighting and controlling the brakes of cars, and has for its object to provide convenient means therefor. It is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view, with part broken away, of the baggage-car equipped with my device; and Fig. 2 is a diagrammatic view.

Like parts are indicated by the same letter in both the figures.

A is the baggage-car; B, a portion of the locomotive-cab; C, a passenger-car.

D is the dynamo, driven by suitable means—as, for example, a steam-engine, which is operated by the steam from the locomotive. From the poles of this dynamo pass the conductors E F, to serve as the car-lighting system, and having coupled between them lamps G G and the battery H, if desired or necessary, and similar lamps and batteries in the cars throughout the train.

E' is a switch in the conductor E.

E<sup>2</sup> is a conductor leading forward into the cab of the locomotive from the pole of the dynamo, from which leads the conductor E. It has two terminals—one a variable resistance E<sup>3</sup>, along which moves the switch E<sup>4</sup>, connected with the conductor J, the other a contact-plate E<sup>5</sup>, adapted to engage the switch E<sup>6</sup>, which connects with the conductor J. From the conductor F leads a conductor K to the electro-magnet L, and from the magnet leads the conductor M to the conductor J. From the conductor M leads the conductor N, terminating in two switches—one the switch O, adapted to engage the contact P in the conductor R, which leads to the conductor S, the other switch T, adapted to engage the variable resistance U, which connects with the conductor S and leads to the conductor E. In front of the electro-magnet L is the armature V on the pivoted bar W, from which passes in one direction the rod X to the lever X', which carries the shoe X<sup>2</sup> to engage the wheel X<sup>3</sup>, and

in the other direction the rod Y, which engages the pivoted lever Y', which carries the shoe Y<sup>2</sup> to bear against the wheel Y<sup>3</sup>. These parts could obviously be greatly changed without departing from the spirit of my invention, and the arrangement of the levers, rods, armature, and electro-magnet underneath the car is designed simply to show the general arrangement of the parts.

The use and operation of my invention are as follows: The dynamo, having been set in operation, generates a current which passes through the conductors E and F and energizes the lights G G and the battery H, or such of such devices as are employed. This action takes place in each car of the train. The switch E<sup>4</sup> is normally out of engagement with the variable resistance E<sup>3</sup>; but if it be placed, as shown in Fig. 2, on such resistance, the switch E<sup>6</sup> being open, it is clear that immediately a current will be established from the generator D, conductor F, conductor K, electro-magnet L, conductor M to conductor J, switch E<sup>4</sup>, variable resistance E<sup>3</sup>, conductor E<sup>2</sup>, and through dynamo D, and thus the electro-magnet L will be powerfully energized, the lever W will be moved on its pivot, the rods X and Y reciprocated in opposite directions, and the shoes X<sup>2</sup> and Y<sup>2</sup> be applied to their respective car-wheels to brake the cars. According to the quantity of current desired to be used, the engineer will regulate the position of the switch upon the variable resistance. Should he desire to apply the full strength of the dynamo and electro-magnet, and do so instantly, he has only to close the switch E<sup>6</sup>, whereupon the same circuit will be established, except that in passing from the conductor J to the conductor E<sup>2</sup> it will pass through switch E<sup>6</sup> and contact-plate E<sup>5</sup> instead of switch E<sup>4</sup> and variable resistance E<sup>3</sup>. It will be observed that this operation is controlled entirely by the engineer in the cab and is independent of any condition of the local electric-lighting plant or the devices for controlling the current applied to the electro-magnet in the car to which the same is secured. If, now, some one on the car where the magnet is located desires to apply the brake to that particular car, it is only necessary to apply the switch O to the contact-plate P or the switch T to the



variable resistance U, when a current will be established along the conductor S, conductor E, switch E', dynamo D, conductor F, conductor K, electro-magnet L, conductor N, and through switch T and resistance U, the switch O, plate P, and conductor R back to conductor S, and this means for applying the brake to the car, it will be observed, is independent of the devices whereby the brakes may be set by the engineer. This last operation is supposed to take place when the switch E is open and the switch E<sup>4</sup> is out of engagement with the variable resistance E<sup>3</sup>. If, now, the dynamo D is out of operation, the engineer, by operating the switch E<sup>4</sup> or E<sup>6</sup>, as above described, can apply the battery H to operate the electro-magnet L, a current being established from the cab along the conductor E<sup>2</sup>, conductor E, battery H, conductor F, conductor K, electro-magnet L, conductor M, and conductor J back to the cab, and in like manner can the operator on the car where the electro-magnet is fixed apply the battery H to the electro-magnet L by operating the switch or switches O or T, the current being from battery H through conductor F, conductor K, electro-magnet L, thence to conductor S and conductor E back to the battery. From this it is evident that either the engineer or the person in charge of the car may simultaneously apply the current arising from either generator D or H, or both, to energize the electro-magnet L and operate the brakes. It is also clear that in no case will the action of either interfere with the other. When the switch E is open, however, and the dynamo D out of operation, the engineer cannot apply the brakes, so that the connection between the conductors E<sup>2</sup> and E must be constant, whether the dynamo D be in or out of operation. I have shown the lighting and braking system on a single car with a dynamo; but it is quite apparent that they will operate in exactly the same manner in whatever car of the train they may be placed.

I claim as new and desire to secure by Letters Patent—

1. The combination of a train of cars with electrically-actuated brakes therefor, an electric generator thereon, a conductor which leads from one pole of the generator to the electro-magnet controlling the brakes, two conductors leading from the other pole of such generator to the brakes, and switches, one in each of said last-mentioned conductors, said switches controllable from different parts of the train, so that either may be used independently to operate the brakes.

2. The combination of a train of cars with

electrically-actuated brakes therefor, an electric generator thereon, a conductor which leads from one pole of the generator to the electro-magnet controlling the brakes, two conductors leading from the other pole of such generator to the brakes, variable resistances, one in each of said last-mentioned conductors, and switches, one in each of said last-mentioned conductors, said switches controllable from different parts of the train, so that either may be used independently to operate the brakes.

3. The combination of a train of cars with electrically-actuated brakes therefor, an electric generator thereon, a conductor which leads from one pole of the generator to the electro-magnet controlling the brakes, two conductors leading from the other pole of such generator to the brakes, and switches, one in each of said last-mentioned conductors, one of said switches located in the locomotive and the other near the brake, so that either may be used independently to operate the brakes.

4. The combination of a train of cars with electrically-actuated brakes therefor, a dynamo and storage-battery thereon, a conductor which leads from one pole of the generator to the electro-magnet controlling the brakes, two conductors leading from the other pole of such dynamo to the brakes, and switches in each of said last-mentioned conductors, said switches controllable from different parts of the train, so that either may be used independently to operate the brakes.

5. The combination of a train of cars with an electric generator, a normally-open circuit leading therefrom and containing a brake-actuating mechanism and a local switch, a second circuit connected with such generator and containing the same brake-actuating mechanism, and a switch placed upon the locomotive, so that the brakes can be operated either from the locomotive or the car independently.

6. The combination of a train of cars with an electric generator thereon, a circuit from such electric generator containing a brake-actuating mechanism and a local switch, electric signaling devices connected with and operated by such generator and placed adjacent to such switch, and a further circuit containing the brake mechanism, and a switch distant from such brake and on the train.

Dated this 4th day of February, 1889.

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Witnesses:

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