

H. E. SAYLOR, H. S. HEDRICK & F. P. GLADFELTER.

BRAKE FOR RAILWAY CARS.

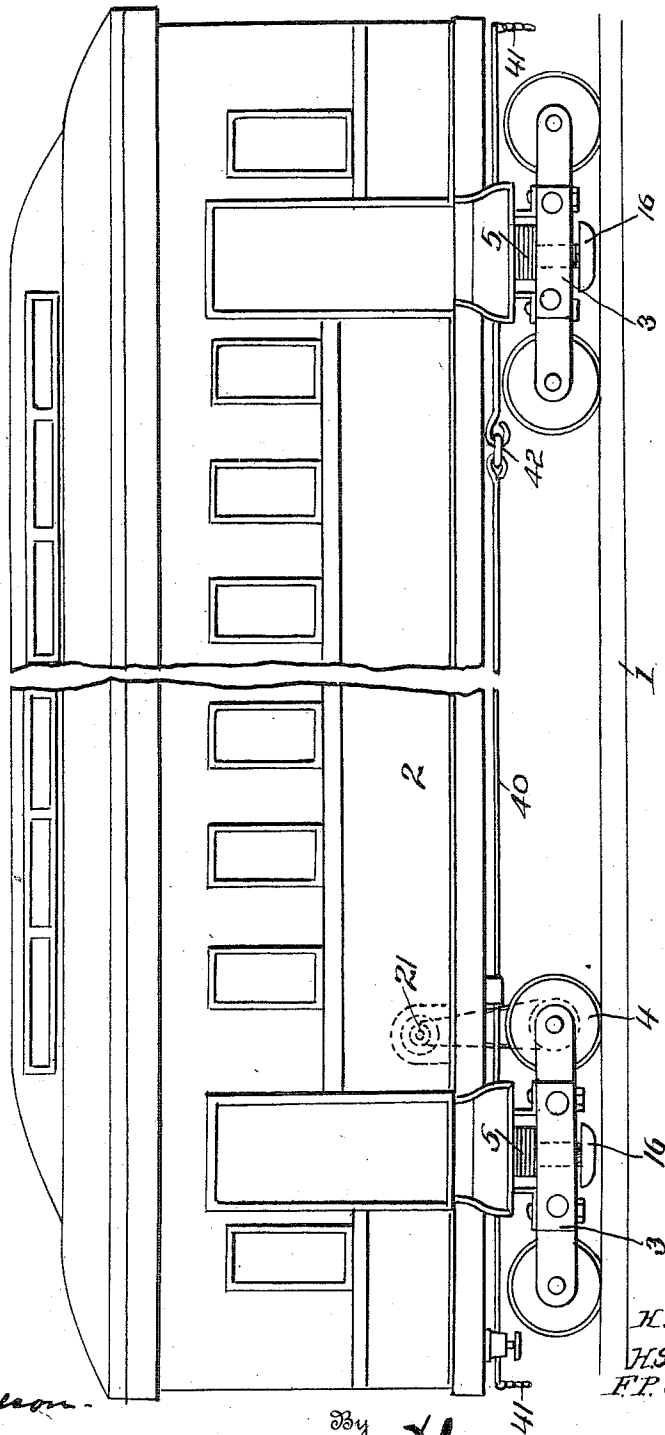
APPLICATION FILED AUG. 2, 1910.

994,791.

Patented June 13, 1911.

4 SHEETS-SHEET 1.

Fig. 1.



Witnesses

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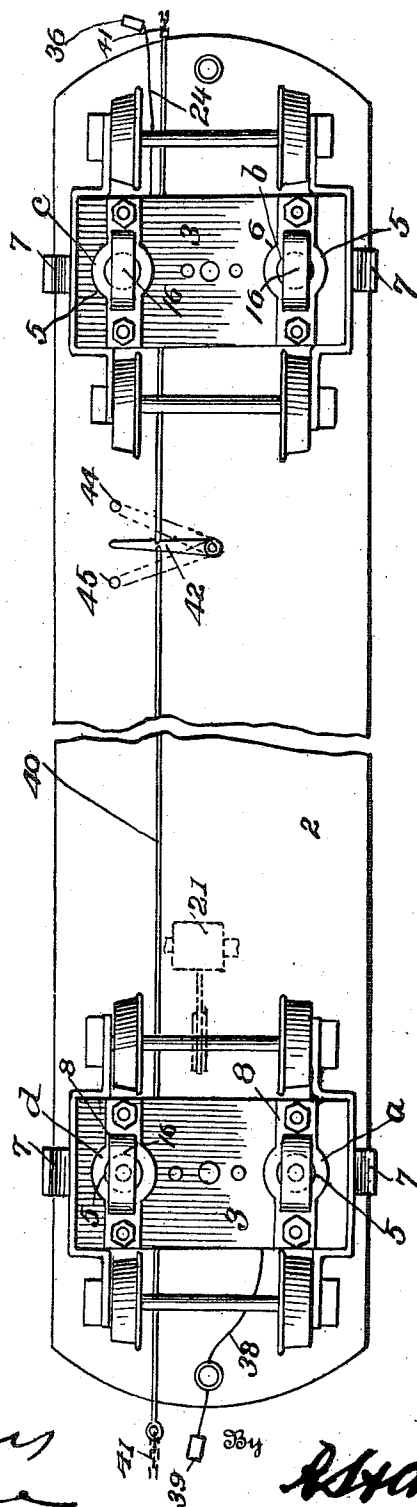
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4 SHEETS-SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

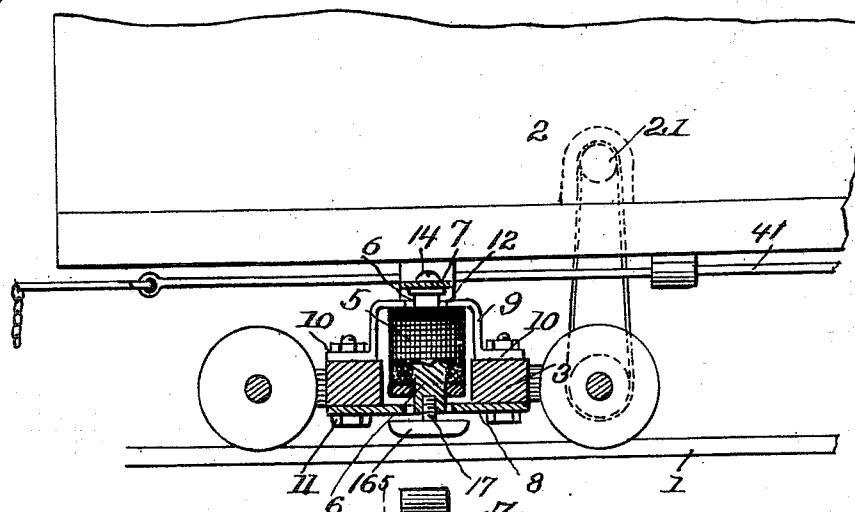


Fig. 4.

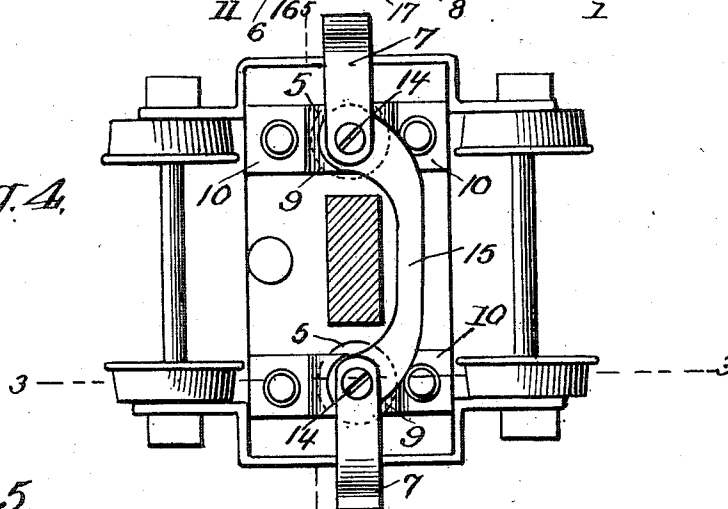
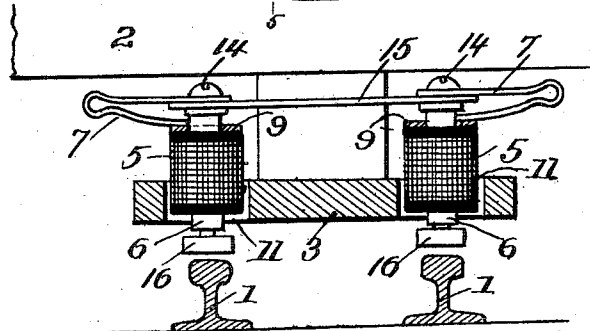


Fig. 5.



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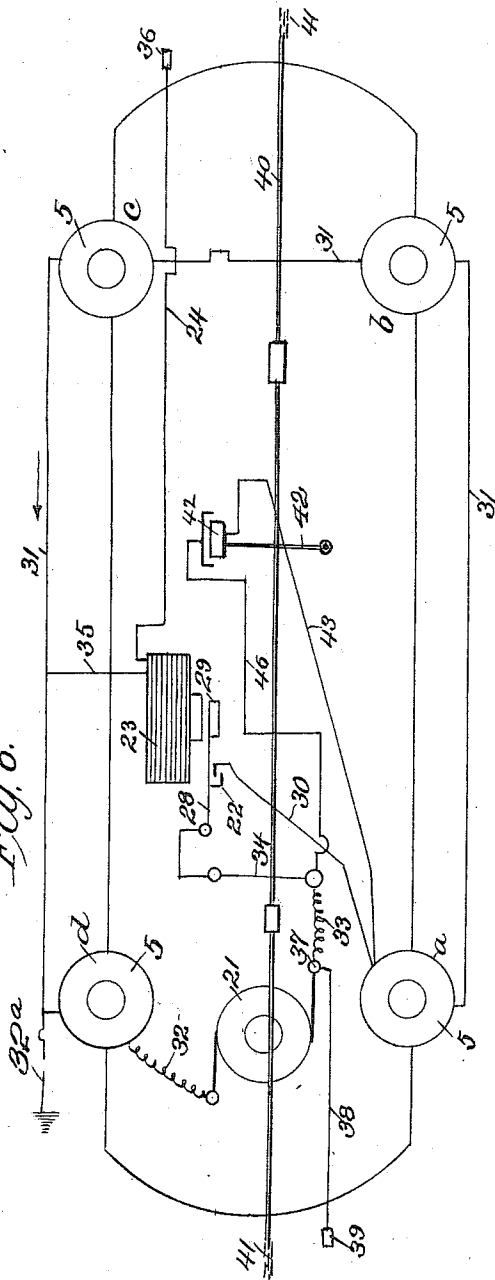
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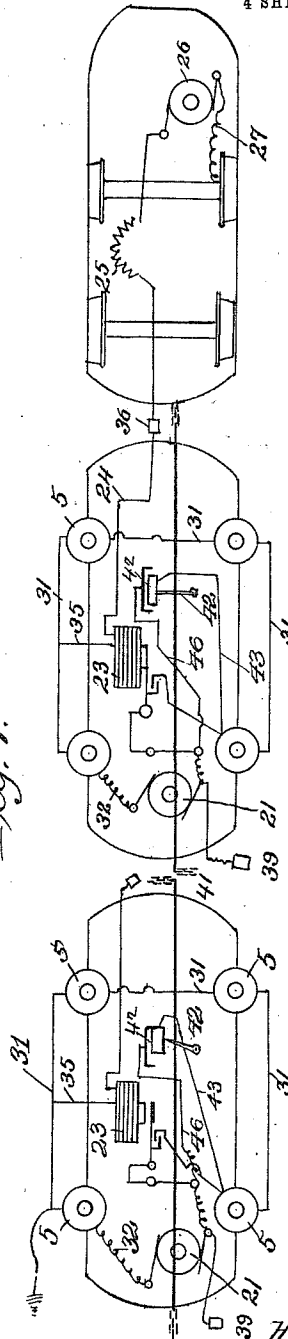
4 SHEETS—SHEET 4.

Fig. 6.



Witnesses
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Fig. 7.



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UNITED STATES PATENT OFFICE.

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BRAKE FOR RAILWAY-CARS.

994,791.

Specification of Letters Patent. Patented June 13, 1911.

Application filed August 2, 1910. Serial No. 575,184.

To all whom it may concern:

Be it known that we, HARRY E. SAYLOR, HERBERT S. HEDRICK, and FRANK P. GLADFELTER, citizens of the United States, residing at Canal Winchester, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Brakes for Railway-Cars, of which the following is a specification.

Our invention relates to brakes for railway cars and particularly to electro-magnetic brakes.

The object of the invention is to provide a brake of this character wherein the magnets shall be energized and the brakes set either at the will of the engineer on the locomotive or automatically when the train breaks in two.

A further object of the invention is to provide a very simple form of electro-magnetic brake in which the trucks of the car shall be provided each with a pair of electro-magnets, the cores of which are movable and provided with removable shoes which have frictional engagement with the rails when the magnets are energized, these shoes being removable in order that they may be replaced when worn.

A further object is to provide an electro-magnetic car brake in which the brakes on each car are adapted to be energized by means of a dynamo driven from the axle of the car so that each car is independent of every other car in the train, and so that if the train breaks in two each car will have the means for automatically energizing its brake magnets.

The invention is shown in the accompanying drawings wherein:

Figure 1 is a side elevation of a car provided with our improved brake. Fig. 2 is an under side view of a car. Fig. 3 is a detail section of one end of a car, and particularly of the trucks thereof, the magnetic brake being shown in elevation, the section being taken on the line 3—3 of Fig. 4. Fig. 4 is an inside view of one of the trucks showing the connections between the pair of magnets carried on the truck. Fig. 5 is a section on the line 5—5 of Fig. 4, the magnets being shown in elevation. Fig. 6 is a

diagrammatic view of the car wiring. Fig. 7 is a diagrammatic view of the connections from one car of the train to the other car thereof.

Referring to these figures 1 designates the rails of a track and 2 a car adapted to travel thereon, the car being provided with the usual trucks 3 and wheels 4. All these parts are of any usual or desired construction.

Carried on each truck are the oppositely disposed magnet coils 5 through which pass the cores 6. The cores are supported on springs 7 which normally hold them and the coils raised above the tracks 1. When, however, the magnets are energized they will be attracted toward the rails 1 and by frictional engagement with the rails will bring the train to a stop. In detail the coils are each supported by means of a transversely extending yoke 8, attached at its ends to the truck and having an enlarged middle portion upon which the coil 5 is adapted to rest when depressed, this enlarged middle portion being formed with an opening for the passage of the core 6, this core being freely movable through the central opening of the yoke.

Mounted upon the upper face of the truck is the yoke 9 which is U-shaped in elevation and provided with the outwardly projecting feet 10 whereby the yoke is attached to the truck. The yoke 9 crosses the opening or recess 11 formed in the truck to receive the magnet, and the distance between the inner face of the yoke 9 and the upper face of the yoke 8 is greater than the length of the coil 5 of the magnet. It will thus be seen that the coil and the core of each magnet has a certain amount of movement between the upper and lower yokes, this movement being sufficient to permit the core of the magnet with its shoe to be raised above the rail 1 or to be depressed into contact with the rail.

The core 6 passes through an opening 12 in the yoke 9 and is attached to a spring 7. The spring illustrated in the drawings is approximately V-shaped in side view, as shown in Fig. 4 but we do not wish to limit ourselves to this construction. One arm of the V-shaped spring rests upon the upper

face of the yoke 9, while the other arm of the spring extends over the core 6 and is attached to the core by a screw or other suitable attaching means 14 which passes
 5 down through the extremity of the spring 13 and into the core 6. The cores of each pair of magnets are connected by a metallic connector 15 of any suitable character and which is secured in place between the upper
 10 end of the core and the upper leaf of the spring 13 by means of the screws 14. It will be obvious now that when the magnets are energized the poles thereof will naturally be attracted by the rails 1, and that this
 15 attraction will cause the magnets to be drawn downward against the force of the springs 7.

In order to prevent wear of the magnet cores we provide the cores with the shoes
 20 16, each shoe being provided with the upwardly projecting shank 17 which is screw threaded and engages with a screw threaded recess in the extremity of the core 6. While we have shown these shoes 16 as being pro-
 25 vided with the shanks 17, it will of course be understood that we do not wish to limit ourselves to this construction as it is obvious that the shoes 16 might be attached to the cores in any suitable manner. It will be
 30 plain that by providing the shoes 16 no wear will come upon the ends of the magnet cores, and that the shoes 16 may be removed and replaced when worn.

While we do not wish to limit ourselves
 35 to any specific number of magnets to be used in connection with the rails, we have shown for this purpose four magnets, *a*, *b*, *c* and *d*, these magnets being connected in series as shown diagrammatically in Fig. 6.
 40 These magnets are also connected in circuit with a dynamo 21, but this circuit is normally broken at a switch 22 which is adapted to be actuated by an electro-magnet or a solenoid 23 of any suitable construction.
 45 The magnet or solenoid 23 is connected by the wire 24 to a rheostat 25 mounted upon the locomotive of the train, the rheostat in turn being connected to an engine dynamo 26 which by a wire 27 is grounded to the trucks
 50 of the car.

28 designates a pivoted switch arm having an armature 29 at one end thereof which is actuated by the electro-magnet 23. When the electro-magnet is energized it will act to
 55 draw the armature 29 toward it, thereby moving the arm 28 and causing one member of the switch to engage the other member thereof and close the circuit through the dynamo and the series of electro-magnets *a*,
 60 *b*, *c* and *d*. One member of the switch 22 is connected by the wire 30 to the electro-magnet *a* from which the wire 31 extends to the magnet *b*, from the magnet *b* to the magnet *c*, from the magnet *c*, to the magnet *d*,
 65 and from thence by the wire 32 to the car

dynamo 21. From the dynamo 21 the current is conducted by the wires 33 and 34 to the switch arm 28. The solenoid 23 is connected to the wire 31 between the magnets
 70 *c* and *d* by means of the connection 35. The wire 24 at its end is provided with a coupling 36 whereby it may be connected to the car immediately ahead, while from the binding post 37 the circuit is taken by a
 75 wire 38 to the car in the rear, this wire 38 being provided with the coupling 39.

It will be obvious now that when the controller on the locomotive is properly turned that current will pass from the locomotive or engine dynamo 26 into the wire 24, from
 80 thence to the solenoid or electro-magnet 23, thence by the wire 35 to the wire 31. This wire 31 is adapted to be grounded by means of a wire 32^a which may be detachably connected to any one of the trucks of the car.
 85 The last car of the train has the wire 31 grounded; the other cars of the train do not, however. Hence it will be seen that when the current passes from the engine dynamo 26 into the wire 24 and from thence
 90 to the electro-magnet 23, it will be conducted by the wire 35 to the wire 31 and from thence through the local circuit of each train and be eventually grounded by the wire 31^a of the last car of the train. The
 95 energizing of the solenoid or electro-magnet 23 causes the armature 29 to move and as a consequence closes the circuit at the switch 22. When this switch is closed a circuit is
 100 established from the car dynamo 21 through the wire 33, through the wire 34, the switch arm 28, the wire 30 to the electro-magnet *a*, thence successively through the electro-magnets *b*, *c* and *d*, and through the wire 32
 105 back to the dynamo. Thus when the solenoid or electro-magnet 23 is actuated the current from the locomotive dynamo will pass into the electro-magnets and at the same time the current from each car dynamo
 110 21 will be thrown into the electro-magnets. It will be obvious that the current after it passes through the electro-magnets of one car will be carried also to the solenoid or electro-magnet 23 of the next car, where-
 115 upon the dynamo of that car will be thrown into circuit with the brake magnets, and so on successively through all of the cars. It is thus within the power of the engineer to energize the brake magnets on all of the
 120 cars simultaneously and thereby bring the train to a stop.

Provision must be made whereby the brakes will be automatically set if the train should happen to break, and to this end we have provided a switch, normally held in a
 125 neutral position, which when the train breaks is so shifted as to close the circuit through the car dynamo and thus cause the brake magnets to be energized and brakes to be set, thereby bringing the train to a stop. 130

To this end we provide the longitudinally extending brake rod 40 which is suitably mounted in guides upon the bottom of the car and is connected at each end by chains 41 to the next adjacent cars of the train. These chains are normally slack so that the brake rod remains in its set position without movement while the train is coupled. Attached to the brake rod and movable therewith is a pivoted contact member 42 which is connected by a wire 43 to the electro-magnet *a*. Located in the path of movement of the contact member 42 are the oppositely disposed spaced contact members 44 and 45. These contact members are connected to each other and are so located that when the brake rod 40 is drawn in one direction the contact member 42 will make electrical engagement with one of the members 44 or 45, and when pulled in the other direction will make contact with the other of said contact members. The contact members 44 and 45 are both connected to a wire 46 which extends to and connects with the wire 34. It will be obvious now that when the brake rod 40 is drawn in either direction the circuit will be closed from the car dynamo 21 through the wires 33 and 46, through the contact 42, through the wire 43 to the brake magnet *a*, and from thence successively to the magnets *b*, *c* and *d*, and through the wire 32 to the car dynamo. It will be obvious that if the train breaks the chains 41 will be tightened before they snap, and that as a consequence the brake rod 40 will be shifted to establish the circuit as above described. The position of the parts taken when the brake rod has been shifted by the train breaking is illustrated in the last car of the train shown diagrammatically in Fig. 7. It will of course be understood that the couplings 36 and 39 are so formed as to permit the connections to part at these points when the train is put together. The chains 41 are also connected to the corresponding chains on the next adjacent car by any suitable connecting device which will permit the chains to break when the train breaks.

While we have shown details which we believe to be thoroughly effective in practice, we do not wish to be limited to these details as it is obvious that many changes might be made without departing from the spirit of the invention and in order to arrange our construction in accordance with various details of car structure.

What we claim is:

1. An electro-magnetic brake system for railway trains, including electro-magnetic brakes engaging with the track upon which the train runs, a normally open local circuit for each car in which the brakes are located, a source of electricity on each car for said local circuit, a circuit closer operating to

close said local circuit but yieldingly held to break the circuit, an electro-magnet adapted to actuate said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with said local circuit closing magnet, and means for closing the train circuit to actuate said circuit closer to close the local circuit and thereby apply the brakes.

2. An electro-magnetic brake system for railway trains, including electro-magnetic brakes engaging with the track on which the train runs, a normally open local circuit for each car in which the brakes are located, a source of electricity for said local circuit on each car, a circuit closer operating to close said local circuit but yieldingly held away from its closed position, an electro-magnet on each car adapted to actuate said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with the circuit closing magnets of each car, and means for closing said open circuit to actuate said circuit closers and thereby apply the brakes.

3. An electro-magnetic brake system for railway trains, including electro-magnetic brakes engaging with the track on which the train runs, a normally open local circuit on each car of the train in which the brakes are located, a source of electricity for said local circuit on each car, a circuit closer operating to close said local circuit but normally breaking said circuit, an electro-magnet actuating said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with the circuit closing magnets of all the cars of the train, means on the engine for closing said last named circuit, a switch also on each car adapted to close the local circuit thereof, and means connecting one car to another and connected to said switch and adapted to shift the switch as the connecting means is shifted to close the local circuit.

4. An electro-magnetic brake system for railway trains, including electro-magnetic brakes engaging with the track upon which the train runs, a normally open circuit in which the brakes are located, a source of electricity for said local circuit, a circuit closer adapted to close said local circuit but normally held in position to break the same, an electro-magnet for actuating said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with the circuit closer magnet, means for closing said last named circuit to energize said magnet and operate the circuit closer, an electrical connection between the source of electricity on each car and the local circuit of said car, a switch normally breaking the circuit through said connection but adapted when moved in either direction to close said cir-

cuit, and means connecting one car to another and connected to said switch to shift the switch and establish said circuit when the connection between one car and another is broken.

5. An electro-magnetic brake system for railway trains, including electro-magnetic brakes engaging with the track upon which the train runs, a normally open local circuit in which the brakes are located, a source of electricity for said local circuit carried on the car, a circuit closer operating to close said local circuit, an electro-magnet actuating said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with the circuit closing magnet, means for closing said normally open circuit to energize the magnet, a normally open shunt circuit extending between the source of electricity on the car and the local circuit, spaced contacts, both connected to said shunt circuit, and a switch also connected to the shunt circuit and adapted to electrically engage with one or the other of said contacts to close the shunt circuit when the switch is moved in one or the other direction, and means, freely movable longitudinally by the breaking of the train, connecting one car to another and connected to said switch to shift the switch in one direction or the other when the connection is shifted by the breaking of the train at one end or the other of the car.

6. An electro-magnetic system for railway trains, including electro-magnetic brakes engaging with the track upon which the train runs, a normally open local circuit for each car in which the brakes are located, a source of electricity on each car for said local circuit, a circuit closer on each car operating to close said local circuit but yieldingly held in a position to break said circuit, an electro-magnet for actuating said circuit closer to close the local circuit, a source of electricity on the engine of the train connected in a normally open circuit with the circuit closing magnet, means for closing the normally open train circuit to shift the circuit closer on each car, a normally open shunt circuit extending between the source of electricity on each car and to the local circuit, spaced contacts connected in said shunt circuit, a switch also connected in the shunt circuit and movable into engagement with either one of said contacts, rods connected to said switch and extending longitudinally of each car to the opposite ends thereof, and frangible connections between the rods of one car and the rods of the next adjacent car.

7. In an electro-magnet system for railway trains, a movable magnet carried by each car of the train, said magnet having its core supported adjacent to a rail of the track, a source of electricity on each car of the train normally out of circuit with the

magnet, a switch normally in inoperative position but adapted when moved in either direction to establish a circuit between the source of electricity and the magnet, and frangible connections between the cars of the train and located at each end of each car and connected to said switch normally holding the switch in its inoperative position but adapted to cause a movement of said switch in one direction or the other to establish said circuit when the train is broken.

8. In an electro-magnetic brake system for railway trains, a plurality of electro-magnets carried by each car of the train, the cores of the magnets being supported adjacent to the rails of the track on which the car runs, a source of electricity on each car in constant operation but out of circuit with said magnets, a switch adapted when moved in either direction to establish a circuit between the source of electricity and the electro-magnets, and longitudinally extending connecting members connected to said switch and adapted to be connected to the adjacent cars of the train by a frangible connection whereby when the train is broken the connection shall be broken and the switch moved to establish a circuit through the source of electricity and the magnets carried by said car.

9. In an electro-magnetic brake system for railway trains, a plurality of electro-magnets mounted upon each car, the cores of said magnets being disposed adjacent to the rails upon which the train runs, a dynamo on the locomotive, a rheostat connected to said dynamo, a connection between said rheostat and the first magnet of the next adjacent car, an electrical connection from said first magnet to all the other magnets of each car of the train, a dynamo mounted on each car of the train and continuously actuated, said dynamo being normally out of circuit with the electro-magnets on each car, means actuated upon the actuation of the rheostat for establishing a circuit between the dynamo on each car and the electro-magnets of said car, whereby the electro-magnets shall be energized and attracted toward and in frictional contact with the rails upon which the car moves, a switch on each car adapted to establish a circuit between the dynamo of that car and the electro-magnets of the said car, said switch being normally open, oppositely disposed contacts with which the switch will make electrical connection when moved in one or the other direction, and connecting members attached to the switch and extending in opposite directions therefrom to the ends of the car, said connecting members having frangible connections to the connecting members on the next adjacent cars whereby when the train is broken the connecting members will be moved, the switch thrown to its opera-

tive position and a circuit established between the dynamo on said car and the electro-magnets thereof.

10 In an electro-magnetic brake system
5 for railway trains, a plurality of electro-magnets mounted upon each car, the cores of said magnets being disposed adjacent to the rails upon which the train runs, said magnets being connected in a normally open
15 circuit, a source of electricity on each car located in said circuit, a source of electricity on the locomotive connected on one side to a ground and connected in circuit with the local circuits of each car, a switch on the
20 engine normally breaking the circuit between the source of electricity on the engine and said local circuits, means actuated upon the actuation of the switch for closing the local circuits of each car whereby the electro-
25 magnets shall be energized and the cores thereof attracted toward and in frictional contact with the rails upon which the car moves, a switch on each car also adapted to establish a circuit between the source of
30 electricity on that car and the electro-magnets thereof, said switch being normally open, and means for operating said switch to close the local circuit of each car, said means being actuated by the breaking of the train.

11. The combination with a railway car truck, of a support mounted on the truck and having an opening disposed immedi-

ately above the rail of a track, an electro-magnet located in said opening, a core movable through the electro-magnet and having
35 a brake-shoe at its lower end supported above the rail of the track, an angular supporting bar bridging the opening in the support through which supporting bar the core of the magnet freely moves, and a spring
40 mounted on said supporting bar and engaging the core to hold the core away from the rail.

12. The combination with a railway car truck, of oppositely disposed electro-mag-
45 nets supported on the truck, each above one of the rails of the track, a core for each of said magnets movable through the coil thereof and having a brake shoe at its lower end, a connection between the cores of both mag-
50 nets, leaf springs approximately V-shaped, one of the leaves of each spring being mounted upon the coil of one of the adjacent magnets and the other leaf of the spring being connected to said core to hold the core
55 above the rails of the track.

In testimony whereof, we affix our signatures in presence of two witnesses.

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