(No Model.) 2 Sheets—Sheet 1.

G. W. von SIEMENS.

CONDUCTOR SYSTEM FOR ELECTRIC RAILWAYS.

No. 489,573. Patented Jan. 10, 1893.

Fig. 1.

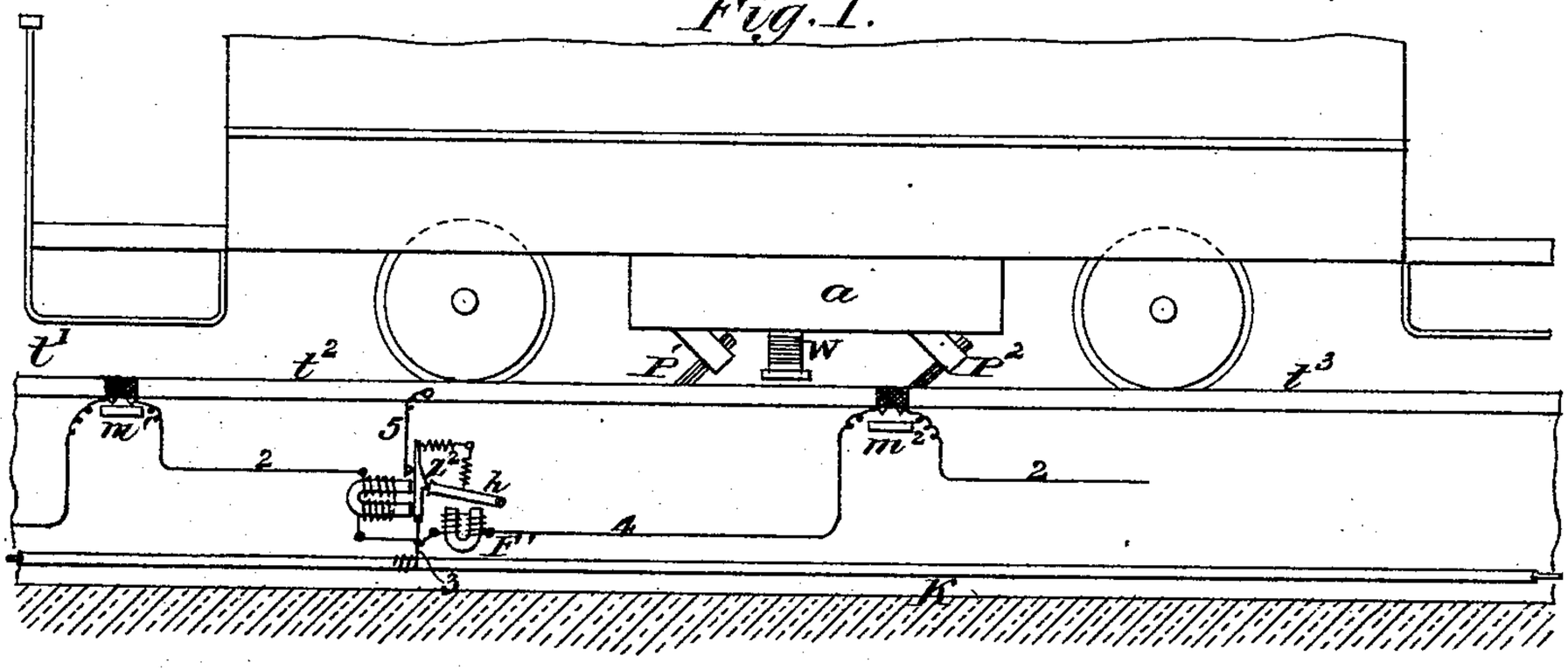
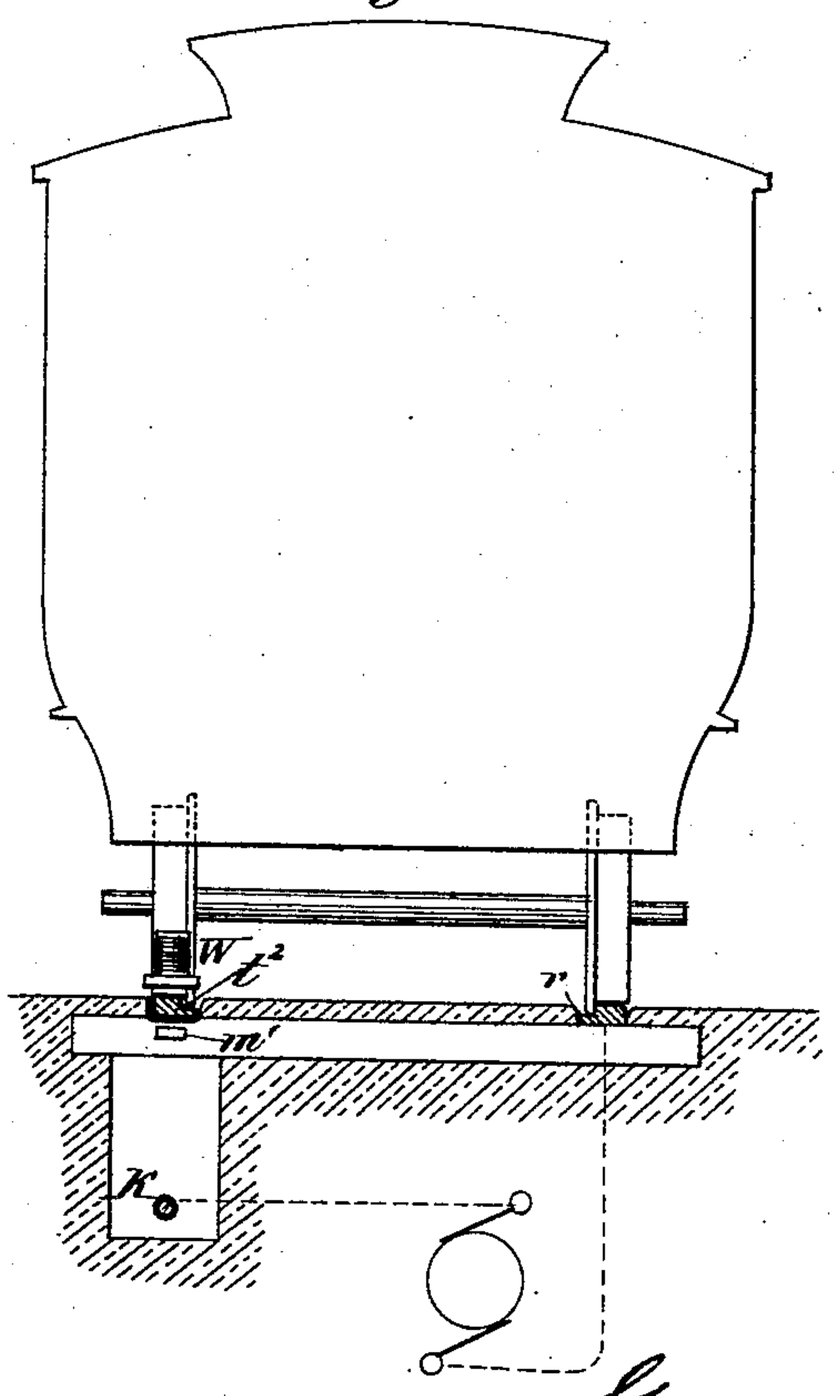


Fig. 2.



WITNESSES:

Timothy F. Dillon

William Kerton

INVENTOR

Georg Wilhelm von Siemens

BY

Robt. H. Benjamin

ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

G. W. von SIEMENS.

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Fig. 3.

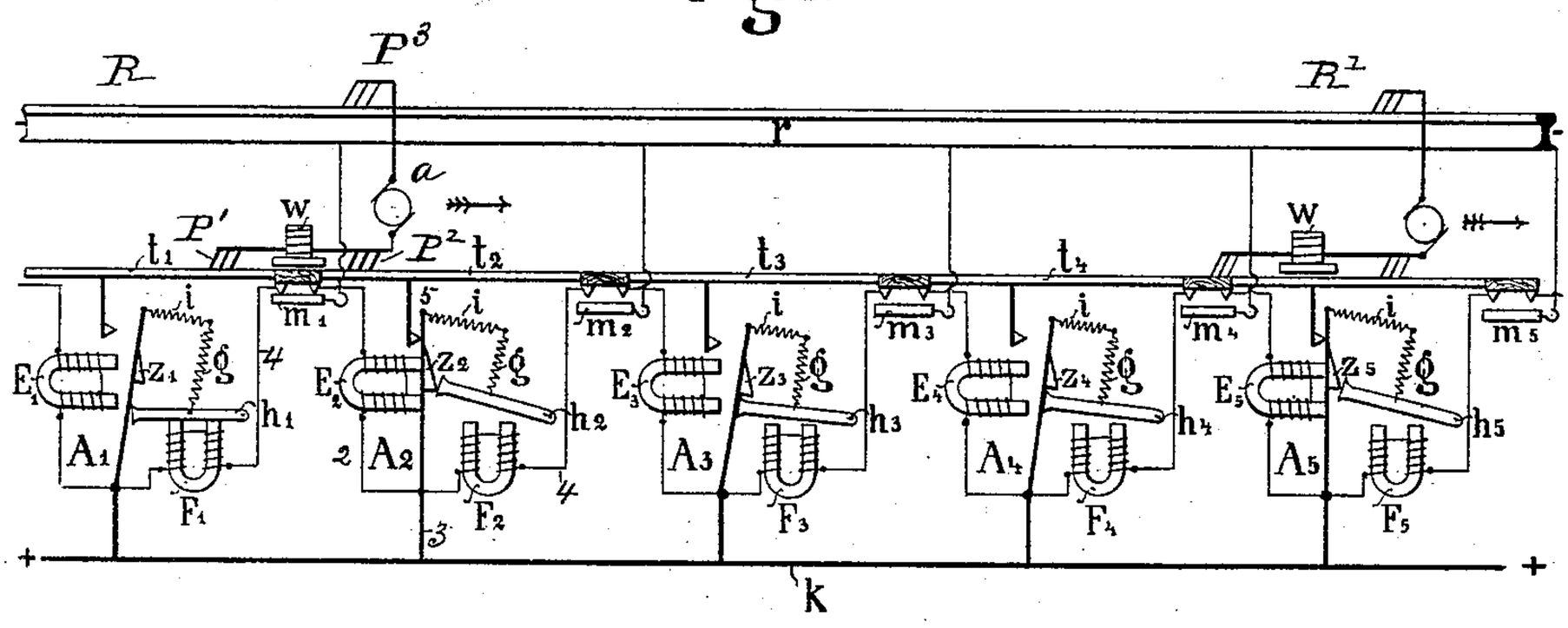
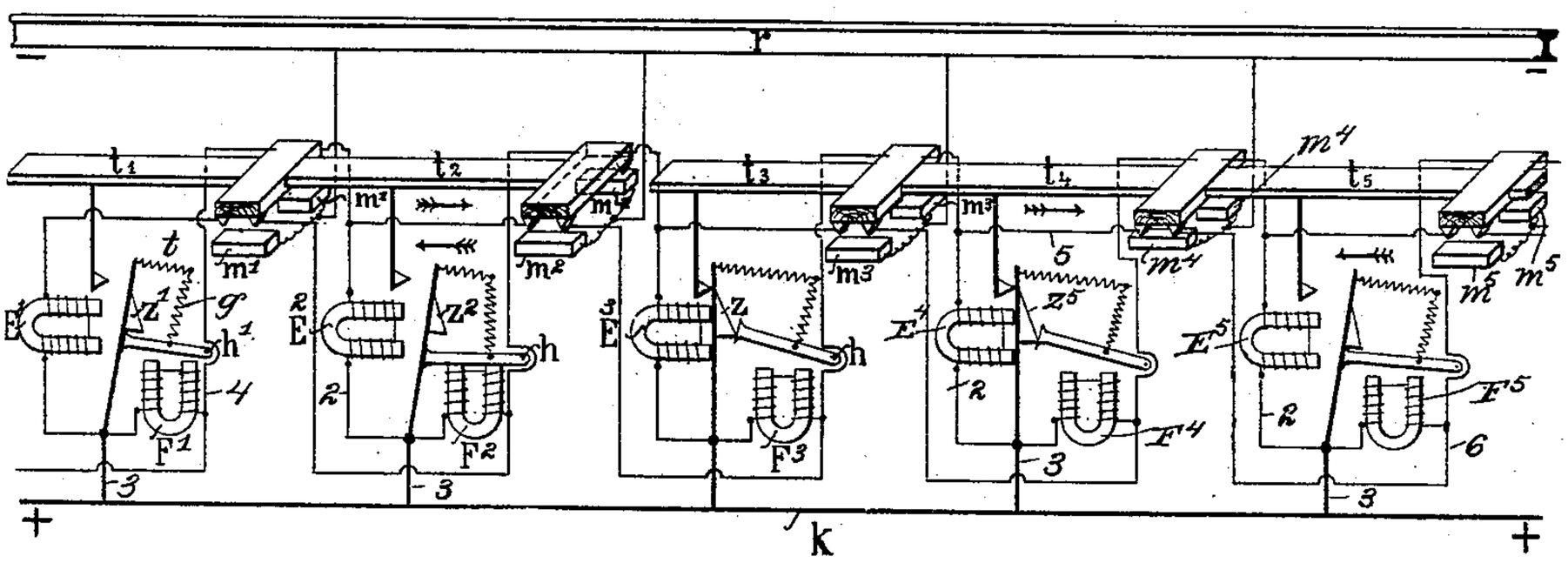


Fig. 4.



WITNESSES
T. F. Dillard
F. M. Rowlette

Georg Wilhelm von Siemens
INVENTOR
By Robt. H. Benjamin
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORG WILHELM VON SIEMENS, OF BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, OF SAME PLACE.

CONDUCTOR SYSTEM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 489,573, dated January 10, 1893.

Application filed February 3, 1892. Serial No. 420,222. (No model.)

To all whom it may concern:

Be it known that I, GEORG WILHELM VON SIEMENS, a subject of the King of Prussia, residing at the city of Berlin, Prussia, Germany, have invented certain new and useful Improvements in Devices for Supplying Current to Electrically-Operated Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention consists in means for supplying the electro-motive current to moving railway cars through an insulated conductor removed from the trackway, or otherwise situated, in a manner such as to promote perfect insulation of such main conductor, and avoid losses which are otherwise liable to result, owing to proximity to the ground when traveling contact is made with such conductor.

Referring to the accompanying drawings, in which similar letters and numerals of reference indicate corresponding parts throughout: Figure 1, is a longitudinal vertical section through the road bed of a railway and illustrating my invention; Fig. 2, a cross section of Fig. 1; Fig. 3, a diagram of the apparatus illustrating one form of construction; and Fig. 4, a diagram illustrating a modification.

K is the main insulated conductor or feeder removed from the trackway.

t', t^2, t^3, &c., are sectional contact making conductors constituting one rail of the railway, or independently disposed.

r represents the other rail which is utilized as a return current conductor.

a represents the motor on the car.

P', P², represent a double traveling contact making device upon the car connected to one pole of the motor, and adapted to promote continuous electrical connection by closing a circuit through one section t', before it is broken upon another. The single traveling contact P³, connected to the opposite pole of the motor, forms continuous connection with the return current rail r.

The traveling contacts of one car are represented at R, in Fig. 3, and those of another car at R'.

W represents an electro magnet upon the car traveling in proximity to the sectional rail t', t^2, t^3, &c. At the rail joints of the sectional rail t', t^2, t^3, suitable insulations are interposed, and on the under side of the sections adjacent to the insulations, central pieces are located, into contact with which, the armatures m', m^2, m^3, &c., are attracted successively by the car magnet W, to close circuit through wires 2, 4.

The apparatuses A', A², A³, &c., embedded in the roadway or located in a suitable subway are adapted to electrically connect and disconnect the main line K, with each sectional contact rail t', t^2, t^3, in succession as the car progresses.

Referring to the apparatus A², for instance, the electro-magnet E² is included in the shunt circuit 2, controlled by the armature m'. When the electro-magnet E², is induced, the armature z^2 is attracted and closes circuit through 3 and 5. The latch armature h^2 locks the armature z^2, and maintains the electrical connection with the rail section t^2, until the magnet W of the car arrives opposite the next armature m^2, and closes circuit through the next rail section t^3. A shunt circuit is closed by the armature m^2 through branch 4 of the apparatus A², including magnet F², which withdraws the latch armature h^2, releasing the contact armature z^2, breaking circuit through 3 and 5 pertaining to rail t^2. The same operation is repeated for each apparatus.

The springs i, g, retract the respective armatures z^2, h^2, when their magnets are cut out of circuit.

Fig. 3, illustrates the position of the parts at the period when the car is passing from section t' to section t^2. The current is led from wire K to the coils of the magnet F' and retracts the spring armature h' of the latter to permit spring i to withdraw armature z' and rupture current connection with the section t'. The current continues from coils of magnet F' along wire 4, armature m', and cross wire to return conductor r. Current is likewise supplied from conductor K to wire 3, and passes to wire 2 including coils of magnet E² to magnet m' and cross wire to return conductor r the completion of this last men-

tioned circuit energizing the magnet E^2 to move the armature z^2, and establish circuit connection between section t^2, and conductor K.

In the modification Fig. 4, the diagram illustrates a double track arrangement in which the cars move along the respective tracks in opposite directions at the same time. In said arrangement, two armatures m', m', &c. are located at each joint of the sectional rail t', t^2, t^3, &c. each armature individually controlling a shunt circuit including the circuit closing and locking magnets. Assuming a car passes from the section t' to section t^2, the armature m', represented in the background will be attracted to effect the following:—a circuit will be established from the supply conductor K through wires 3, 2, magnet E^2 operated armature m', and cross wire to return current rail r, thus energizing the magnet E^2 attracting armature z^2 to directly connect the section t^2, with the main supply conductor K. Coincidently a circuit is established from the conductor K, through wire 3 of preceding section t', magnet F' wire 4 operated armature m' and cross wire to return current rail r, thereby exciting said magnet F', to attract its armature h', against the action of its spring g and thereby unlock circuit closing armature z', to enable its spring i, to retract the same and rupture the circuit connection of section t', with the main supply conductor. When a car moves in the opposite direction on the parallel track and passes say from section t^5, to section t^4, the armature m^4, represented in the foreground will be attracted to effect the following:—a circuit through wires 3, 2, of section t^4, magnet E^4, wire 5 operated armature m^4, and cross wire to return current rail r, thus attracting circuit closing armature z^5, and placing section t^4, in direct connection with the main supply conductor. Coincidently a circuit is established leading from main supply conductor K, through wire 3, of section t^5, through the coils of magnet F^5 wire 6, and operated armature m^4 to return rail r, exciting magnet F^5 and retracting the locking armature h^5, to release armature z^5 and interrupt the current connection of section t^5 with the main supply conductor.

I claim:—

1. In an electric railway, the combination with a contact conductor composed of a series of relatively insulated sections, a supply conductor, normally interrupted connections between the supply and contact conductors, an electro-magnetic device for each contact section, and armatures adapted to be successively operated by a magnetic device on the vehicle, to close the circuit through said magnetic devices, to complete the interrupted supply connection of the section into which the vehicle is moving, and interrupt the corresponding connection of the preceding section.

2. In an electric railway, the combination with a contact conductor composed of a series of relatively insulated sections, a supply conductor, normally interrupted connections between the supply and contact conductors, an electro-magnetic device for each section, comprising electro-magnetic circuit completing and locking means, and a series of armatures adapted to be operated by an electro-magnetic device on the car to operate the circuit closing device of one section, and release the lock of the preceding section.

3. In an electric railway, the combination with a contact conductor composed of a series of relatively insulated sections, a main supply conductor, normally interrupted connections between the supply and contact conductors, a device for each section comprising magnets having spring retracted circuit closing and locking armatures, and a series of armatures m', &c., adapted to be actuated by an electro-magnetic device on the car to operate the circuit closing magnet of one section, and the retracting magnet of the locking armature of the adjoining section, substantially as described.

4. In a system of electrical distribution for railways, the combination of a continuous main insulated conductor, a contact making conductor composed of a series of sections insulated from one another, a series of electro-magnetically controlled contacts for electrically connecting and disconnecting the said main conductor with the respective sections of the sectional conductor, normally open shunt circuits including the magnets of said contacts, magnetically controlled contacts for making and breaking said shunt circuits, and a magnet traveling with the car adapted to operate said contacts of the shunt circuits in the manner and for the purpose described.

5. In a system of electrical distribution for railways, the combination of a continuous main insulated conductor, a contact making conductor composed of a series of sections insulated from one another, a series of electro-magnetically controlled contacts for electrically connecting and disconnecting the said main conductor with the respective sections of the sectional conductor, normally open shunt circuits including the magnets of said contacts, magnetically controlled contacts for making and breaking said shunt circuits, lock armatures for retaining the contacts of said shunt circuits, electro-magnets for releasing said lock armatures, and second normally open shunt circuits including said releasing magnets controlled by the contacts of the first shunt circuits in the order described, whereby the closure of circuit through one of the sections of the sectional conductor is released simultaneously with the closure of circuit through a succeeding section.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORG WILHELM VON SIEMENS.

Witnesses:
W. HAUPT,
MAX WAGNER.