

(No Model.)

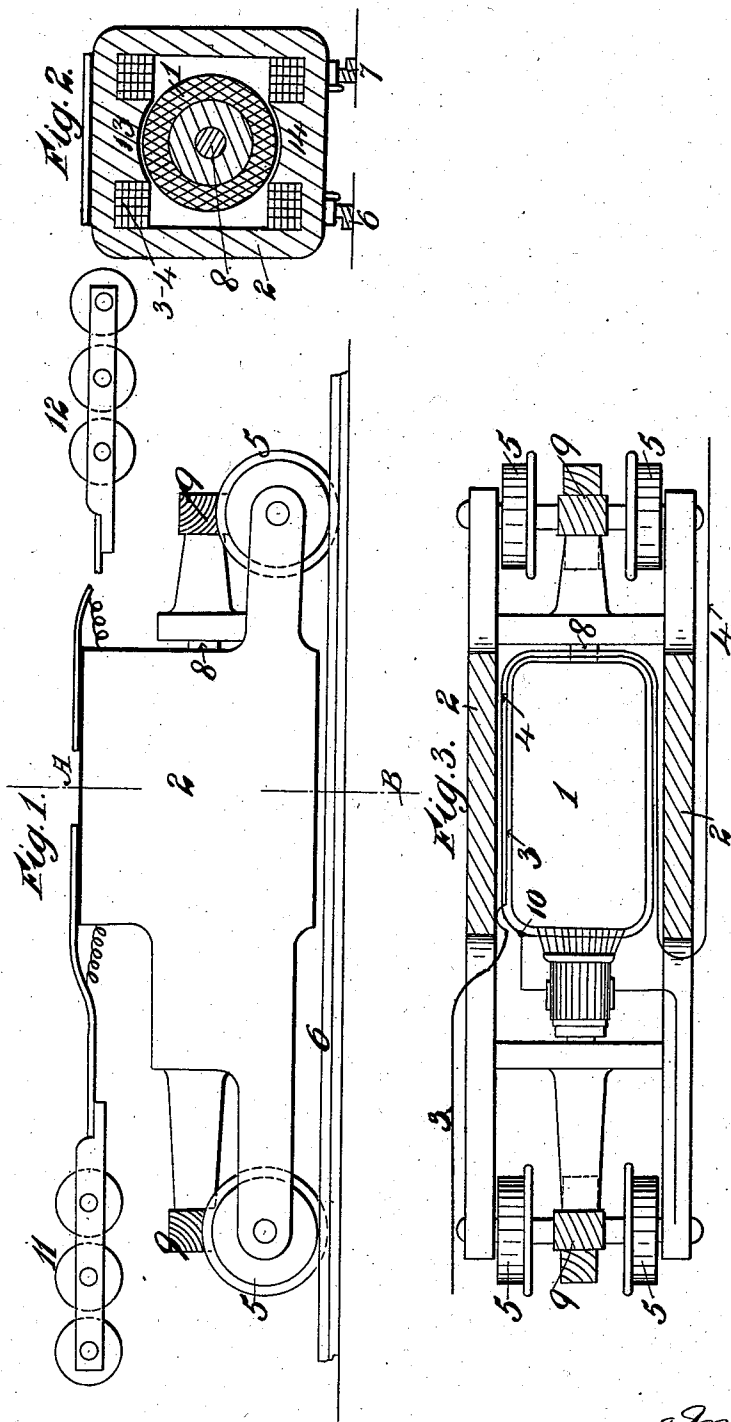
3 Sheets—Sheet 1.

F. WYNNE.

CONTACT MAKING DEVICE FOR ELECTRIC RAILWAYS.

No. 381,048.

Patented Apr. 10, 1888.



Witnesses.
Charles E. Prougham.

Wm Cross.
2-12

Inventor.
Frank Wynne

(No Model.)

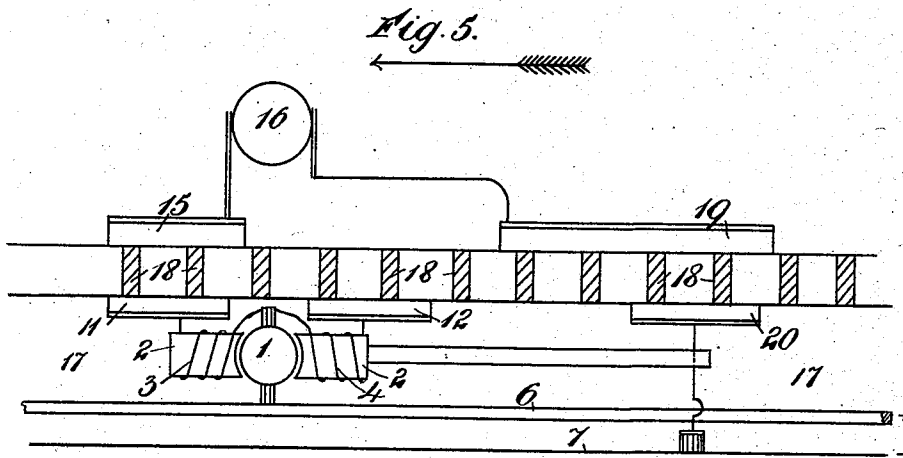
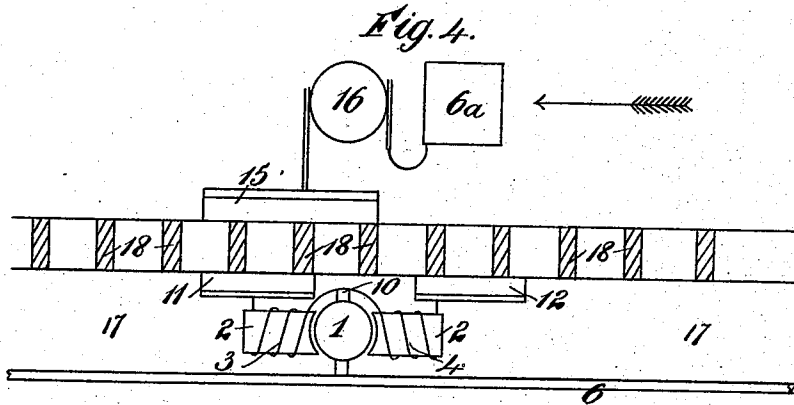
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Fig 6.

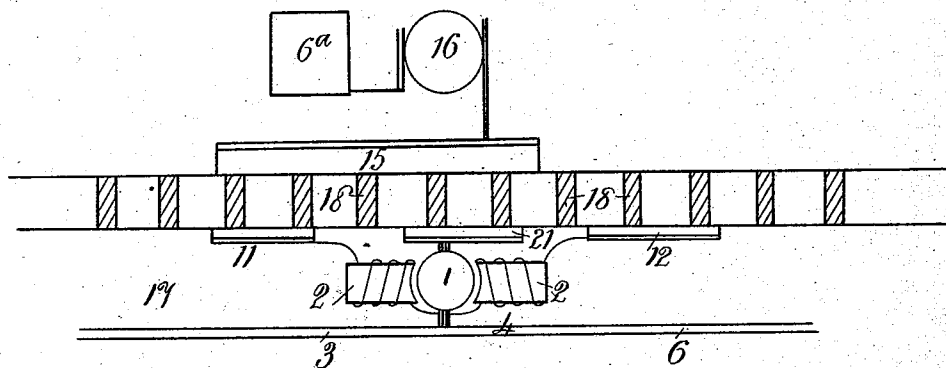
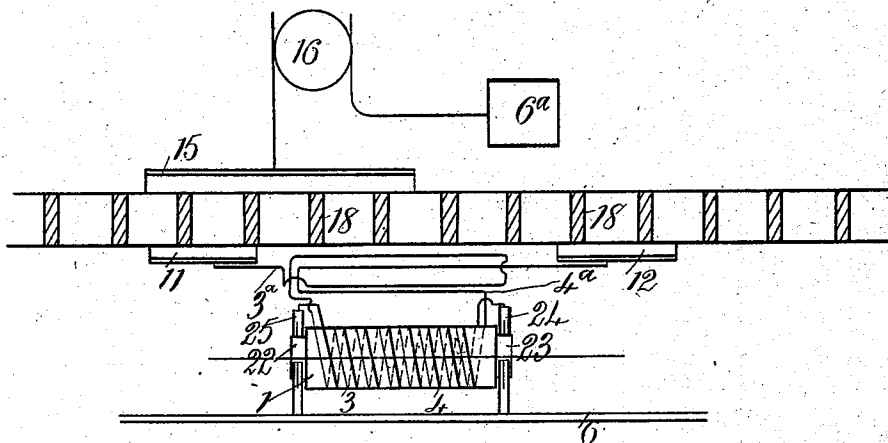


Fig 7.



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UNITED STATES PATENT OFFICE.

FRANK WYNNE, OF WESTMINSTER, COUNTY OF MIDDLESEX, ENGLAND.

CONTACT-MAKING DEVICE FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 381,048, dated April 10, 1888.

Application filed June 6, 1887. Serial No. 240,420. (No model.) Patented in England July 15, 1886, No. 9,215; in Germany January 27, 1887, No. 41,326; in France March 9, 1887, No. 182,077; in Belgium September 2, 1887, No. 78,757, and in New South Wales October 4, 1887, No. 235.

To all whom it may concern:

Be it known that I, FRANK WYNNE, a subject of the Queen of Great Britain and Ireland, residing at Westminster, in the county of Middlesex, Kingdom of Great Britain and Ireland,
5 have invented Improvements in Contact-Making Devices for Use in the Application of Electricity to Propel Vehicles on Tramways and Railways, of which the following is a specification.

This invention (which has been patented as follows: Great Britain, No. 9,215, dated July 15, 1886; Germany, No. 41,326, dated January 27, 1887; France, No. 182,077, dated March 9, 1887; Belgium, No. 78,757^b, dated September 2, 1887, and New South Wales, No. 235, October 4, 1887) has reference to improvements in electrically-propelled contact-making devices for use in the application of electricity to propel vehicles on tramways and railways according to the mode or method in which the electricity is derived from a producer or reservoir of electricity, and there are employed a covered channel containing a bare main conductor of electricity (with or without a special return in the channel) and a series of insulated contact-surfaces exposed in the said channel and connected electrically to a series of insulated contacts exposed in the road upon which the car or vehicle to be propelled travels.

An electrically-propelled contact-making device according to this invention is specially applicable for use with a covered channel and insulated contacts of the kind described and claimed in another application for a United States patent filed June 6, 1887, Serial No. 240,419.

In order that the nature of my invention and the manner in which it can be conveniently carried into practical effect may be readily, clearly, and fully understood, I append two sheets of illustrative drawings, with the aid of which I proceed to describe my improvements.

Referring to the drawings, Figure 1 is a side elevation, and Fig. 2 a transverse section on the line A B of Fig. 1, illustrating an electrically-propelled contact-making device according to this invention, and hereinafter called a

"carrier." Fig. 3 shows the carrier in plan or top view, partly in section, the separate windings on the field-magnet being shown diagrammatically. Figs. 4, 5, 6, and 7 are diagrammatic views illustrating four arrangements of the electrical propelling apparatus of the car or vehicle and carrier, whereby the motion of the carrier is regulated and controlled. In these views the winding of the fields on the car-motor is not indicated and the armature is indicated diagrammatically.

In the arrangement of electrically-propelled reversible carrier represented in Figs. 1, 2, 3, and diagrammatically in Fig. 4, the electric motor employed is a series motor having the axis of its armature 1 arranged (by preference) lengthwise of the closed channel in which it is to work.

2 is its field-magnet wound with two windings, 3 4, in opposite directions.

5 6 are pairs of wheels mounted in the carrier-frame and arranged to travel on rails or bare conductors of electricity 6 7, arranged in the channel. When the wheels are employed to collect the current from the rails, they are so insulated from the frame of the carrier as to prevent short-circuiting of the armature of the carrier-motor, and when the conductor 7 is employed as a return the wheels traveling on it must be insulated from those traveling on the conductor 6. Motion is imparted to them from the armature-shaft 8 by spiral or other suitable gearing, 9.

As shown diagrammatically in Figs. 3 and 4, the current passes from the main conductor 6 to the pair of wheels 5, and after passing through the armature divides at the point 10 and passes to the two windings 3 4, wound in opposite directions on the field-magnet.

11 12 are carrier rolling contacts in electrical connection with the windings 3 4, respectively; or sliding contacts may be used. The iron forming the field-magnet 2 is arranged to surround the armature lengthwise of its axis, as shown in Figs. 2 and 3, whereby external lines of magnetic force, which are liable to be short-circuited and thereby wasted through the iron of the channel, are wholly or largely suppressed. 13 and 14 are the field-magnet poles.

The action of the motor for controlling the movement of the carrier in its channel for completing the car-motor circuit progressively as the car or vehicle travels along the road will be readily understood by reference to Fig. 4, in which 6 is the bare main conductor of electricity situate within a closed channel, 17; 6*, an earth-return effected through the framework and wheels of the car or vehicle to be propelled and the tram-rails; 1, the carrier-motor armature; 2, field-magnet of carrier-motor; 3 4, windings in opposite directions on the said field-magnet; 11 and 12, contact-pieces in electrical connection with the windings 3 and 4, respectively; 15, car contact-piece; 16, car-motor; 17, closed channel in which the carrier runs, and 18 18 insulated stud-contacts passing through the top of the channel and provided with exposed contact-surfaces in the channel and in the roadway, substantially in the manner described in my separate application for a United States patent hereinbefore mentioned. The car contact-piece 15 is electrically connected with one pole of the car-motor 16, and is arranged to bear upon the upper ends of the contacts 18 18.

The operation is as follows: Supposing the car-motor and carrier to be traveling at the same velocity in the direction indicated by the arrow, and to be in the relative positions indicated, the electric current passes from the main conductor through the wheels of the carrier to the motor-armature 1, field-winding 3, contact-piece 11, contacts 18 18, contact-piece 15, to car-motor 16, and thence to earth-return 6*. As long as the velocity of the vehicle and carrier is approximately equal within moderate limits, the course of the current above mentioned will be continued. If, however, from any cause the carrier should begin to outrun the vehicle, the contact-piece 12 will be placed in electrical connection with the car contact-piece 15 through one or more of the contacts 18. Under these conditions part of the current, after passing through the armature 1, will pass through the field-winding 4, contact-piece 12, contact piece or pieces 18, and car-contact 15 to car-motor, and thence to earth, thereby causing the field-winding 4 to exert a neutralizing effect on the field-winding 3, and reducing or neutralizing the field in which the armature works, and thereby its propelling-power.

Should the momentum of the carrier from any cause—such as the sudden stopping of the vehicle—carry the contact-piece 11 out of electrical connection with the car-contact 15 through the contacts 18, the contact-piece 12 will be placed in electrical connection with the car-contact 15, and the whole of the current will then pass through the field-winding 4, reversing the direction of rotation of the armature, and thus bring back the carrier to its normal position relatively to the vehicle.

Fig. 5 shows an arrangement similar to that shown in Figs. 1, 2, 3, and 4, but with a special metallic return-conductor, 7, laid in the

channel 17, and which, for convenience, I take to be negative and mark with the minus sign. For this purpose the vehicle carries a second contact-piece, 19, in electrical connection with the negative pole of the car-motor, and the carrier carries an additional contact-piece, 20, insulated therefrom but in contact with the conductor 7.

In the diagrammatic views shown in Figs. 4 and 5 the opposite windings on the field-magnet are shown for clearness each as if on a separate limb of the field-magnet, while in practice they would usually be wound together on one field-magnet.

It will be obvious that the carrier-motor may be variously modified. Thus a shunt-motor may be employed, as shown diagrammatically in Fig. 6, wherein the armature 1 is arranged in a shunt-circuit and provided with a separate rolling or rubbing contact, 21, which is placed in electrical connection with the car-contact 15 by the contacts 18, as shown. In other respects the operation of this modified arrangement is substantially the same as that hereinbefore described; also, instead of placing the separate windings 3 and 4 on one field-magnet, they may be placed on separate magnets. In this case the two parts of the field-magnet 23, on which the windings 3 and 4 are wound, would be independent magnets; also, the armature may have two commutators and double windings, which are connected, respectively, to the carrier-contacts, as shown in Fig. 7, the windings of the field-magnet in this case being in one direction only.

3 and 4 are the windings on the armature 1, and through which currents will flow in opposite directions when they are in circuit. The armature is provided with two commutators, 22 and 23, and two sets of brushes, 24 and 25, one brush in each set being in electrical connection with the main conductor 6.

3* and 4* are the parts of the windings wound in the same direction on the field-magnet (not shown) and currents to the rubbing or rolling contacts 11 and 12. In other respects the arrangement is similar to that shown in Fig. 4, and is similarly figured. When the whole of the current passes through the winding 3, the carrier moves forward in the direction of the arrow, as before, while when it passes through the winding 4 it moves in the reverse direction. When the current is divided and passes through both windings, the one winding partly or wholly neutralizes the effect of the other, and thus regulates the propelling-power of the carrier.

What I claim is—

1. The combination, with a covered channel, a main conductor of electricity therein, contacts fixed in said channel and insulated from said conductor, said contacts having parts exposed in said channel and in the road on which a vehicle is to be propelled, an electric motor on said vehicle, a car-motor contact adapted to make contact with said fixed contacts, and a return-conductor, of a reversible electrically-

propelled carrier or contact-maker adapted to travel in said channel, and having a single electric motor provided with a rubbing or rolling contact in electrical connection with said main conductor, and also rubbing or rolling contacts arranged to bear successively against said exposed fixed contacts and place these contacts in electrical connection with said electric conductor, substantially as herein described, for the purposes set forth.

2. The combination, with a covered channel, a main conductor of electricity therein, contacts fixed in said channel and insulated from said conductor, said contacts having parts exposed in said channel and in the road on which a vehicle is to be propelled, an electric motor on said vehicle, a car-motor contact adapted to make contact with said fixed contacts, and a return-conductor, of a reversible electrically-propelled carrier or contact-maker having an electric motor with double windings, through which currents of electricity may pass in opposite directions, a rubbing or rolling contact in electrical connection with said windings and adapted to bear on said main conductor, and separate rubbing or rolling contacts electrically connected to said windings and adapted to travel successively against the parts of said fixed contacts exposed in the channel, substantially as herein described, for the purposes set forth.

3. The combination, with a covered channel, a main conductor of electricity therein, contacts fixed in said channel and insulated from said conductor, said contacts having parts exposed in said channel and in the road on which a vehicle is to be propelled, an electric motor on said vehicle, a car-motor contact adapted to make contact with said fixed contacts, and a return-conductor, of a reversible electrically-propelled carrier or contact-maker having an electric motor with double windings in opposite directions, a rubbing or rolling contact in electrical connection with said windings and adapted to bear on said main conductor, and separate rubbing or rolling contacts electrically connected to said windings and adapted to travel against the parts of said fixed contacts exposed in the channel, substantially as herein described, for the purposes set forth.

4. The combination, with a covered channel, a main conductor of electricity therein, contacts fixed in said channel and insulated from said conductor, said contacts having parts exposed in said channel and in the road on which a vehicle is to be propelled, an electric motor on said vehicle, a car-motor contact, and a return-conductor, of a reversible electrically-propelled carrier or contact-maker having an armature, a field magnet or magnets with double windings in opposite directions, a rubbing or rolling contact in electrical connection with said windings and adapted to bear on said main conductor, and separate rubbing or rolling contacts, also electrically connected to said windings and adapted to travel against the

parts of said fixed contacts exposed in the channel, substantially as herein described, for the purposes set forth.

5. The combination, with a covered channel, a main conductor of electricity therein, contacts fixed in said channel and insulated from said conductor, said contacts having parts exposed in said channel and in the road on which a vehicle is to be propelled, an electric motor on said vehicle, a car-motor contact, and a return-conductor, of a reversible electrically-propelled carrier or contact-maker having an electric motor wound with double windings and provided with a field-magnet, the iron of which is arranged to surround the motor-armature longitudinally and form a closed magnetic circuit, a rubbing or rolling contact in electrical connection with said windings and adapted to bear on said main conductor, and separate rubbing or rolling contacts electrically connected to said windings and adapted to travel against the parts of the contacts exposed in the channel, substantially as herein described, for the purposes set forth.

6. The combination, in a reversible electrically-propelled carrier or contact-maker designed to travel in a pipe or channel, of an electric motor with double windings in opposite directions, the motor-armature having its axis arranged parallel to that of the channel in which the carrier travels and surrounded longitudinally by iron, and rubbing or rolling contacts in connection with the double windings in opposite directions, substantially as herein described, for the purpose specified.

7. The combination, in a reversible electrically-propelled carrier or contact-maker, of an electric motor having double windings in opposite directions, separate rubbing or rolling contacts connected with the said windings in opposite directions and arranged to travel against contacts exposed in a channel in which the carrier or contact-maker travels, and a rubbing or rolling contact insulated from the carrier or contact-maker, and also arranged to travel against said exposed contacts and to place them in electrical connection with a return-conductor in said channel, substantially as herein described, for the purposes specified.

8. The combination, in a reversible electrically-propelled carrier or contact-maker, of an armature, 1, a field-magnet, 2, with double windings in opposite directions, sliding or rolling contacts 11 and 12, in connection with said double windings, carrying-wheels 5, and gearing 9, all substantially as herein described, for the purposes specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK WYNNE.

Witnesses:

CHARLES E. BROUGHAM,

WM. CROSS,

Both of 46 Lincoln's Inn Fields, London, W. C.