(No Model.) 3 Sheets—Sheet 1.

C. O. MAILLOUX.

ELECTRIC CAR MOTOR.

No. 457,357. Patented Aug. 11, 1891.

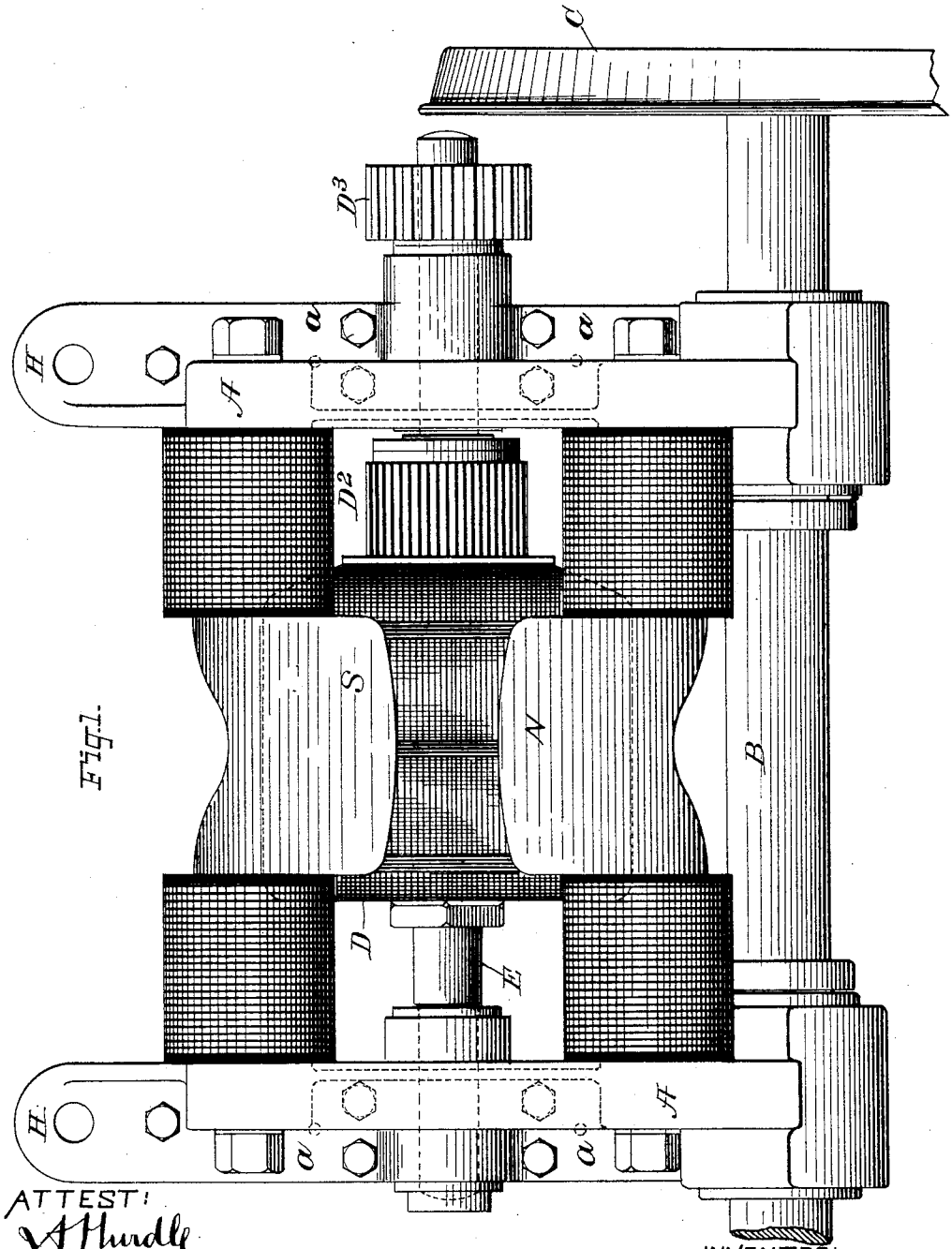


Fig. 1.

ATTEST:
J. A. Hurdle
Wm. H. Capel

INVENTOR:
Cyprien O. Mailloux
By E. L. Townsend
Attorney

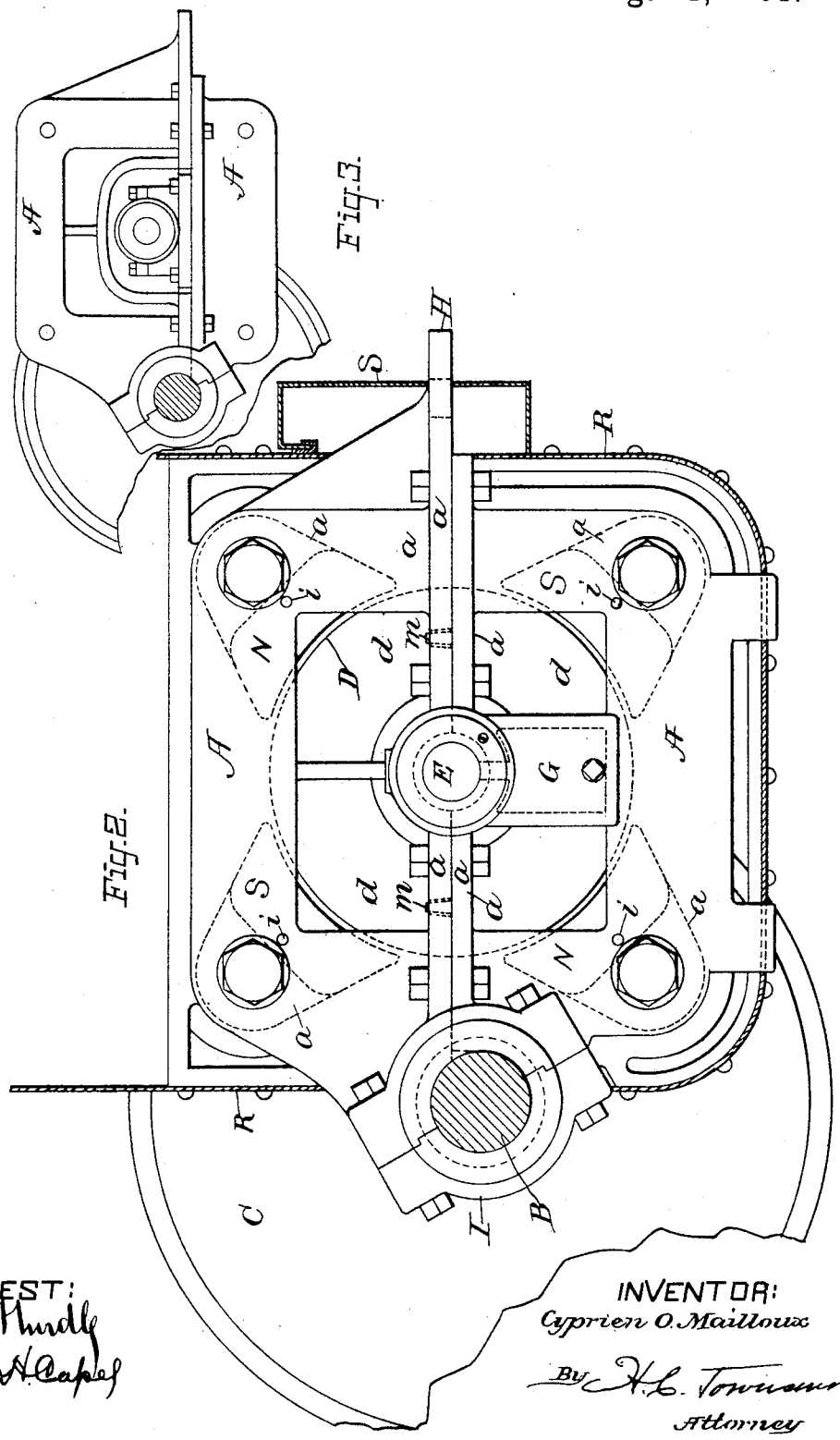
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(No Model.) 3 Sheets—Sheet 2.

C. O. MAILLOUX.

ELECTRIC CAR MOTOR.

No. 457,357. Patented Aug. 11, 1891.



ATTEST:
J. A. Thurdle
Wm. H. Capel

INVENTOR:
Cyprien O. Mailloux
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

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Fig. 5.

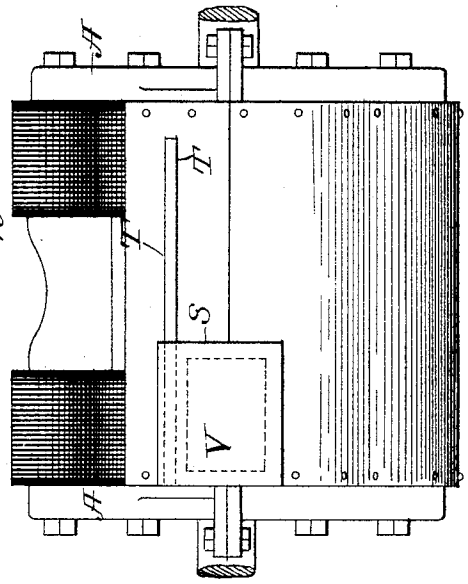


Fig. 6.

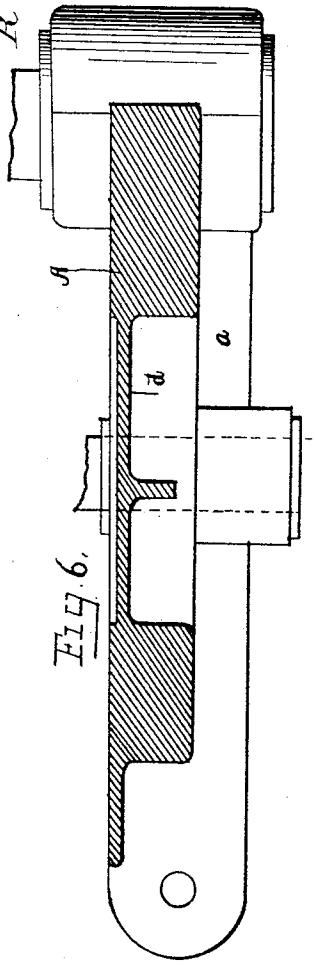
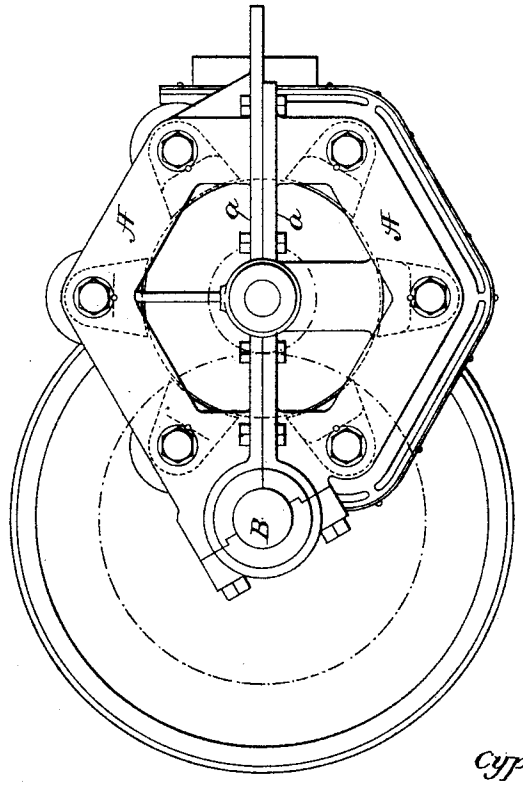


Fig. 4.



ATTEST:
J. A. Hurdle
Wm. A. Capel

INVENTOR:
Cyprien O. Mailloux
By H. C. Townsend
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CYPRIEN O. MAILLOUX, OF NEW YORK, N. Y.

ELECTRIC-CAR MOTOR.

SPECIFICATION forming part of Letters Patent No. 457,357, dated August 11, 1891.

Application filed March 18, 1891. Serial No. 385,489. (No model.)

To all whom it may concern:

Be it known that I, CYPRIEN O. MAILLOUX, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Electric-Car Motor, of which the following is a specification.

My invention relates to the construction and manner of mounting electric motors applied to running railway-cars or other vehicles.

The object of my invention is to secure compactness in the motor, and, further, to provide for the ready repair of the motor when applied to a railway-car in case it is desired to remove the armature of the machine for that purpose. In the usual constructions of railway-motors it is necessary when the armature is to be repaired to lift it out of its bearings and out of the machine, which is frequently a difficult and troublesome operation when the motor is supported in the usual manner beneath the car-floor.

The aim of my invention is to permit the motor-armature to be readily removed for repair from beneath, the car for such purpose being run over a suitable pit. A special purpose of the invention is to permit such removal to be effected without entirely dismantling the motor or removing the same from its support complete.

The invention consists, essentially, in making the motor-frame in two parts, one of which is supported suitably upon the car-axle or the truck-frame, as usual in the art, while the other part upon which the armature is supported is attachable and detachable from beneath and may be lowered with the armature leaving the main portion of the motor supported in normal position over the car-axle or upon the truck-frame in any usual or proper manner. Preferably I detachably secure the lower portion of the motor-frame upon which the armature is supported directly to the upper portion of said frame in proper manner to permit it to be lowered at pleasure.

In carrying out my invention I also prefer to divide the field-magnet frame into two parts, the lower of which carries or supports the armature and when lowered carries the armature with it, while the upper portion is supported upon the car-axle or truck-frame in the usual or proper manner.

A further object of my invention is to permit a motor having a multipolar field-magnet to be employed for propelling a railway-car and yet not to exceed the limits of space which can be conveniently taken up by the motor when the same is mounted beneath the car-body.

I have illustrated my improved motor as applied to the running of a railway-car and as carried out in the construction of a motor having four or six field-magnet poles, from which description the application of the invention to other kinds of vehicles and to motors having any number of field-poles will be obvious.

My invention consists, further, in the special combinations and details of construction hereinafter described, and specified in the claims.

In the accompanying drawings, Figure 1 is a plan of a motor constructed and mounted in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation of a modification. Fig. 4 is a side elevation of a motor having six poles. Fig. 5 shows an end view of the motor incased. Fig. 6 is a horizontal cross-section of one of the end plates of the frame.

Referring to Figs. 1 and 2, B indicates the axle of a railway-car, and C the car-wheel fixed to said axle, as usual.

I shall hereinafter describe the mounting of the armature in a manner to permit it to be removed from beneath as carried out in connection with an electric motor, the field-magnet frame of which has a vertical end plate or plates, from which project arms or rods carrying the pole-pieces, between which the armature rotates in a plane parallel with said end plate or plates; but I do not wish to be understood as limiting myself to mounting the armature of an electric-railway motor in the lower detachable portion of such a field-magnet frame. It will be seen, however, from the subjoined description that the special construction of field-magnet frame mounted, as hereinafter described, lends itself particularly to the carrying out of this portion of my invention.

A A indicate the end plates or pieces of

the field-magnet frame for the electric motor, whose armature is mechanically connected with the car-axle for the purpose of turning the same and propelling the car. These end plates or pieces A, mounted parallel to one another, are provided with suitable journal-bearings for the armature-shaft, and are mounted, preferably, upon the car-axle by sleeving the yoke-pieces upon the same. They are each made in two parts or bisected, as will be presently described, and are connected and tied together by the four parallel cross rods or bars which support or carry the four field-magnet pole-pieces N S N S of the machine, said poles being excited or developed by magnetizing-coils in any suitable way. The cross rods or bars are bolted to the end plates or pieces and in the preferred construction of the machine are utilized as part of the field-magnet or field-magnet circuit, in which case the field-energizing coils may be wound upon said cross bars or rods, as indicated, in which case the end plates or pieces A A, if of iron, will have the function of magnetic yoke-pieces.

While the frame made of the end plates or pieces and the connecting cross-rods carrying the field-magnet poles may be thus utilized as part of the magnetic circuits for the field-magnet, I do not limit myself to such manner of employing them, and the field-poles might be developed in other ways, they being, however, at the same time carried or supported by the frame composed of the end plates and cross rods or bars constituting the motor-frame and having the armature-shaft mounted in the end plates and parallel to the cross-bars or tie-rods. When the cross-bars have the field-coils wound upon them at opposite sides of the pole-piece, they should act to develop consequent poles at N S N S, as will be obvious. It will be obvious that the locating of the pole-pieces at any particular point on the cross-rods is not essential to the invention. Any change from the position shown would only require obvious modification in the location of whatever energizing-coils might be used. It will be also obvious that the frame might be divided on any other horizontal line without departing from the invention and that a greater or a less portion of the same might be left permanently supported when the under part is lowered with the armature.

D indicates the armature of the motor, and E the armature-shaft.

D^2 indicates the commutator-cylinder. The construction of the latter device and the manner of mounting and supporting the commutator-brushes are not particularly described or shown herein, as this forms no part of my present invention. I have also omitted any particular description of the means for gearing or connecting the armature-shaft with the car-axle, as such mechanism forms no part of my present invention and may be varied at pleasure. I have, however, indicated at D^3 a gear-wheel, which is ordinarily employed as the first member of the train of gearing for rotating the car-axle by the armature. Each of the yoke or end pieces A is made in two parts, as clearly shown in the side elevation, and each of said parts is provided with flanges *a* at the line of union, where the two parts may be detachably secured together by means of bolts, as indicated.

The armature-shaft of the machine is mounted in the end plates A A parallel to the car-axle, as shown, the journal-bearings for the shaft being formed on or carried by said plates at or near the center, which is connected, as clearly indicated, with the peripheral thicker portion of the end pieces (where the cross-pieces are fastened) by flanges *a* and by the webs *d*. These webs and the other parts forming the interior portion of the end pieces form a protection against injury to the armature at its ends. At G each end plate A is enlarged to form a suitable oil box or cavity, and its upper portion is extended, as at H, to form a nose-piece, which may rest by a spring or other bearing upon a cross-bar of the truck-frame in the manner usual in the art. At its opposite side it rests upon the top of the car-axle, as clearly shown, while the lower part, which may be detached from the upper, is provided with a part of the sleeve surrounding said axle. The remaining portion of the sleeve is formed by the detachable cap, like a journal-cap, (indicated at I,) which may be bolted to the parts of the sleeve or journal-bearing which surrounds the car-axle, and are carried by or formed upon the two portions of the bisected end plate or piece A. The portion of the journal-bearing for the armature-shaft which corresponds to the pillow of an ordinary journal-bearing is carried by the lower portion of the bisected end piece, while the upper portion or journal-cap portion is, in the form shown in Fig. 2, carried by the upper part of said end piece. When the armature is to be removed, the car is run over a suitable pit and the bolts fastening the upper and lower parts of the frame A together are removed, when the lower portion can be lowered with the armature in place upon it, the upper portion being left resting upon the car-axle and the truck-frame. The flanges *a a* are provided with a dowel or guide-pin and guide-opening, as indicated at *m*, whereby the lower part may be guided into place when it is to be secured to the upper part. As will be seen, the cap I is removable and detachable independently of the lower portion of the end plate or yoke-piece. It is therefore possible to attach the lower part of the yoke-pieces with the armature-shaft in place and fix them in position before applying the cap I to complete the sleeve or journal-bearing around the car-axle. In this way the application of the liners employed is greatly facilitated, and the difficulties which would be experienced if the cap were permanently attached to the lower removable portion of the frame, so that

the two would have to be applied together, are avoidable.

At *i i* are indicated suitable keys, which pass through the end plates or yoke-pieces into the cores of the field-magnets to prevent them from turning so as to displace the pole-pieces with relation to the armature.

It is obvious that the yoke-plates or end pieces might be bisected on a different line, and, as indicated in Fig. 3, that the line might be such as to raise the motor away from the ground, thus giving more clearance between the road-bed and motor.

In Fig. 3 I have shown also a modification of the invention, which consists, essentially, in supporting both parts of the journal-bearing—that is to say, the pillow and the cap for the armature-shaft—upon the lower or detachable portion of the frame. By this construction all of the working or rotating parts and their bearings are removed together when the lower section of the frame is lowered away from the upper section, which rests upon the axle.

Another part of my invention consists in means for protecting the motor from dust, dirt, and water. As before explained, the field-magnet yoke-plates or end pieces being made practically continuous from their edges to the armature-shaft or bearings for the latter close in and protect the armature at its ends. In combination with the yoke-plates or end pieces I use a shield or covering consisting of a thin sheet of wood, iron, or other material, (indicated at R,) which unites said yoke-plates or end pieces and is fastened to the flanges or edges of said plates, as clearly shown, preferably permanently. The shield or cover R completes the casing of the working parts of the motor. It is preferably made in parts secured, respectively, to the two parts or portions of the field-magnet frame, so that the lower portion of the motor-frame with the armature may be removed, as before explained, without disturbing the shield or casing R, which protects the motor from beneath.

To allow ready access to the working parts of the motor—as, for instance, to the commutator-brushes—the casing or shield R is provided at the end with an opening, (indicated by dotted lines at V, Fig. 5,) through which access may be had to such working parts. S indicates a suitable cover-plate which normally covers said opening, but which may be moved to one side when desired. This cover S is preferably made to slide upon the rib T, secured to and projecting from a part of the shield or casing R, secured to the upper portion of the field-magnet frame.

As will be seen by the construction described, I avoid the complications and inconveniences dependent upon the use of pans or shields, which are hung from the motor-truck work and which have to be removed in order to gain access to the motor from beneath. By my invention the shield and detachable portions of the motor are removed together when the two parts of the motor-frame are disconnected from one another. The movable cover-plate S may be mounted or hung in any desired manner and to either portion of the shield or cover R, as will be obvious.

In Fig. 4 I have shown a form which the invention assumes when a motor having six poles is employed. It will be obvious that a motor with eight or any greater number of poles might be similarly constructed and mounted.

What I claim as my invention is—

1. The combination, in an electric-railway motor, of a motor-frame made in two parts, one supported upon the car axle or truck, while the other part supports the armature and is attachable and detachable from beneath the first, so that it may be lowered with the armature, leaving the upper part in place, as and for the purpose described.

2. The combination, in an electric-railway-car motor, of a field-magnet frame made in two parts, the upper portion of which is supported upon the car-axle or truck-frame, while the lower portion is movable downwardly away from the first, and an armature having its lower journal-bearing mounted on the lower movable portion.

3. In an electric-railway-car motor, the combination, substantially as described, of a field-magnet frame divided into two portions, the upper of which is supported upon the top of the car-axle, while the lower is attachable and detachable from the first and may be lowered away from it, and an armature supported on such lower portion.

4. In an electric-railway-car motor, a field-magnet frame made in two parts divided on a horizontal line, one of said parts being mounted upon the car-axle or truck-frame, while the other is attached to the first from beneath and may be lowered away from it, in combination with an armature supported on the lower portion, so as to be movable away from the upper portion without disturbing the mounting of the latter, as and for the purpose described.

5. An electric-railway motor having its armature mounted on suitable journal-bearings carried by a support movable downwardly away from the main portion of the motor without disturbing the latter and provided with suitable means for attaching and detaching it at pleasure, so that the armature may be lowered from its position, leaving a greater or less portion of the field-magnet in place.

6. In an electric-railway-car motor, the combination, substantially as described, of a motor-frame having an end plate or piece made in two parts and sleeved on the car-axle, rods or bars projecting therefrom in a horizontal plane and carrying or supporting the field-magnet poles, and an armature journaled in said end plate or frame and supported by the lower removable portion thereof.

7. In an electric-railway-car motor, the com-

bination, substantially as described, of a field-magnet yoke-piece made in two parts and sleeved on the car-axle and an armature journaled in said yoke-piece and supported on the lower removable portion thereof, as and for the purpose described.

8. In an electric-railway-car motor, the combination, substantially as described, of the two end plates or pieces made in two parts and sleeved on the car-axle, the parallel connecting rods or bars carrying or supporting the field-magnet poles, and an armature journaled in the frame thus constituted and supported by the lower removable portion thereof, as and for the purpose described.

9. In an electric-railway-car motor, the combination, substantially as described, of two field-magnet yoke-pieces made in two parts and sleeved on the car-axle and an armature journaled in said yoke-pieces and supported by the lower removable portion thereof, as and for the purpose described.

10. In an electric-railway-car motor, a multipolar field-magnet having pole-pieces supported on connecting rods or bars between end plates or pieces sleeved on the car axle, in combination with an armature journaled parallel to the car-axle on parts of said end plates detachably secured beneath the parts which rest on the car-axle.

11. In an electric-railway motor, a multipolar field-magnet having yoke-pieces sleeved on the car-axle and connected by field-magnet cores parallel to the car-axle and provided with consequent poles, in combination with an armature journaled on parts of said yoke-pieces detachably secured beneath the parts which rest on the car-axle.

12. In an electric-railway-car motor, a bisected field-magnet frame sleeved on the car-axle, in combination with an armature mounted on said frame parallel to the car-axle and having both parts of its journal-bearing carried by a detachable portion of the frame, as and for the purpose described.

13. In an electric-railway-car motor, a bisected field-magnet yoke-piece sleeved on the car-axle, in combination with an armature mounted on said yoke-piece parallel to the car-axle and having both parts of its journal-bearing carried by a detachable portion of the yoke-piece, as and for the purpose described.

14. In an electric-railway-car motor, the combination, substantially as described, of end plates or pieces of the motor-frame sleeved on the car-axle and having the continuous webs or projecting portions *d*, and an armature having a shaft mounted on said end plates or pieces.

15. In an electric-railway-car motor, a mulpolar field-magnet frame having two parallel end pieces sleeved on the car-axle and made in two parts provided with flanges *a*, in combination with an armature mounted on said end plates on the line of division of said parts.

16. In an electric-railway motor, a field-magnet having two parallel magnetic yoke-pieces sleeved on the car-axle and each made in two parts joined on a horizontal line, in combination with an armature mounted on said yoke-pieces parallel to the car-axle and connecting bars or rods between the end plates carrying pole-pieces and energizing-coils.

17. In an electric-railway-car motor, the combination, substantially as described, of two field-magnet yoke-pieces parallel to one another and each made in two parts, the upper of which is supported on the car-axle independently of the lower, an armature having its lower journal-bearing on the lower portion, and means for detachably fastening the said lower portion to the upper, as and for the purpose described.

18. In an electric-railway motor, the combination, substantially as described, of the bisected field-magnet yoke-pieces having flanges *a* and guide pins or dowels *m*, and an armature parallel to the car-axle and having a journal-bearing on the lower movable portion of said bisected yoke-piece.

19. The combination, in an electric-railway motor, substantially as described, of a bisected frame the upper portion of which has a journal-bearing resting on the car-axle, an armature having the lower part of the journal-bearing for its shaft carried by the movable lower or under portion of the frame, and a journal-bearing cap for the upper portion of the frame attachable and removable from the car-axle independently of the lower portion, as and for the purpose described.

20. In an electric-railway motor, the combination, with parallel end plates or pieces covering the armature at its end and having the connecting bars or rods carrying pole-pieces, of a shield or cover uniting said yoke-pieces and secured to the same, as and for the purpose described.

21. In an electric-railway motor, the combination, with a field-magnet frame made in two parts detachable and attachable in the manner described, of a protecting shield or cover also made in parts secured, respectively, to said parts of the field-magnet frame.

22. In an electric-railway motor, the combination, substantially as described, of the parallel end plates or pieces A, bisected on a horizontal line and having the lower portion attached and detachable from the upper, of an armature mounted on the lower portion and a shield or cover fastened to said lower portion and uniting the portions of said plates at opposite ends of the armature.

23. In an electric-railway motor, the combination, substantially as described, of the motor-frame made in two parts, the upper portion of which is supported on the car-axle, while the under portion carrying the armature is detachable from the former, and a cover or shield made in parts secured, respectively, to said upper and lower portions and having

an opening, as V, provided with a movable cover S, as and for the purpose described.

24. In an electric-railway motor, the combination of the vertical plate or piece A, made in two parts joined on a horizontal line, an armature borne on the lower portion thereof, and a series of rods or bars extending horizontally from said plate and carrying the field-magnet poles of the motor.

Signed at New York, in the county of New York and State of New York, this 14th day of March, A. D. 1891.

CYPRIEN O. MAILLOUX.

Witnesses:
CHARLES HEINECKE,
R. P. SCHULZE.