(No Model.)

C. A. PHILIPSBORN.

CONTACT DEVICE FOR ELECTRIC RAILWAYS.

No. 549,655. Patented Nov. 12, 1895.

Fig. 1.

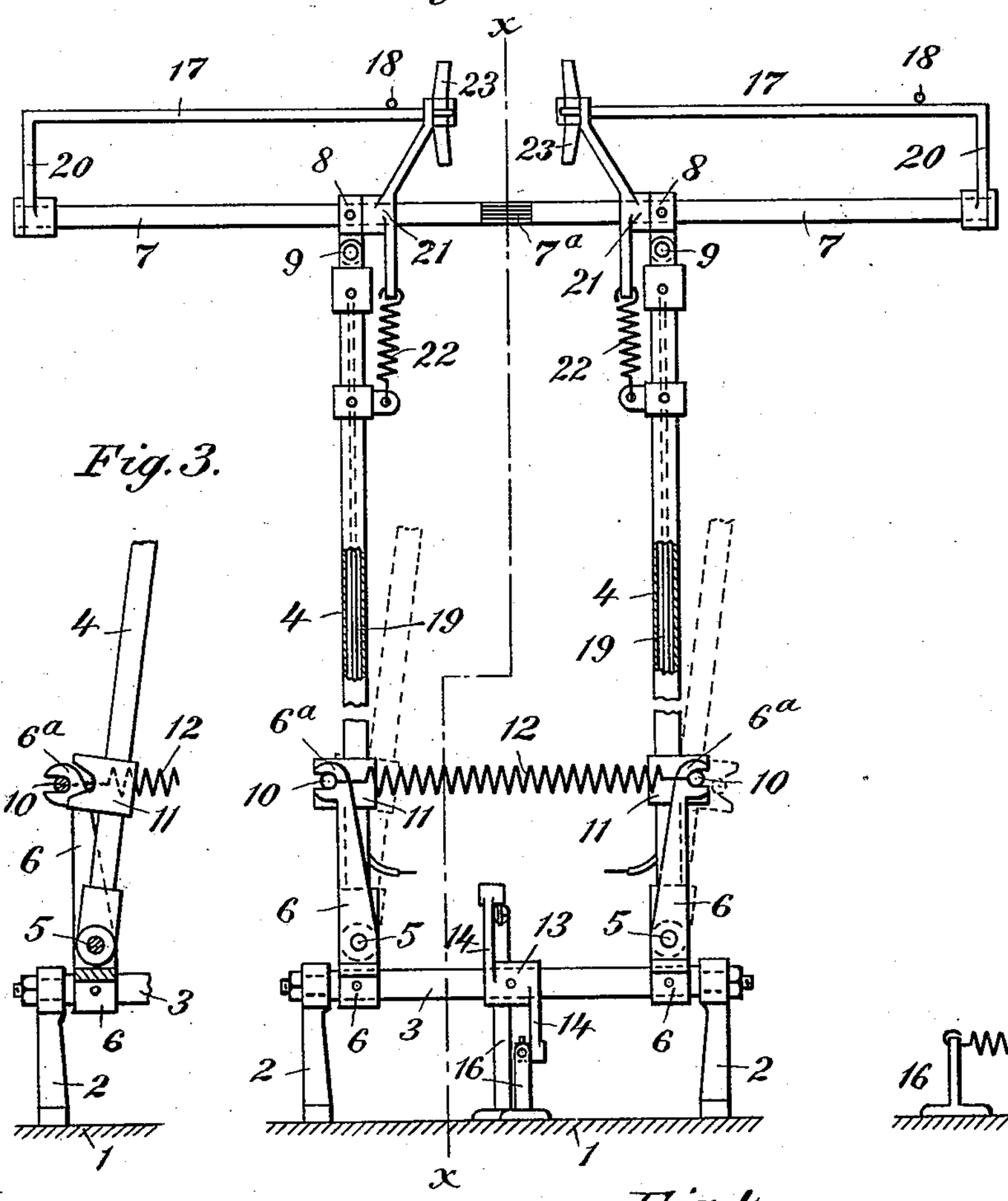


Fig. 2.

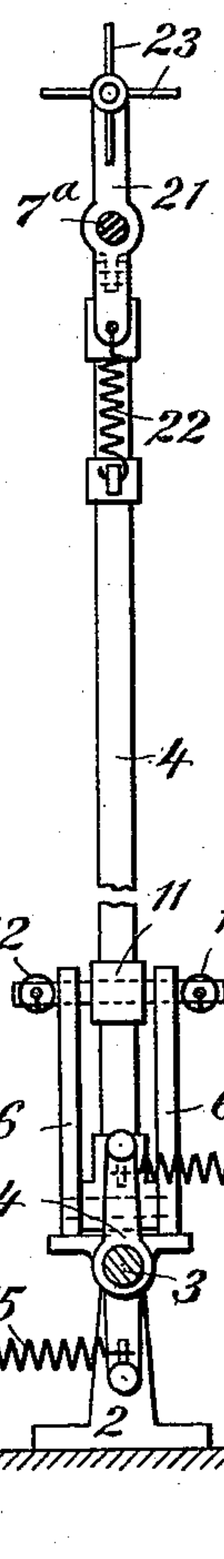
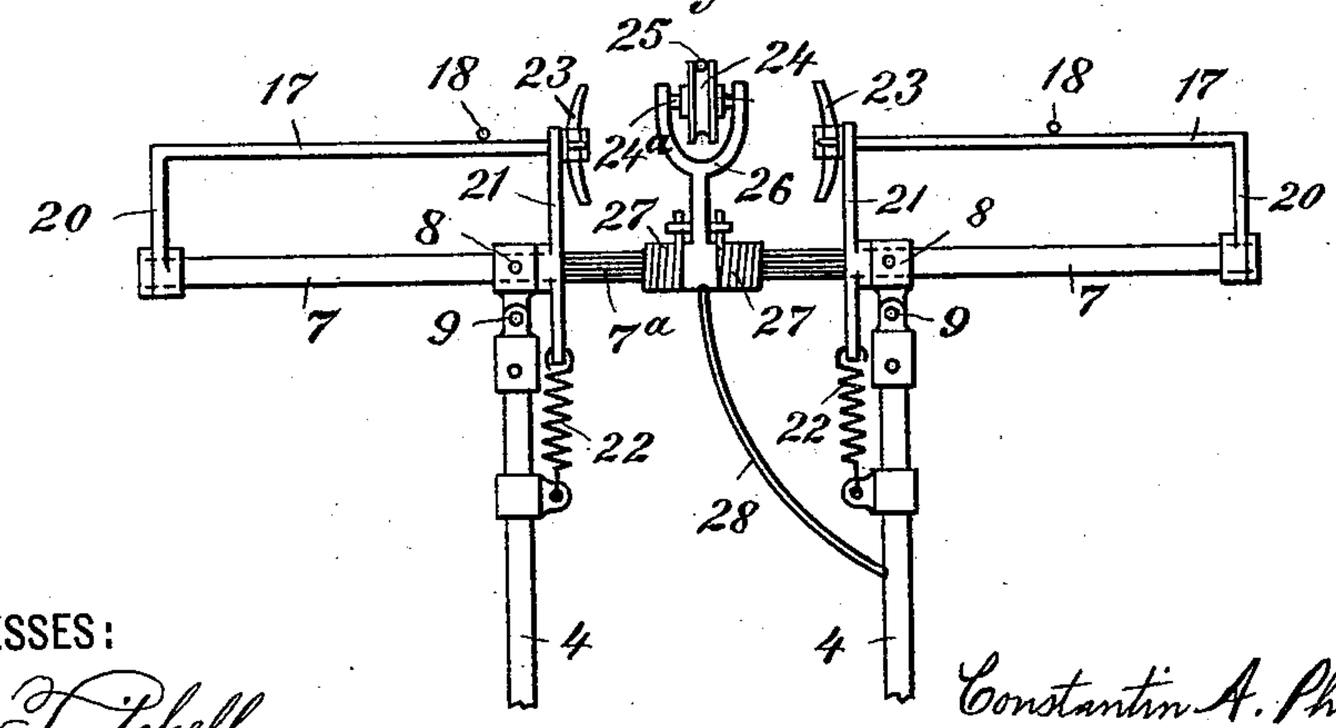


Fig. 3.

Fig. 4.



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CONTACT DEVICE FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 549,655, dated November 12, 1895.

Application filed April 20, 1893. Serial No. 471,173. (No model.)

To all whom it may concern:

Be it known that I, CONSTANTIN ALEXANDER PHILIPSBORN, a subject of the King of Prussia, German Emperor, residing at the city of Berlin, Kingdom of Prussia, German Empire, have invented new and useful Improvements in Contact Devices for Electric Railways, of which the following is a specification.

My invention relates to a contact device or so-called "trolley" more especially adapted for vehicles of electric railways operated by biphase or polyphase currents.

The invention consists generally in a trolley contact device having a contact-carrier (preferably a transverse bar) held to a railway car or vehicle by a support coupled to the carrier and to the car in a manner permitting bodily movement of the support and contact-carrier both longitudinally and transversely of the vehicle and line conductor.

The invention also includes special constructions and combinations, with a support, of two laterally-extended contact-surfaces, preferably having star-wheels at their inner ends to retain the line conductors and permit passage of the contact device at crossings thereof.

A further improvement includes the adaptation of an intermediate revolving contact surface, preferably yielding and having some lateral movement and disposed between the laterally-extended contact-surfaces for operation with a third line conductor.

Various details of construction contribute to the maximum efficiency of the entire contact device.

The invention will first be described, and then will be particularly defined in claims hereinafter set forth.

Reference is to be had to the accompanying drawings, forming part of this specification, and in which similar reference-numerals indicate corresponding parts in the several views.

Figure 1 is a front elevation of one form of my improved contact device as seen from the end of a car or vehicle to which it is attached. Fig. 2 is a side view with parts in vertical section on the line *x x* in Fig. 1. Fig. 3 is a detail sectional front view of a portion of the contact-carrier support and bearings, and Fig. 4 is a detail front elevation illustrating the intermediate revoluble contact acting with a third line conductor.

I describe one preferred adaptation of the invention as follows:

To the roof 1 of a car or vehicle (indicated by light section-lines in Figs. 1, 2, and 3 of the drawings) are fastened suitable bearings 2 2, in which is journaled a transversely-ranging rocking shaft or pivoted standard 3, to which is held one suitable form of support which comprises two parallel bars 4 4, which are pivoted at 5 5 at their lower ends to and between upwardly-projecting pairs of arms forming parts of two stay or brace devices 6 6, which are fixed to the transverse shaft 3. These bars 4 4 support a contact-surface carrier, which, as herein shown, comprises a transverse bar 7, which has fixed couplings 8 8, to which the upper ends of the bars 4 4 are connected by pivots 9 9.

The four pivots 5 5 9 9 range longitudinally or lengthwise of the car or vehicle and as the stays 6 6 are fixed to the transverse rock-shaft 3 the support and contact-surface are free to move both transversely and longitudinally with relation to the car and the line conductor or conductors. The transverse bar has an intermediate insulated portion 7^a, which provides for use on said bar of two or more separate and insulated contact-surfaces, as presently explained.

The term "longitudinal pivotal connection" employed throughout the specification and the claims is used to designate a pivotal connection in which the axis of the pivot extends longitudinally of the car or line of travel, while "transversely-ranging bearing or pivot" is employed to designate a bearing or pivot the axis of which extends in a transverse direction.

I provide means for holding the support yieldingly in position to retain the carrier contact surfaces in operative relation to one or more line conductors, while allowing every necessary lateral or longitudinal movement of the contact device. A preferred means or mechanism for this purpose is shown in the drawings. To permit the lateral movement I employ two tie-rods 10 10, which are adapted

to enter the outwardly-projecting upper forked extremities 6^a of the stays 6, and are adapted also to enter the outer forked portions of bearings 11, fixed to the support-bars 4 4. The outer ends of the tie-rods 10 10 are connected by two springs 12 12, which normally contract, and thus keep the rods within the forked extremities 6^a of the stays and within the forks of the bearings 11 and have a tendency to hold the bars 4 4 in the laterally-upright position shown in full lines in Fig. 1 of the drawings. To the rock-shaft 3 is fixed a collar 13, having opposite radial arms 14 14, to the extremities of which is fixed one end of normally-contracting springs 15 15, the other ends of which are fastened to posts or uprights 16 16, fixed to the car-roof. The draft of the springs 15 tends to hold the supports 4 4 and contact-surface carrier 7 in upright position longitudinally of the car, as shown in Fig. 2 of the drawings.

Should side swaying of the vehicle swing the support and carrier 4 4 7 over toward the right hand, as in partial dotted lines, Fig. 1 of the drawings, the bearing 11 on the right-hand bar 4 carries the right-hand tie-rod 10 out of the forks 6^a of the corresponding stay 6, while the bearing 11 on the left-hand bar 4 is simply drawn over to the right hand and away from the left-hand tie-rod 10, as shown in Fig. 3 of the drawings. Should the support 4 4 7 be swung over toward the left hand, the left-hand tie-rod 10 is carried by the left-hand bar-bearing 11 out of the forks 6^a of the left-hand stay 6, while the right-hand tie-rod 10 remains in the forks of the right-hand stay 6. After lateral movement in either direction the springs 12 restore the support to normal upright position. (Shown in full lines in Fig. 1 of the drawings.) Should the support and contact-carrier swing too far either forward or backward on the transverse shaft 3, as a center of motion, the opposing springs 15 15 will return the parts to the normal upright or any necessary slanting position maintaining contact with the line conductors.

The lateral or transverse movement of the support relatively to the trolley-conductor and the vehicle facilitates the travel of the contacts in rounding curves. Should the trolley-conductor come in contact with one of the star-wheels, the support will yield laterally to permit the contact device to adjust itself to the trolley-conductor. Furthermore, when the car is swinging from side to side a considerable lateral movement of the contact device upon the trolley-conductor would result if the support were maintained rigid laterally; but by mounting the support so that it may partake of a lateral movement the swinging of the car is permitted, while the contact device may make contact with the trolley-conductor without considerable lateral play due to the swinging of the car.

The drawings show one preferred form of contact-surface 17 mounted on the carrier-bar 7. One distinctive feature of these contact-surfaces consists in their laterally-extended form, whereby they will maintain frictional contact with two independent line conductors 18 18, whether they are parallel or not, and also around curves of the road. Each of these contact-surfaces 17 17 is electrically connected to a wire 19, which preferably runs down inside the support-bar 4 and will be connected in any approved manner with the motor on the vehicle to convey current thereto. The insulation 7^a assures conveyance of a distinct or separate current from each line conductor 18 to its respective wire 19 and proper connection to the motor or motors on the vehicle.

Another distinctive feature of the laterally-extended contact-surfaces 17 17 consists in mounting them on the carrier in a manner enabling them to yield bodily to better accommodate themselves to the line conductors. I accomplish this by sustaining the contact-surfaces by end arms, which are pivoted or hung loosely on the transverse bar 7. One of these arms 20 may be an inbent outer end of the contact-surface itself, and the other arm 21 is preferably made separately and has an upper part receiving the inner end of the contact-surface, and also has a pendent portion, to which is connected one end of a contracting spring 22, the other end of which is coupled to the support 4. The springs 22 thus normally hold the contact-surfaces 17 in extended or fully-projected position and also allow them to yield to accommodate vertical irregularities of either or both line conductors.

Another distinctive feature of this part of my invention consists in providing the laterally-extended contact-surfaces, such as 17, each with a star-wheel 23 at its inner end. These star-wheels will rotate and normally prevent inward slipping of the line conductors from the contact-surfaces, while also allowing the conductors to pass safely into the spaces between the star-wheel teeth, and thus allow the contact device to freely pass along at crossings of the conductors. These star-wheel retainers 23 are equally useful with either yielding or rigid laterally-extended contact-surfaces.

As a further improvement I provide a revolving trolley-wheel contact 24 between the two laterally-extended contact-surfaces 17 17 and adapted to a third line conductor 25. (Shown in Fig. 4 of the drawings.) This intermediate revolving contact 24 may be mounted in a rigid arm projected from the insulated part 7^a of the transverse bar 7 or other suitable carrier; but I prefer to mount said contact 24 on a transverse shaft 24^a, on which it may have lateral movement between the arms of a forked bearing 26, which is loosely placed on the carrier at 7^a and is normally held in upright position while being allowed to yield to the conductor 25 by means of springs 27 on the carrier engaging the bearing. The third wire 28 from this intermediate contact-surface extends to and downward

within one of the carrier-supporting rods 4 to make suitable connection with the vehicle-motor. It thus will appear that with the intermediate revoluble contact 24 preferably also having lateral movement and adapted to yield bodily, in connection with the two side laterally-extended and preferably-yielding contact-surfaces 17 17, this trolley contact device is adapted for taking current from either two or three independent line conductors irrespective of lateral or vertical irregularities thereof along all portions of an electric railway and will at the same time allow hanging of conductors from fewer supports at curves of the road, whereas with three rigidly-mounted roller-trolleys, as heretofore employed, such certainty of operation could not be obtained, as no relative movement of the several contact-making devices is permitted.

The details of construction may vary from the drawings and description within the scope of the appended claims, which particularly indicate the latitude of the invention.

I claim as my invention—

1. The combination with a standard pivoted to move in a longitudinal plane, of a support carried upon said standard and mounted to move in a lateral plane, and a contact-carrier provided upon the upper end of said support and capable of movement in a lateral plane; substantially as described.

2. The combination with a standard pivoted to move in a longitudinal plane, of a support carried upon said standard and mounted to move in a lateral plane, a contact-carrier provided upon the upper end of said support and capable of movement in a lateral plane; and means yieldingly holding said support in position to retain the contact-carrier in operative relation to one or more line conductors; substantially as described.

3. The combination with a standard pivoted to move in a longitudinal plane, of a support carried upon said standard and mounted to move in a lateral plane, a contact-carrier provided upon the upper end of said support and capable of movement in a lateral plane, and stays held to said pivoted standard and moving longitudinally with the support, and springs normally drawing the support to said stays while permitting the lateral movement of the support and contact device; substantially as described.

4. The combination with a standard pivoted to move in a longitudinal plane, of a support mounted upon said standard to move laterally, a transverse bar mounted upon the upper end of said support and capable of a longitudinal movement relatively to said support, and a contact-carrier mounted upon said transverse bar and capable of movement longitudinally relatively to the trolley conductor.

5. A contact device for electric railway vehicles, comprising two independent laterally extended contact surfaces adapted to respective line conductors, and means connecting said contact surfaces to the vehicle and permitting their bodily movement both longitudinally and transversely of the conductors.

6. A contact device for electric railway vehicles, comprising two independent laterally extended and yielding contact surfaces adapted to respective line conductors, and means connecting said contact surfaces to the vehicle and permitting bodily movement of said surfaces both longitudinally and transversely of the conductors.

7. A contact device for electric railway vehicles, comprising a transverse bar, two or more insulated contact surfaces held thereto and adapted to respective line conductors, a support pivotally connecting the transverse bar to the vehicle and movable with said bar and its contact surfaces both longitudinally and transversely of the conductors, and means yieldingly holding said support in position to retain the contact surfaces in operative relation to the conductors.

8. A contact device for electric railway vehicles, comprising a transverse bar, two laterally extended contact surfaces held thereto and adapted to respective line conductors, and a support pivotally connecting the transverse bar to the vehicle and movable with the bar both longitudinally and transversely of the conductors.

9. A contact device for electric railway vehicles, comprising a transverse bar, two laterally extended and yielding contact surfaces held thereto and adapted to respective line conductors, and a support pivotally connecting the transverse bar to the vehicle and movable with the bar both longitudinally and transversely of the conductors.

10. A contact device for electric railway vehicles, having two independent laterally extended contact surfaces adapted to respective line conductors, and a star wheel at the inner end of each contact surface.

11. A contact device for electric railway vehicles, having two independent laterally extended and yielding contact surfaces adapted to respective line conductors, and a star wheel at the inner end of each contact surface.

12. A contact device for electric railway vehicles, comprising two independent laterally extended contact surfaces adapted to respective line conductors, a star wheel at the inner end of each contact surface, and means connecting said contact surfaces to the vehicle and permitting bodily movement of said surfaces both longitudinally and transversely of the conductors.

13. A contact device for electric railway vehicles, comprising a transverse bar, two laterally extended contact surfaces held thereto and adapted to respective line conductors, a star wheel at the inner end of each contact surface, a support to one end of which the transverse bar is coupled by a longitudinal pivotal connection, a transversely ranging

rocking bearing on the vehicle and to which bearing the other end of said support is coupled by a longitudinal pivotal connection, and means yieldingly holding said support and transverse bar in position to retain the contact surfaces in operative relation to respective line conductors.

14. A contact device for electric railway vehicles, having two independent laterally extended contact surfaces, and a third intermediate insulated contact surface, each surface adapted to a line conductor.

15. A contact device for electric railway vehicles having two independent laterally extended and independently yielding contact surfaces, and a third intermediate yielding contact surface, each surface adapted to a line conductor.

16. A contact device for electric railway vehicles, having two independent laterally extended non-rotating and yielding contact surfaces, and a third intermediate yielding roller contact surface; each surface adapted to a line conductor.

17. A contact device for electric railway vehicles, having two laterally extended contact surfaces and an intermediate revoluble and laterally movable contact surface, each surface adapted to a line conductor.

18. A contact device for electric railway vehicles, comprising a transverse bar, two laterally extended contact surfaces and an intermediate revoluble contact surface held thereto, and a support yieldingly connecting said transverse bar to a car or vehicle.

19. A contact device for electric railway vehicles, comprising a transverse bar and two laterally extended contact surfaces and an intermediate revoluble and yielding contact surface held thereto, and a support yieldingly connecting said transverse bar to a car or vehicle.

20. A contact device for electric railway vehicles, comprising a transverse bar and two laterally extended contact surfaces and an intermediate revoluble and laterally movable and yielding contact surface held thereto, and a support yieldingly connecting said transverse bar to a car or vehicle.

21. A contact device for electric railway vehicles, comprising a transverse bar, two laterally extended contact surfaces each having a star wheel at its inner end, and an intermediate revoluble contact surface, held to said transverse bar, and a support yieldingly connecting said bar to a car or vehicle.

22. A contact device for electric railway vehicles, comprising a transverse bar and two laterally extended contact surfaces and an intermediate revoluble contact surface held thereto, a support held at one end to said transverse bar by a longitudinal pivotal connection, a transversely ranging rocking bearing on the car or vehicle and to which bearing the other end of said support is coupled by a longitudinal pivotal connection, and means yieldingly holding the support and transverse bar in position to retain the three contact surfaces in operative relation to corresponding line conductors.

23. The combination, in a contact device for electric railway vehicles, of a transverse rock-shaft 3, stay bearings 6 fixed thereto and having forked outer ends 6^a, bars 4, pivoted at 5 in the parts 6 and provided with bearings 11, tie bars 10 adapted to the parts 6^a, 11, springs 12 connecting the tie bars, arms 14, fixed to the shaft 3, springs 15 holding the shaft and connected parts in normal position, a transverse bar 7 having insulation 7^a and pivoted at 9 to the outer ends of the bars 4, and one or more contact surfaces held to said bar 7 and adapted to line conductors.

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

CONSTANTIN ALEXANDER PHILIPSBORN.

Witnesses:
GUSTAV STENZEL,
MAX WAGNER.