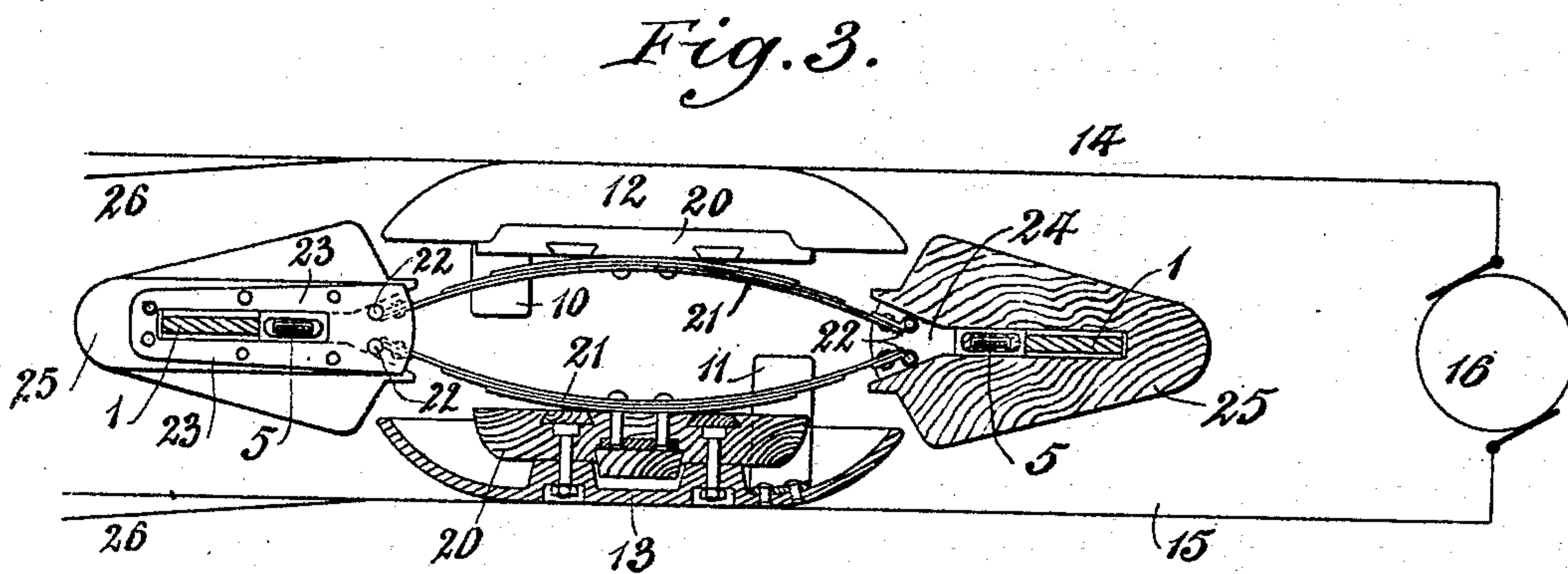
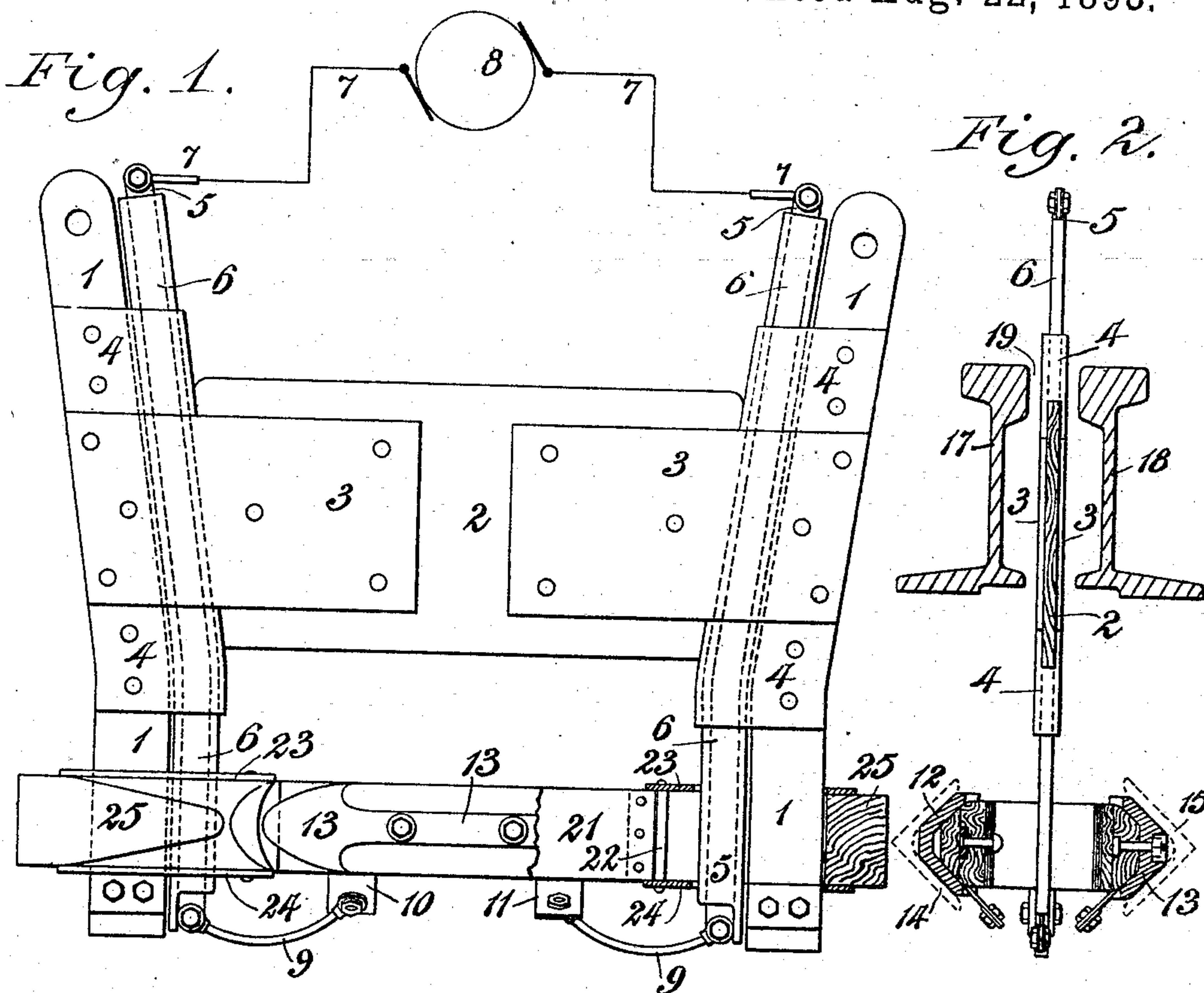


(No Model.)

A. WÖRNER.  
CONTACT FOR CONDUIT ELECTRIC RAILWAYS.

No. 503,710.

Patented Aug. 22, 1893.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

ADOLF WÖRNER, OF BUDA-PESTH, AUSTRIA-HUNGARY, ASSIGNOR TO  
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## CONTACT FOR CONDUIT ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 503,710, dated August 22, 1893.

Application filed May 18, 1893. Serial No. 474,671. (No model.)

*To all whom it may concern:*

Be it known that I, ADOLF WÖRNER, a subject of the Emperor of Germany, residing at the city of Buda-Pesth, in the Empire of Austria-Hungary, have invented new and useful Improvements in Subway-Contacts for Electric Railways, of which the following is a specification.

My invention relates to contacts adapted to subway conduits of electric railways in which the cars or vehicles run either above a subway built or located beneath and between opposite rails of a single track, as instanced by United States Patent No. 478,026, issued June 28, 1892, to C. T. H. Schwieger; or when the subway is arranged below and between the inside rails of two parallel up and down tracks, as shown in the United States Patent No. 486,315, issued to A. W. Wright, November 15, 1892.

The invention has for its object to prevent injury of the conductors which electrically connect the motor on a car or vehicle with the electrical contact ship or traveler device and the main current conduits in the subway, by providing an efficient guard which protects the conductors from abrasion or other injury by preventing rubbing or friction of the conductors against the rails or walls of the slot in the roadway through which the contact frame passes.

A further object of the invention is to construct the contact device in a manner providing for the most free operation of all its parts, by giving some of them relatively independent movements, thus preventing excessive friction and promoting the most effective operation of the entire contact mechanism and the car which carries it.

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 a part of this specification, and in which like numerals indicate similar parts in the several views.

Figure 1 is a side view of the improved device partly in section and with the car or vehicle motor diagrammatically indicated. Fig. 2 is a central transverse vertical section of the contact mechanism and the rails or walls at

the slot of the roadbed, and Fig. 3 is a sectional plan view of the contact ship or traveler device and a diagram of the main current conduits and generator and a switch guide rail in the subway.

My improved contact device is provided with a thin longitudinally ranging frame which is made with two opposite metal end plates 1, 1, which are preferably flared at their longer upper parts, and are rigidly connected by a longitudinal wood plate 2 and oppositely disposed lapping metal tie plates 3, 3, which are riveted to the parts 1, 2, as shown in Fig. 1 of the drawings. Above and below the tie plates 3, 3, are bolted to the end plates 1, 1 the end portions of bent C shaped metal plates 4, 4, which at their inner bends provide room for the reception of the conductors which consist of an interior copper core 5 surrounded, it may be, by a suitable jacket or casing 6 of wood or other insulating material. To the upper ends of the conductors 5, are connected the wires 7, 7, which run to the motor or motors 8 carried by the car or vehicle (not shown), and the lower ends of said conductors are electrically connected by suitable copper or other wires or rods 9, 9 with binding plates 10, 11 fastened to the opposite plates or shoes 12, 13 of the contact ship or traveler device, which are in electrical connection with the opposing conduits 14, 15 of the main line circuit within the subway, and which are supplied with current by any preferred generator or transformer 16. With this construction the contact frame plates 3, 4 effectually protect the conductor 5, 6 (or the conductor 5 should its insulating jacket 6 be dispensed with) against rubbing or abrasion against the opposing edges or faces of the rails or marginal walls 17, 18 between which is formed the roadway slot or slit 19, in which the frame of the contact device travels as the car or vehicle moves along the roadway or tramway.

The contact proper may be called a ship, runner or traveler because of its free travel in the opposing <> shaped conduits 14, 15, shown by dotted lines in Fig. 2 of the drawings. The metal shoes 12, 13 of the ship or traveler have <> forms at their central parts which are respectively fitted for sliding



movement in the conduits 14, 15, and the shoes preferably have outwardly flaring rounded shuttle-like ends, assuring easy travel along the conduits at curves or switches. To the inner face of each shoe 12, 13 is bolted a block 20 of wood or other suitable insulating material, and to these blocks 20 are fastened the middle parts of semi-elliptical springs 21, 21, the opposite ends of which are pivotally connected to four pins 22. The two pins 22, 22 at each end of the spring device 21, 21, are fastened in metal plates 23, 24, which are bolted or screwed to upper and lower faces respectively, of one of the two like wooden tapering heads or prows 25 of the contact ship, each of which has a slot loosely receiving the lower end portions of the frame plate 1 and conductor 5. The plates 23, 24 are slotted to correspond with the inner rectangular portion of the slot of the head 25, and the slots are sufficiently large to allow ample play of the parts 1, 5, 6 or 1, 5 therein while accommodating a lateral movement of either of the elastically held and laterally yielding heads 25, as it strikes curved or angularly disposed portions 26 of the subway conduits 14, 15, while the car travels around a corresponding and more or less sharp curve to either the right or left hand, or while the car takes or leaves a switch of the roadway track, and irrespective of the direction in which the car may be moving. The ship heads 25, in the preferred form, have opposite side parts or walls which diverge rearward or inward from their rounded nose or point, and these side parts are also chamfered or rounded off from the top and bottom to give the tapering heads the best form for running easily in the  $\langle \rangle$  or  $\subset \supset$  shaped subway conduits, when meeting curves or switches thereof corresponding with curves or switches of the roadway or tramway on which the car or vehicle travels. It will be understood that the upper ends of the comparatively light conductors 5, with their insulation 6 have suitable support by or from the upper motor connecting wire 7, and the lower contact connections 9, to sustain said conductors normally about in relative positions shown in Figs. 1 and 2 of the drawings, and that the upper ends of the plates or parts 1, 1, preferably have suitable yielding or flexible connection with the car body (not shown), to cause the entire contact structure to be moved along by and with the car or vehicle as the latter is propelled by the motor 8, from which electric current passes *via* wires 7, conductors 5, connections 9, 10 and 11, and the contact shoes 12, 13 from the positive and negative conduits 14, 15 connected to the source of electric energy 16. It will be noticed that the parts 1 have free vertical play in the heads 25 of the contact device, and the conductors 5, with their insulation 6 are also independently free to slide in the guides 3, 4 on the frame, thereby leaving the contact ship by its shoes 12, 13 free to adjust itself to the main cur-

rent conduits 14, 15, and maintain effective electrical connection therewith, while the yielding connections of the heads 25 allow them lateral play in advance of the shuttle like shoes 12, 13. Hence a perfect contact of the shoes with the conduits 14, 15 is always assured, irrespective of the vertical jolting movements or settling of the car body by the load thereon, or of lack of vertical parallelism between the rails of the roadway on which the car or vehicle travels and the electric conduits 14, 15 of the subway, and whether the car travels on a straight track or takes curves or switches to either the right or left hand.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a subway contact, of a supporting frame, electrical conductors having free vertical movement in said frame, and guards preventing injury to the conductors at the road-way slot, substantially as described.

2. A subway contact having electrical conductors which have free vertical movement in the supporting frame, substantially as described.

3. A subway contact having guards preventing injury to its electric conductors at the roadway slot, said conductors having free play in the frame and having support from the electric connections to the motor and contact ship or traveler, substantially as described.

4. A subway contact having a ship or traveler adapted to opposing electric conduits in the subway and a frame for connection to the car made vertically movable in the ship or traveler, substantially as described.

5. A subway contact having a ship or traveler adapted to opposing electric conduits in the subway, a frame for connection to the car, and electric conductors connecting the ship or traveler and the car or vehicle motor, said frame being vertically movable in the ship or traveler and the conductors being vertically movable in the frame, substantially as described.

6. A subway contact having a ship or traveler provided with opposite shoes having  $\langle \rangle$  cross-sectional form adapted to electrical conduits in the subway, said contact having a frame adapted to sustain it from a car or vehicle and made vertically movable in the ship or traveler, substantially as described.

7. A subway contact having a ship or traveler provided with opposite shoes having  $\langle \rangle$  cross sectional form adapted to electrical conduits in the subway and provided with rounded shuttle-like ends, said contact having a frame adapted to sustain it from a car or vehicle and made vertically movable in the ship or traveler, substantially as described.

8. A subway contact having a ship or traveler provided with opposite shoes having  $\langle \rangle$  cross-sectional form adapted to electrical conduits in the subway, said contact having a frame adapted to sustain it from a car or ve-



hicle, and electric conductors connecting the shoes with the motor on the car, said frame being vertically movable in the ship or traveler and the conductors being vertically movable in the frame, substantially as described.

9. A subway contact having a ship or traveler provided with opposing side shoes, and elastically held yielding insulated heads, substantially as described.

10. A subway contact having a ship or traveler provided with opposing side shoes and elastically held yielding insulated heads to which the ship propelling frame is connected, substantially as described.

11. A subway contact having a ship or traveler provided with opposing side shoes having curved shuttle-like ends, and elastically held yielding insulated heads to which the ship propelling frame is connected, substantially as described.

12. A subway contact having a ship or traveler provided with opposing side shoes having  $<>$  shaped cross-sectional form at the central parts and having curved shuttle-like ends, and elastically held yielding insulated heads to which the ship propelling frame is connected, substantially as described.

13. A subway contact having a ship or traveler provided with opposing side shoes and elastically held yielding insulated tapering heads, substantially as described.

14. A subway contact having a ship or traveler provided with opposing side shoes and elastically held yielding insulated tapering heads to which the ship propelling frame is connected, substantially as described.

15. A subway contact having a ship or traveler provided with opposing side shoes having  $<>$  shaped cross-sectional form at their central parts and having curved shuttle-like ends, and elastically held yielding insulated tapering heads to which the ship propelling frame is connected, substantially as described.

16. A subway contact having a ship or trav-

eler provided with opposing side shoes and elastically held yielding insulated heads, and a frame connecting a car or vehicle to the ship or traveler and made vertically movable in its head, substantially as described.

17. A subway contact having a ship or traveler provided with opposing side shoes having  $<>$  shaped cross-sectional form, and elastically held yielding insulated heads, and a frame connecting the ship or traveler to a car or vehicle and made vertically movable in the traveler, substantially as described.

18. A subway contact having a ship or traveler provided with opposing side shoes adapted to electric conduits in the subway and having elastically held yielding insulated heads, a frame connecting a car or vehicle and the ship or traveler and made vertically movable in the traveler heads, and electric conductors connecting the ship shoes with the car or vehicle motor and made vertically movable in the frame, substantially as described.

19. In a subway contact, the combination with the frame 1, 2, 3, 4 and conductors 5 movable therein, of a contact ship or traveler comprising shoes 12, 13, insulating blocks 20, springs 21, 21, held to said blocks, tapering slotted heads 25 held to the springs and loosely receiving the parts 1, 5; connections 7 between the conductors 5 and the car motor, and connections 9, 10, 11 between the conductors and the contact ship, substantially as described.

20. The contact ship or traveler, comprising shoes 12, 13, insulating blocks 20 thereon, springs 21, 21 on said blocks and tapering heads 25 held to the springs, substantially as described.

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

ADOLF WÖRNER.

Witnesses:

EDWARD KÖNIG,  
JULIUS EDERH.