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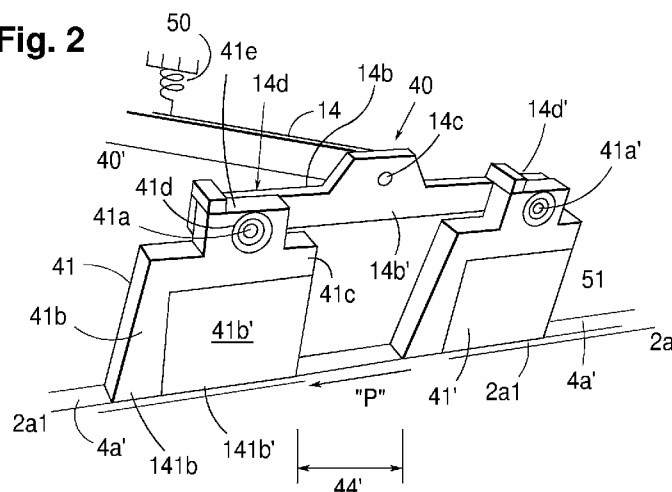
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(54) Title: VEHICLE-RELATED CONTACT MEANS

Fig. 2

(57) Abstract: The present invention comprises a vehicle-related contact means (40) that clears a track (51) introduced in a road section (2a1) and having current-feedable and energizable contact surface(s) (4a') from loose and/or fixed obstacles ("H") and/or is deflectable, which contact means has a contact unit (41, 41'), wherein said contact unit (41) is rotatably attached to a vehicle-associated lever unit (14) and rotatably arranged about a horizontally oriented rotational shaft (41a), so as to, via a collision against a fixed obstacle ("H"), be rotatable from a position co-operating with the contact surface (4a') into a position uncovering the contact surface, and vice versa. Said contact unit (41) is, in a selected direction of travel of the vehicle, formed with, at least, two co-ordinated parts (41b, 41b'), a first part (41b) for a protection of an electrically conducting, second part (41b'), and where the first part (41b) and the second part (41b') are arranged one after the other with an orientation corresponding to the longitudinal extension of the track (51) and contact surface (4a').

5 **VEHICLE-RELATED CONTACT MEANS**

10 ***TECHNICAL FIELD OF THE INVENTION***

The present invention relates generally to a vehicle-related contact means and then more particularly to a contact means that clears a track introduced in a road section and having current-feedable and energizable contact surface(s) from loose and/or fixed obstacles and/or is deflectable, which contact means should serve as an electrical contact or coupling means, usually denominated collector shoe.

Here, it is taught that at least one contact unit associated to the contact means should be rotatably fixed to a vehicle-associated lever unit and with the contact unit and/or the contact means being rotatably arranged about one (or more) horizontally oriented axes of rotation.

This rotatable attachment is required to be able to fold back the contact means and particularly the contact unit thereof upon a collision against a fixed and/or a heavy and big obstacle, so that the contact unit should be rotatable from a position co-operating with the contact surface into a position uncovering from the contact surface and raised above the obstacle, or vice versa.

By the expression "fixed" obstacle, reference is made to an obstacle that has got stuck in a track allocated to the road section and/or an obstacle having a size and a shape that is not easily removable by the contact unit upon a displacement at a vehicle-related speed along the track and the electrical contact surface thereof.

BACKGROUND OF THE INVENTION

Methods, arrangements and designs, related to the above-mentioned technical field and having a function and a nature that meet requirements made, are previously known in several different embodiments.

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As an example of prior art and the technical area to which the invention relates, it may be mentioned a vehicle-related contact means or contact unit that clears a track assigned in a road section and having introduced current-feedable and energizable contact surface(s) from loose and/or fixed obstacles and/or is deflectable, with the contact unit rotatably fixed to a vehicle-associated lever unit and with the contact unit rotatably arranged about a horizontally oriented rotational shaft, so as to allow the contact unit, upon a collision against the obstacle, by the action of the obstacle, to rotate from a position co-operating with the track-assigned contact surface into a position facing and uncovering from the contact surface and oriented above the obstacle, and vice versa.

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An example of such a vehicle-related clearing contact means is disclosed in WO 2011/123051. The clearing contact means is in the form of a collector shoe and comprises an insulating material as well as a lower contact surface composed of an electrical material.

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As a further example of prior art, reference is made to the contents in the International Patent Application WO 2010/140964 A1, where Figure 1A in this patent publication also is inserted in the present application as Figure 1, in order to illustrate in more detail a known system to which the present invention relates.

25

Particularly, in WO 2010/140964 A1, under Figure 5, there are disclosed different designs of vehicle-related contact means adapted to road sections, such as collector shoes or current diverters, and contact surfaces assigned to road sections and/or tracks, in the form of electrically conducting rails with associated contact surfaces, introduced in elongate tracks along the route and roadway of the vehicle.

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Such a collector shoe is adapted to convey electrical energy from vehicle-external contact surfaces allocated to the road section to a vehicle-internal motor, such as a DC motor.

- 5 A more detailed account of the shown and described known system will be made in the following with a reference to Figure 1.

The present invention intends to afford an alternative design of the contact means illustrated here, in the form of a horizontally movable and vertically adjustable collec-
10 tor shoe or current diverter, and its co-operation with a contact surface oriented in a track.

SUMMARY OF THE PRESENT INVENTION

TECHNICAL PROBLEM

- 15 If attention is paid to the circumstance that the technical considerations that a person skilled in the relevant technical field has to make to be able to present a solution to one or more technical problems raised, are, on one hand, initially a necessary understanding of the measures and/or the sequence of measures that have to be taken, and on the other hand a necessary selection of the means that is/are required, then
20 the subsequent technical problems would, in view of this, be relevant in the creation of the present subject matter of invention.

Considering prior art, such as it has been described above, it should, therefore, be seen as a technical problem to be capable of realizing the significance of, the advan-
25 tages associated with, and/or the technical measures and considerations that will be required in order to, in a vehicle-related contact means that clears a track formed in a road section and having current-feedable and energizable contact surface(s) inserted therein from loose and/or fixed obstacles and/or is deflectable, which contact means has a contact unit rotatably attached to a vehicle-associated lever unit and rotatably
30 arranged about at least one horizontally oriented rotational shaft, so as to, by the action of the fixed obstacle, be rotatable from a normal position co-operating with the contact surface and adapted for the current collection into a position uncovering the contact surface and in that connection allow providing a mechanical protection, via a first part, as viewed in the normal direction of travel of the vehicle, that is active dur-

ing the passage of the contact means including the contact unit along the track, and where said protection should be co-ordinated with, such as integrated with, an electrically conducting second part assigned to the contact unit.

- 5 There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow said contact unit, in a selected direction of travel of the vehicle, to be formed with at least two co-ordinated and/or integrated parts, the first part for a protection of the electrically conducting second part, and where the first part and the
10 second part should be oriented one after the other in a selected direction of travel of the vehicle and in an orientation corresponding to the longitudinal extension of the track and contact surface.

- There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be
15 required to allow the first part to be formed as an electrically insulating part.

- There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be
20 required to allow the first, electrically insulating, part to be arranged to partly surround the second, electrically conducting, part and particularly in an extension and in a direction from the contact surface, and in that connection allow having an upper portion (facing away from the contact surface), for a rotatable co-operation with a horizontal rotational shaft.

- 25 There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow the upper portion, adjacent to said rotational shaft, to be adapted to co-operate with a resilient member dimensioned to, by a small spring force, be able
30 to keep the first part and/or the second part within a contact unit in a position co-operating with the contact surface.

There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be

- required to allow the upper portion, within an area above the rotational shaft, to be formed with a first surface, an abutment surface or a support surface, adapted to, during travelling along the contact surface and the track, be able to keep the contact unit in a position co-operating with the track-assigned contact surface, and a second surface, an abutment surface, adapted to serve as a stop for the maximal rotational motion of the contact unit, caused by a collision with the fixed obstacle and out of a co-operation with said contact surface as well as return to an abutment against the first support surface.
- 10 There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow the first and/or the second abutment surface or support surface to be adapted to be able to co-operate with one and the same shoulder-shaped means, directly or indirectly formed into a vehicle-associated lever unit.
- 15 There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow a centre portion of a support lever to the lever unit to be arranged to co-operate with the vehicle-associated lever unit, via a horizontally oriented rotational shaft assigned to the lever unit and/or assigned to the support lever, and where the distal end areas of the support lever both should be adapted to support each a horizontally oriented contact unit-associated rotational shaft, one for each a contact means and/or contact unit.
- 20 There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow the first contact unit-assigned part to be formed from a material that has a lower durability and/or smaller resistance to wear than the material from which the second contact unit-assigned part should be formed, whereby it is ensured that the second part always will be able to abut against the contact surface with electrical contact.
- 25
- 30

There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be

required to allow, facing the contact surface and oriented along the track, a first surface section of the first contact unit-assigned part and a second surface section of the second contact unit-assigned part be mutually assigned a selected length ratio, preferably falling within the range between 0.1 and 0.5, such as about 0.3.

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There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow a contact means, with the associated two contact units thereof and with the respective surface sections thereof, to be separated from each other by a distance along the longitudinally oriented extension of the track and contact surface, and where this distance advantageously can be assigned a selected ratio, related to the longitudinal extension of the contact units and surface sections along the track and along the contact surface, preferably falling within the range between 1.0 and 0.5.

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There is a technical problem to be capable of realizing the significance of, the advantages associated with, and/or the technical measures and considerations that will be required to allow two identical, or at least essentially identical, contact means, with the two deflectable contact units thereof, to be co-ordinated side by side (parallel oriented) for a co-operation with respective contact surfaces assigned a respective one of two parallel tracks.

20

THE SOLUTION

The present invention is defined by the vehicle-related contact means that is stated in the independent claim 1 as well as the independent claim 12. Preferred embodiments are defined in the dependent claims.

25

In that connection, the present invention starts out from the known technique provided by way of introduction, wherein a vehicle-related contact means that clears a track formed in a road section and having introduced current-feedable and energizable contact surface(s) from loose and/or fixed obstacles and/or is deflectable, which contact means has at least one contact unit rotatably attached to a vehicle-associated lever unit and rotatably arranged about a horizontally oriented rotational shaft, so as to allow ... obstacle and during travelling, to

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rotate from a position co-operating with the contact surface into a position uncovering the contact surface, and vice versa.

5 In order to be able to solve one or more of the above-mentioned technical problems, the present invention particularly teaches that the known technique shall be supplemented by allowing said contact unit associated to the contact means, in a selected direction of travel of the vehicle, to be formed with at least two co-ordinated parts, a first part, formed for a protection of an electrically conducting second part, and where the first part and the second part should be oriented one after the other in a selected
10 direction of travel of the vehicle and in an orientation corresponding to the longitudinal extension of the track and contact surface. The first part has an upper portion adapted to a rotatable co-operation with a horizontal rotational shaft. The upper portion, within an area situated above the rotational shaft, is formed with a first abutment surface or support surface, adapted to, during travelling, be able to keep the contact
15 unit in a position co-operating with the contact surface, and a second abutment surface, adapted to serve as a stop for the maximized rotational motion of the contact unit, initiated by a collision with a fixed obstacle, where the spring force should be able to act against (and out of) a co-operation with said first abutment surface.

20 The first abutment surface or support surface and the second abutment surface may both be adapted to co-operate with one or more shoulder-shaped means, directly or indirectly formed into or related to the vehicle-associated lever unit.

As proposed embodiments, falling within the scope of the fundamental idea of the
25 present invention, moreover it is taught that the first part should be formed as an electrically insulating part.

Preferably, the first part should be arranged to partly be able to surround the part of the extension of the second part that is adapted to face away from the contact surface and should, in that connection, present the upper portion adapted to a rotatable
30 co-operation with the horizontal rotational shaft.

Further, it is suggested that the upper portion, adjacent to said rotational shaft, can be adapted to co-operate with the horizontal rotational shaft, ensioned to, by a spring force,

be able to keep and press the first part and the second part during travelling in a position co-operating with the contact surface.

5 An intermediate portion, assigned to the lever unit, for a support lever should be arranged to co-operate with the vehicle-associated lever unit, which by a resilient member should press the contact units against contact surfaces, via a horizontally oriented, vehicle-related rotational shaft assigned to the lever unit and/or assigned to the support lever, and where the distal end areas of the support lever both should be adapted to support each a horizontally oriented contact unit-associated rotational
10 shaft, one for each a contact unit.

The first contact unit-assigned part is preferably formed from a material that has a lower durability and/or resistance to wear than the material from which the second part is formed. In doing so, it is guaranteed that the first part always is worn faster
15 than the second part, wherein the first part always will have a shape that protects the second part and serves its purpose of clearing away obstacles in the track.

The parts – a first surface section of the first contact unit-assigned part and a second surface section of the second contact unit-assigned part – facing the contact surface
20 and oriented along the track may mutually be assigned a certain length-related ratio, such as falling within the range between 0.1 and 0.5, such as about 0.3.

The two contact means with their associated contact units and with their surface sections should be separated from each other by a distance along the longitudinally oriented extension of the track and contact surface, and where this distance should be
25 assigned a ratio, related to the longitudinal extension of the contact units along the track and the contact surface, falling within the range between 1.0 and 0.5.

Two identical, or at least essentially identical, contact means, with the two deflectable
30 contact units thereof, may be co-ordinated side by side (parallel oriented) for a co-operation with respective contact surfaces assigned a respective one of two parallel tracks.

The advantages that foremost may be regarded as characteristic of the present invention and the special significative features provided thereby are that, in this way, conditions have been created in order to, in a vehicle-related contact means that
5 clears a track introduced in a road section and having current-feedable and energizable contact surface(s) from loose and/or fixed obstacles and/or is deflectable, with one of the contact units rotatably attached to a vehicle-associated lever unit and rotatably arranged about a contact means-assigned horizontally oriented rotational shaft, so as to, upon a collision with a fixed obstacle, be rotatable from a position co-
10 operating with the contact surface into a position uncovering the contact surface, or vice versa, and in that connection allow providing a co-ordinated and/or integrated, mechanical protection, related to said contact unit, such as an electrically insulating protection, in the form of a first part, for a (second) electrically conducting part that should be able to afford a current collection from the contact surface.

15 More particularly, the present invention teaches that said contact unit should, in a selected direction of travel of the vehicle, be formed from at least two co-ordinated parts, a first part and a second part, and where the first part and the second part should be oriented one after the other in a selected direction of travel of the vehicle
20 and in an orientation corresponding to the longitudinal extension of the track and contact surface, wherein the first part has an upper portion formed with a surface, a first support surface, adapted to, under a limited spring force, be able to keep the contact unit in a position co-operating electrically and mechanically with the contact surface, and a second surface, an abutment surface, adapted to serve as a stop for the
25 maximized rotational motion of the contact unit out of a co-operation with said contact surface, and the first and the second surface being adapted to co-operate with a shoulder-shaped means formed into said vehicle-associated lever unit.

BRIEF DESCRIPTION OF THE DRAWINGS

30 Prior art and a presently proposed embodiment, having the significative features associated with the invention, will now, for the purpose of exemplifying, be described in more detail with reference to the appended drawing, wherein:

Figure 1 shows, as prior art according to the patent publication WO 2010/140 964 A1, in a perspective view a vehicle, converted for a battery operation by an electrically driven motor, a control circuit controlling the power for a speed regulation corresponding to a current power output, as well as a controlling means,

5 **Figure 2** shows in a perspective view a deflectable contact means and/or contact unit, having a first contact unit and a second contact unit, each one of which provided with a first electrically insulating part and a second electrically conducting part serving as a collector shoe, co-ordinated one after the other in a longitudinal extension assigned to its only track,

10 **Figure 3** shows in a perspective front view the first contact unit in a co-operation with a track and with an electrical contact surface inserted in the bottom of the track, and **Figure 4** shows in a perspective view (according to Figure 2) the deflectable contact units assuming a fully upward and deflected position, because of these contact units during travelling having collided and hit a fixed obstacle, here jammed within the
15 track.

DESCRIPTION OF THE PROPOSED EMBODIMENT

Then, by way of introduction, it should be emphasised that in the subsequent description of a presently proposed embodiment, exhibiting the significant features associated with the invention and being elucidated by the figures illustrated in the subsequent drawings, we have selected terms and a particular terminology with the purpose of, in that connection, first of all allowing to make evident the inventive idea.

However, it should in this connection be taken into consideration that expressions
25 selected here should not be seen as limiting solely to the terms utilized and selected here, but it should be understood that each term accordingly selected should be interpreted so that it, in addition, comprises all technical equivalents that work in the same or essentially the same way, in order to, in this way, be able to achieve the same or essentially the same intention and/or technical effect.

30

Thus, with reference to the appended Figures 1 to 4, not only the features applicable to the present invention are shown schematically and in detail, but likewise the significant peculiarities associated with the invention have been made concrete, by the presently proposed tail in the following.

Accordingly, Figure 1 shows and discloses a known system "S" for an electrically drivable vehicle 1 passing along a route 2 with associated road sections 2a1, 2a, 2a1' in the direction of travel of the vehicle and tracks 51, 52 introduced therein.

5

The system "S" provided here comprises an electrically conducting arrangement (4) that serves as a vehicle-associated collector shoe and is extendably adapted between the vehicle 1 and an energizable first rail or rail section 4a, in a first track or channel 51, and an energizable second rail or rail section 4b, in a second track or
10 channel 52, including an electrically separating insulation 53, oriented in the longitudinal extension of the rails 4a, 4b, such as an electrically insulating canalization 30 having an E-shaped cross-section, in order to form the channels 51, 52 on a respective side of an electrically insulating partition wall 53.

15 The electrically conducting arrangement (4) serving as a collector shoe (in Figure 2, assigned the reference designation 40) is thus adapted vertically adjustable between an electrically drivable vehicle 1 and an energizable "first contact surface" 4a' – related to a route 2 and the individual road sections 2a1', 2a' thereof and allocated to a first road section 2a1' – such as in the form of a first, first rail 42, and an energizable
20 "second contact surface" 4b' – allocated to a second route 2a' – such as in the form of a second, first rail 43, coupled after each other as viewed in a direction of travel of a vehicle and with a "first contact surface" 4a' allocated to the first route 2a1' and "second contact surface" 4b' allocated to the second route 2a', as well as an end-to-end separating and short electrical insulation, such as an electrically insulating "first
25 insulating part", designated 44.

The "first contact surface" 4a', for a first, first rail 42 and the "second contact surface" 4b' coupled after for a second, first rail 43 are both assigned one and the same road section-assigned first channel, in the form of a track 51, in order to be able to allow
30 said collector shoe (4), 40, to pass along the first, first rail 42 and the first road section 2a1' thereof, the electrically insulating and separating part 44 and the second road section thereof as well as the second, first rail 43 coupled after and the third road section 2a' thereof, in order to divert electric power and energy to one or more of the electrically drivable vehicles 1 and their DC motor 5.

Here, the first rail 42 is illustrated to be assigned the first channel or track 51, within the first road section 2a1', and here the second rail 43 is illustrated to be assigned the same channel or track 51, within a second road section 2a'.

5

The first track 51 and the second track 52 may advantageously be adapted to be coordinatable parallel to each other via the canalization 30.

The vehicle 1 is a vehicle drivable by an electric motor.

10

According to the invention the vehicle 1, should then comprise a control equipment or a control unit 3, so that a driver "F" (not shown) can drive and steer his/her vehicle along said route 2 having assigned road sections 2a1, 2a; 2a1', 2a' and a circuit 10 for raising and lowering the control means (4).

15

Then, the proposed system "S" according to the invention should primarily comprise: "a", one or more vehicles 1 drivable via each an electric motor or motors, and where the respective vehicle has a power-control loop "R2", for a provision of a requisite power and/or a speed regulation, and where the requisite power is provided primarily by vehicle-associated rechargeable batteries "II", "B", and "b", a plurality of road sections 2a1, 2a; 2a1', 2a' that can divide the route 2 and each of which assigned one or more electrical stations "s1", "III", in order to, thereby, among other things supplementingly allow charging the batteries "II", "B" of the vehicle.

20

25 The present invention is related to a contact means 40, serving as a collector shoe or current diverter, and said contact means 40 will now be described in more detail with a reference to the embodiment shown in Figures 2, 3 and 4.

30

Figure 2 illustrates a contact means 40 (40'), having two identical deflectable contact units 41, 41', in a position where both co-operate with one and the same track-associated contact surface 4a', Figure 3 illustrates in a perspective front view, as counted in a selected direction of travel, a first deflectable contact unit 41 during its co-operation with the track and the contact surface 4a', and Figure 4 illustrates the two identical deflectable contact units 41, 41' in a position where both, by their dis-

placement motions "P" toward and past a fixed obstacle "H", have rotated toward and into the top position shown here.

A vehicle-related contact means 40 that clears a track 51 introduced in a road section 2a1' and having current-feedable and energizable contact surface(s) 4a' from loose and/or fixed obstacles "H" and/or is deflectable, should, by a first contact unit 41, be rotatably attached to a vehicle-associated lever unit 14 and rotatably arranged about a horizontally oriented rotational shaft 41a, so as to, by the action of the fixed obstacle, "H" be rotatable from a position, according to Figure 2, co-operating with the contact surface 4a' into a position, according to Figure 4, uncovering the contact surface 4a', and vice versa.

Said first contact unit 41 is, in a selected direction of travel "P" of the vehicle, formed with at least two parts 41b, 41b', a first electrically insulating part 41b for a protection of an electrically conducting second part 41b', and where the first part 41b and the second part 41b' are oriented one after the other in a selected direction of travel of the vehicle and in an orientation corresponding to the longitudinal extension of the track 51 and contact surface 4a'.

The first part 41b is thus formed as an electrically insulating part, such as a part formed of plastic materials, and in that connection formed and arranged to only partly be able to surround the extension of the second electrically conducting part 41b', particularly the part that faces away from the contact surface 4a' and has thereby an upper portion 41c for a rotatable co-operation with said rotational shaft 41a.

The upper portion 41c, adjacent to said rotational shaft 41a, is adapted to co-operate with a resilient member 41d dimensioned to be able to keep the contact unit 41 with its first part 41b and its second part 41b' integrated thereto in a position co-operating with the contact surface 4a'. Said resilient member may be dimensioned to, by a limited force, allow pressing the second part 41b' and surface area 141b' thereof down against the contact surface 4a'. Against the action of the resilient member, the contact unit 41 is brought to the position shown in Figure 4 so as to, by the action of the resilient member, rotate back to the position according to Figure 2.

The upper portion 41c, within an area 41e above the rotational shaft 41a, is formed with a first abutment surface or support surface 41f, adapted to be able to keep the contact unit 41 in a position co-operating with the contact surface 4a', and a second abutment surface 41g, adapted to serve as a stop for the maximal rotational motion
5 of the contact unit 41 out of a co-operation with said contact surface 4a', according to Figure 4.

The first 41f and the second abutment surface 41g are adapted to co-operate with a shoulder-shaped means 14a formed into a vehicle-associated lever unit 14 and the
10 support lever 14b thereof.

A centre portion 14b' assigned to the lever unit 14 is arranged to co-operate with the vehicle-associated lever unit 14 via a horizontally oriented rotational shaft 14c, and where the distal end areas 14d, 14d' of the centre portion 14b' of the lever unit are
15 both adapted to support each a horizontally oriented rotational shaft 41a, 41a', one for each a contact unit 41, 41'.

The first part 41b should be formed from a material that has a lower durability and be less wear-resistant than the material from which the second part 41b' is formed.

20 In combination with action from the resilient member 41d, an even wear of the surface sections 141b, 141b' should be accomplishable.

The lever unit 14 may advantageously be pressed downward by a resilient member
25 (not shown) so that the same contact pressure should be realizable for the two contact units (41) and surface sections (141b, 141b').

The lengths facing the contact surface 4a' and oriented along the track 51 of the surface sections 141b, 141b' of the first part 41b and the corresponding of the second
30 part 41b', are mutually assigned a mutually selected ratio, falling within the range between 0.1 and 0.5, such as about 0.3.

The two contact units 41, 41' are separated from each other by a selected distance 44' along the longitudinally oriented extension of the track 51, and where this dis-

tance is assigned a selected ratio, related to the longitudinal extension (141b, + 141b') of the contact units (41) along the track 51 and the contact surface 4a', falling within an area between 1.0 and 0.5.

- 5 Two identical, or at least essentially identical, parallel contact means 40, (40' not shown) having contact units 41, 41' are co-ordinated side by side (parallel oriented) for a co-operation with respective contact surfaces 4a', 4b' assigned a respective one of the two parallel tracks 51, 52.
- 10 The first part 41b may then be formed from a soft carbon material, a soft ceramic material and/or from a soft plastic material, while the second part 41b' then may be formed from an electrically conducting specially treated hard material, such as a carbon material.
- 15 Here, the resilient member 41d is formed into a plane helical shape, such as a helical shape agreeing with an Archimedes' helix.

Figure 3 illustrates an orientation of a contact surface 4a' and a conductor 4c for a zero potential or a protective earth connection, and where the height of the movable
20 contact unit 41 should be smaller than the distance between an upper edge (4a') of the contact surface 4a' and a lower edge 4c' of the conductor 4c and an insulation gap added thereto.

The embodiment described here has turned out to work well upon a collision against
25 a fixed obstacle "H" at a vehicle speed of 100 km/h.

The sides of the contact unit do not need to be electrically insulating if the second part 41b' of the contact unit is assigned a height dimension making that it will not reach up to the lower edge 4c' of a protective cover or conductor 4c when the protec-
30 tive cover is connected to earth potential 4c in order to guarantee personal safety.

By selecting an electrically conducting and/or an electrically insulating material in the first part 41b of the clearing means and an electrically conducting material in the sec-

ond part 41b', said two parts can be secured to each other without requirements of moving by means of spring devices.

5 In case of wear of the surface sections 141b, 141b' of the contact unit 41 upon a displacement along the contact surface 4a', the clearing means and/or the surface section 141b will all the time be worn somewhat more than the surface section 141b' and be worn down by minor particles on the contact surface 4a', and thereby the contact surface 4a' is cleared initially before an electrical contact will occur between the surface section 141b' and the contact surface 4a', and in that connection wear will
10 follow parallel downwardly about the rotational shaft 41a, 41a' and fulfil their different purposes.

A resilient member 50 is adapted to act upon the contact unit (41), or the contact units (41, 41'), toward and into a co-operation with the contact surface 4a' via the surface sections 141b, 141b'.
15

The invention is of course not limited to the embodiment given above as example, but may be subjected to modifications within the scope of the general idea according to the invention, illustrated in the subsequent claims.

20

Particularly, it should be taken into consideration that each unit and/or category shown can be combined with any other unit and/or category shown within the scope in order to be able to attain the desired technical function.

CLAIMS

1. Vehicle-related contact means (40) which clears a track (51) introduced in a road section and having current-feedable and energizable contact surface(s) (4a'),
5 from loose and/or fixed obstacles ("H") and/or which is deflectable, which contact means has a contact unit (41) rotatably attached to a vehicle-associated lever unit (14) and rotatably arranged about a horizontally oriented rotational shaft (41a), so as to, upon a collision against a fixed obstacle ("H") within the track (51), be rotatable from a position co-operating with the contact surface (4a') into a position uncovering
10 the contact surface (4a'), and vice versa, said contact unit (41) being, in a selected direction of travel of the vehicle (1), formed with at least two parts, a first part (41b) arranged for protection of an electrically conducting second part (41b'), and where the first part (41b) and the second part (41b') are oriented one after the other and having an orientation corresponding to the longitudinal extension of the track (51)
15 and the contact surface (4a'), **characterized in that** said first part (41b) has an upper portion (41c) adapted to a rotatable co-operation with said horizontal rotational shaft (41a), the upper portion (41c), within an area (41e) above the rotational shaft (41a), being formed with a surface, a first support surface (41f), adapted to, under a limited spring force, keep the contact unit (41) in a position co-operating electrically and me-
20chanically with the contact surface (4a'), and a second surface, an abutment surface (41g), adapted to serve as a stop for the maximized rotational motion of the contact unit (41, 41') out of a co-operation with said contact surface (4a'), and the first (41f) and the second (41g) surface being adapted to co-operate with a shoulder-shaped means (14a) formed into said vehicle-associated lever unit (14).

25

2. Vehicle-related contact means according to claim 1, **characterized in that** the first part (41b) is formed as an electrically insulating part.

3. Vehicle-related contact means according to claim 1, **characterized in that** the
30 first part (41b) is arranged to partly surround or encompass the extension of the second part (41b'), facing in a direction from a lower surface section (141b') arranged to co-operate with the contact surface (4a').

4. Vehicle-related contact means according to claim 3, **characterized in that** the upper portion (41c), adjacent to said rotational shaft (41a), is adapted to co-operate with a resilient member (41d) dimensioned to, by a small spring force, keep the first part (41b) and the second part (41b') in a position co-operating with the contact surface (4a').
5. Vehicle-related contact means according to claim 1, **characterized in that** a centre portion (14b') of a support lever (14b) assigned to the lever unit (14) is arranged to co-operate with the vehicle-associated lever unit (14) via a horizontally oriented rotational shaft (14c), and where the distal end areas (14d, 14d') of the lever unit are both adapted to support a respective horizontally oriented rotational shaft (41a, 41a') for a respective contact unit (41, 41').
6. Vehicle-related contact means according to claim 1 or 2, **characterized in that** the first part (41b) is formed from a material that has a lower durability and/or resistance to wear than the material from which the second part (41b') is formed.
7. Vehicle-related contact means according to claim 1, **characterized in that** the surface sections (141b, 141b') of the first part (41b) and second part (41b') facing the contact surface (4a') and oriented along the track and the contact surface (4a') are mutually, as regards to their longitudinally oriented extension, assigned a selected ratio, falling within the range between 0.1 and 0.5, such as about 0.3.
8. Vehicle-related contact means according to claim 5, **characterized in that** the two contact units (41, 41') are separated from each other by a selected distance along the longitudinally oriented extension of the track (51), and where this distance (44') is assigned a ratio, related to the longitudinal extension of the contact units along the track (51, 52) and the contact surface (4a'), falling within the range between 1.0 and 0.5.
9. Vehicle-related contact means according to anyone of the preceding claims, **characterized in that** two identical, or at least essentially identical, contact means are co-ordinated side by side for a co-operation with a respective contact surface (4a') assigned a respective one of two parallel tracks (51, 52).

10. Vehicle-related contact means according to claim 4, **characterized in that** the resilient member (41d) is adapted to, by the spring force, again rotate the contact unit (41) for a co-operation with the contact surface (4a').
- 5 11. Vehicle-related contact means according to claim 1 or 5, **characterized in that** a resilient member (50) is adapted to, by a downwardly directed force, press the contact unit (41) or the contact units (41, 41') toward a co-operation with the contact surface (4a').
- 10 12. Vehicle-related contact means (40) which clears a track introduced in a road section and having current-feedable and energizable contact surface(s) (4a'), from loose and/or fixed obstacles ("H") and/or which is deflectable, which contact means has a contact unit (41) rotatably attached to a vehicle-associated lever unit (14) and rotatably arranged about a horizontally oriented rotational shaft (41a), so as to, upon
15 a collision against a fixed obstacle ("H") within the track (51), be rotatable from a position co-operating with the contact surface (4a') into a position uncovering the contact surface (4a'), and vice versa, said contact unit (41) being, in a selected direction of travel of the vehicle (1), formed with at least two parts, a first part (41b) arranged for protection of an electrically conducting second part (41b'), and where the first part
20 (41b) and the second part (41b') are oriented one after the other and having an orientation corresponding to the longitudinal extension of the track (51) and the contact surface (4a'), **characterized in that** said first part is formed from a material that has a lower durability and/or resistance to wear than the material from which the second part is formed.
- 25 13. Vehicle-related contact means according to claim 12, wherein the first part (41b) is formed as an electrically insulating part.

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Fig. 1

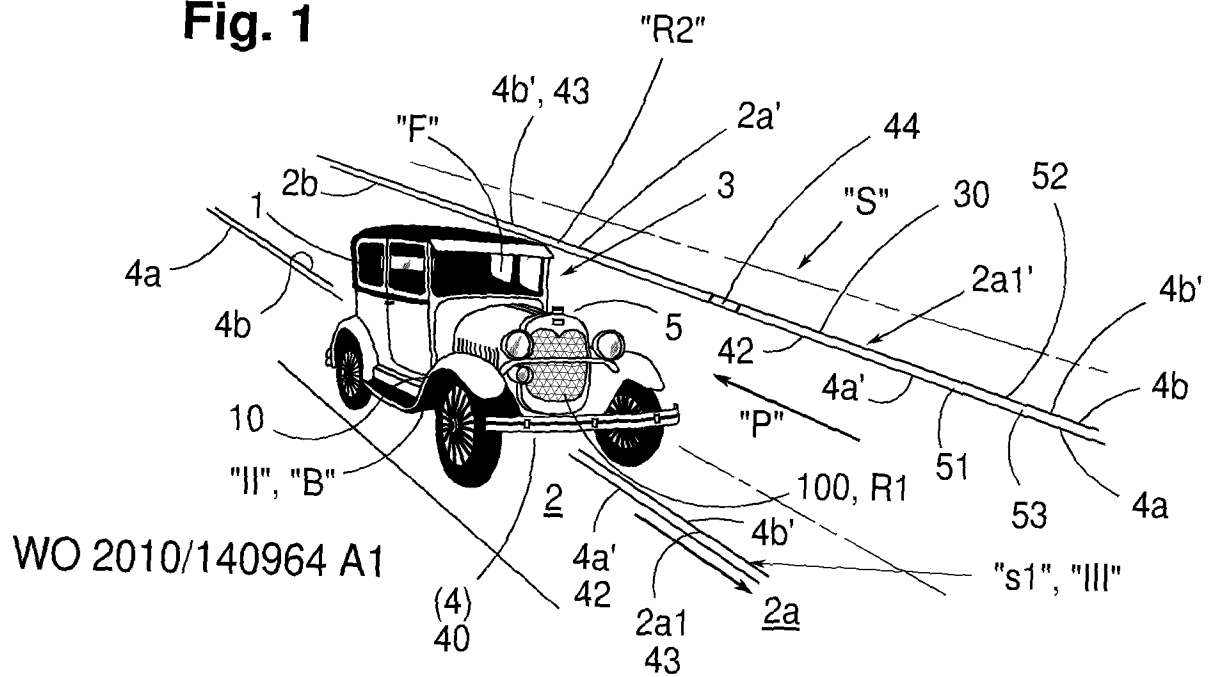
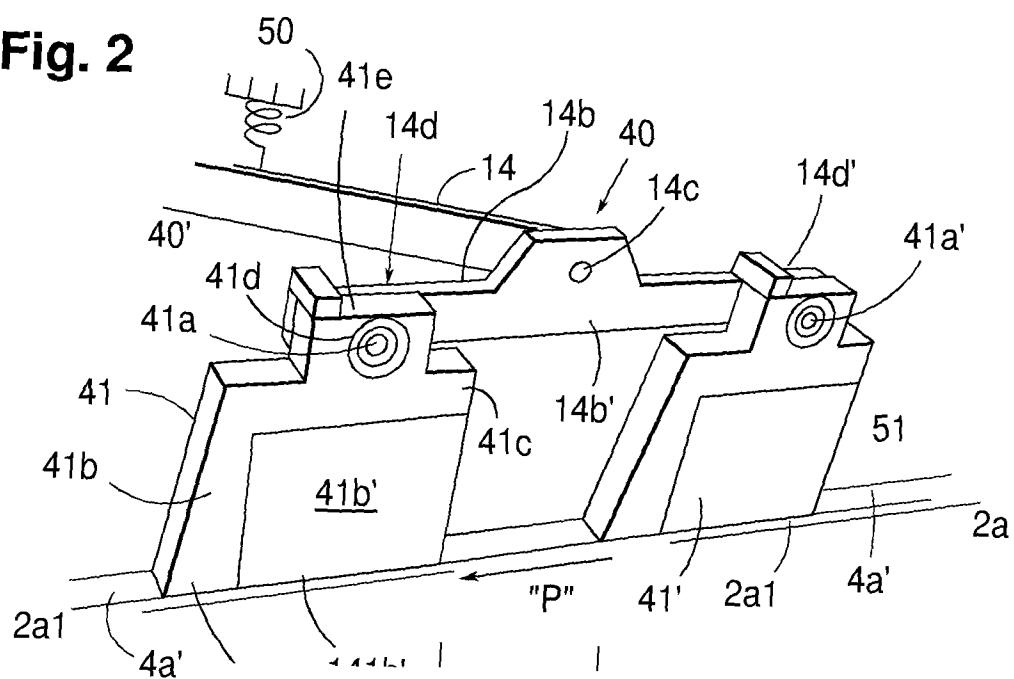


Fig. 2



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Fig. 3

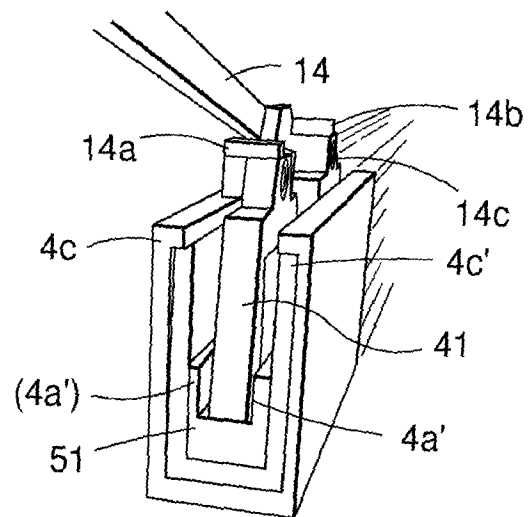
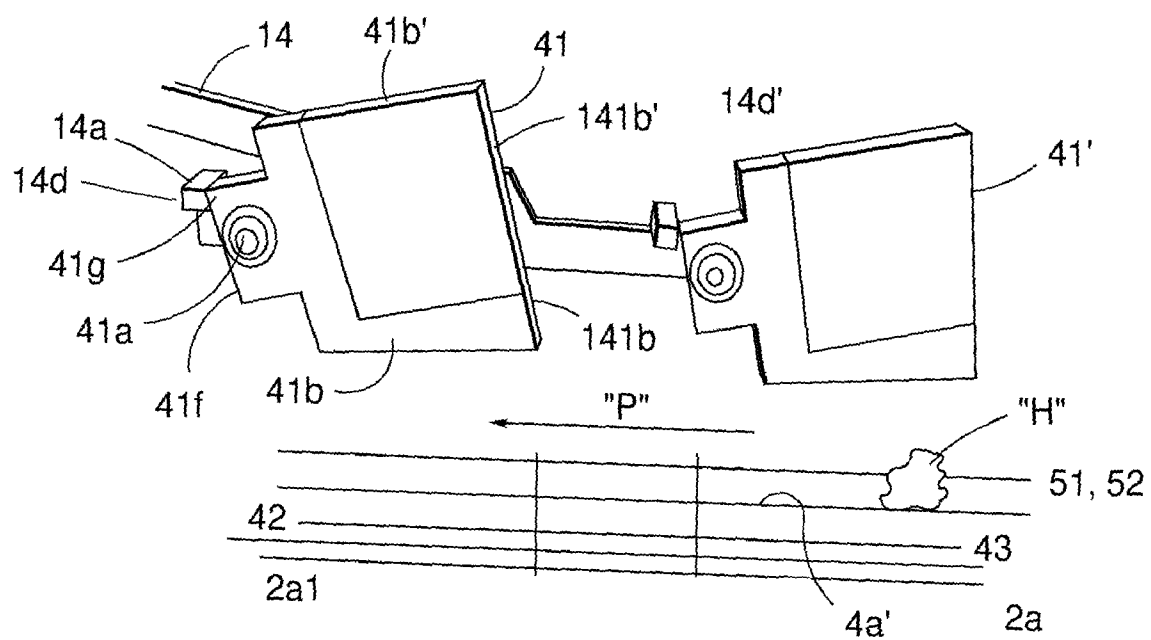


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/050344

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B60L, B60M, E01H, H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 5207608 A (MATSUSHITA ELECTRIC WORKS LTD), 13 August 1993 (1993-08-13); paragraphs [0010]-[0017]; figures 1-4 --	1-13
A	EP 0505845 A1 (UTTSCHIED GEORG), 30 September 1992 (1992-09-30); whole document --	1-13
A	JP 2001128304 A (TOSHIBA CORP), 11 May 2001 (2001-05-11); whole document --	1-13
A	KR 1020050080017 B1 (OK EUN HO), 17 February 2009 (2009-02-17); whole document --	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

19-06-2012

Date of mailing of the international search report

04-07-2012

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2012/050344

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Continuation of: second sheet

International Patent Classification (IPC)

B60L 5/40 (2006.01)

B60L 11/18 (2006.01)

E01H 8/12 (2006.01)

H01R 41/00 (2006.01)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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