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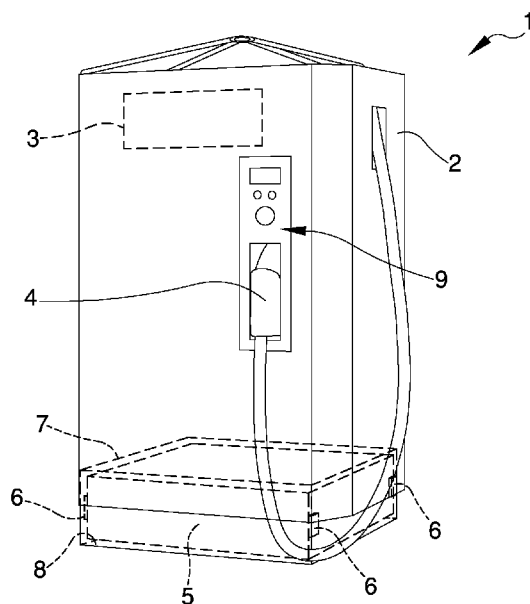
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(54) Title: UPGRADED MOBILE CHARGING STATION

Fig. 1



(57) Abstract: The upgraded mobile charging station (1) comprises a bearing structure (2), an electric charging circuit (3) of the battery of an electric vehicle (V), supported by the bearing structure (2) and having an output connector (4) connectable to the electric vehicle (V), a removable battery pack (5) and coupling/uncoupling means (6) of the removable battery pack (5) which can be positioned in a coupling configuration, wherein the removable battery pack (5) is locked together with the bearing structure (2) and is connected to the electric charging circuit (3), or in an uncoupling configuration, wherein the removable battery pack (5) can be removed from the bearing structure (2).

UPGRADED MOBILE CHARGING STATION

Technical Field

The present invention relates to an upgraded mobile charging station.

Background Art

- 5 The use is well known and increasingly widespread of special stations of different type, shape and size for the electric charging of batteries of electric vehicles.

In particular, with reference to the so-called "car sharing" services of electric vehicles, that is, to all those public or private services that allow for the use of
10 an electric vehicle on booking and paying according to the actual use, the installation is known of charging stations in parking lots or, anyway, in appropriate areas for the picking and delivery of vehicles.

Generally, so-called fixed charging stations are used, i.e. installed in a non-removable way in predefined positions, e.g. in a parking lot, and so-called
15 mobile charging stations, i.e. stations that can be transported and the position of which may vary from time to time, depending on specific needs.

The mobile charging stations, therefore, do without or at least reduce the need for dedicated and specially prepared parking lots.

The mobile charging stations of known type comprise a bearing structure,
20 commonly consisting of an outer container body that substantially extends upwards and inside which are housed the electronics for charging and the battery pack.

Specifically, such electronics comprise a charging circuit connected to the battery pack and having one or more connectors accessible from outside and
25 connectable to an electric vehicle to be charged.

The station electronics, furthermore, comprise a special circuit connectable to an external power line and adapted to manage the charging of the battery inside of the station itself.

Furthermore, the charging stations generally comprise a display for displaying
30 the state of charging and of the internal battery, in addition to any appropriate control pushbuttons.

The mobile charging stations of known type, however, have some drawbacks.

In particular, after the internal battery is depleted, the mobile stations must necessarily be replaced with others having fully charged batteries.

The assigned operators must therefore necessarily move periodically along predefined paths with appropriate motor vehicles, the type e.g. of vans equipped
5 with a lifting arm, so as to replace the depleted stations with fully charged stations.

The motor vehicles used can however be loaded with a limited number of stations, thus requiring a considerable number of motor vehicles along several paths.

10 Furthermore, all depleted stations must necessarily be brought back to one or more collecting centers and, therefore, they are unusable for the time necessary for charging the respective battery packs.

Description of the Invention

The main aim of the present invention is to devise an upgraded mobile charging
15 station that allows to simplify and speed up the transport and charging operations of the stations.

Another object of the present invention is to devise an upgraded mobile charging station having simplified electronics and affordable costs.

The above mentioned objects are achieved by the present upgraded mobile
20 charging station according to the characteristics of claim 1.

Brief Description of the Drawings

Other characteristics and advantages of the present invention will become better evident from the description of a preferred, but not exclusive, embodiment of an upgraded mobile charging station, illustrated by way of an indicative, but non-
25 limiting, example in the accompanying drawings, wherein:

Figure 1 is an axonometric view of an upgraded mobile charging station according to the invention;

Figures 2 to 6 schematically illustrate the replacement of the removable battery pack of a station according to the invention.

Embodiments of the Invention

30

With particular reference to such figures, globally indicated with reference number 1 is an upgraded mobile charging station positionable inside areas

intended for charging electric vehicles.

The station 1 comprises a bearing structure 2 and an electric charging circuit 3 supported by the bearing structure 2 and having at least an output connector 4 connectable to a charging circuit of an electric vehicle.

- 5 Advantageously, the station 1 also comprises at least a removable battery pack 5 and coupling/uncoupling means 6 of the removable battery pack 5.

In particular, these coupling/uncoupling means 6 are positionable:

- in a coupling configuration, wherein the removable battery pack 5 is locked together with the bearing structure 2 and is connected to the electric charging circuit 3, or
- 10 - in an uncoupling configuration, wherein the removable battery pack 5 can be removed from the bearing structure 2.

Advantageously, therefore, once dead, the removable battery pack 5 can be removed from the station 1, thus simplifying and speeding up accordingly the transport and charging operations of the stations.

In fact, this way the transport is no longer necessary of the whole dead stations 1 to a charging center, but it is instead possible to move only the respective removable battery packs 5 for charging.

This way the assigned operators can therefore move by means of a single motor vehicle a large number of removable battery packs 5, allowing a far from negligible reduction in the number of motor vehicles required, with a consequent cost reduction.

Furthermore, the station 1 has simplified electronics and is therefore less expensive than the mobile charging stations of known type.

25 In particular, while the stations of known type have an electric circuit for the charging of electric vehicles and a further electric circuit adapted instead to allow the charging of the internal battery of the station itself at a charging center, the station 1 according to the invention only has the electric charging circuit 3 connectable to an electric vehicle.

30 In fact, the station 1 does not have a further electric circuit for charging the removable battery pack 5, since only the removable battery pack 5 is moved and charged.

With reference to the particular embodiment illustrated in the figures, the bearing structure 2 is composed of a container body which extends substantially upwards and which has a seat 7 for housing the removable battery pack 5.

In particular, the housing seat 7 has an appropriate opening 8 for the insertion
5 and removal of the removable battery pack 5.

Preferably, still with reference to the particular embodiment of the station 1 shown in the figures, the housing seat is formed at a lower portion of the container body 2 and the opening 8 of the housing seat 7 is made substantially at the bottom of the container body itself.

10 Alternative embodiments cannot however be ruled out.

For example, the housing seat 7 for the removable battery pack 5 may be made at the upper portion of the bearing structure 2, while the electric charging circuit may be arranged at the bottom of the bearing structure 2 or, in any case, below the removable battery itself.

15 This way, the removable battery pack 5 may be extracted from an appropriate upper opening formed on the bearing structure 2, without moving the whole station 1. In this case, therefore, the replacement of a dead removable battery pack 5 with a fully charged one would be carried out only by moving the battery packs themselves.

20 Preferably, the station 1 also comprises a hermetic closure element of the opening 8 of the housing seat 7, not shown in the figures, adapted to allow the perfect isolation of the removable battery pack 5 from the external environment once positioned and locked inside the seat 7.

According to a possible embodiment, the coupling/uncoupling means 6
25 comprise one or more grip elements made at one or more portions of said removable battery pack 5 and one or more respective hooks associated with the bearing structure 2 and movable between:

- said uncoupling configuration, wherein each hook is substantially moved away from the respective grip element on the removable battery pack 5,
30 and
- said coupling configuration, wherein each hook is engaged on a respective grip element for the fixing of the removable battery pack 5 to

the bearing structure 2.

Preferably, the movement between the aforementioned uncoupling and coupling configurations is controlled by the same lifting hook of the vehicle V.

In practice, therefore, the lifting hook mounted on the vehicle V is able, with a
5 single mechanical and/or electronic action/procedure, to control the uncoupling of the removable battery pack 5 from the bearing structure 2.

Conveniently, the station 1 can comprise appropriate locking means of the coupling/uncoupling means 6 in the coupling configuration, i.e. when the removable battery pack 5 is fixed to the bearing structure 2, so as to prevent the
10 removable battery pack from being removed by unauthorized people.

In this case, the station 1 can envisage the use of electronic authentication and identification means operatively connected to the locking means and adapted to disable the locking means to allow the movement of the coupling/uncoupling means 6 from the coupling configuration to the uncoupling configuration.

15 Such electronic authentication and identification means may e.g. comprise a radio wave receiving device, the type of a transponder or the like, adapted to receive at least an identification signal sent via an appropriate transmitter by an assigned operator, prior to the removal of the removable battery pack 5.

Preferably, the electric charging circuit 3 also comprises a pair of laminar
20 contacts positioned inside the housing seat 7 and adapted to allow a quick electric connection to the removable battery pack 5. In fact, such contacts are positionable directly in contact with the poles of the removable battery pack 5 once this is arranged inside of said housing seat 7 and is hooked to the bearing structure 2.

25 Different embodiments cannot however be ruled out.

The connection between the electric charging circuit 3 and the removable battery pack 5 can e.g. be carried out by means of contactless coupling means, of the induction type or the like.

In addition, the station comprises a control panel 9, having a display and one or
30 more control pushbuttons.

The use of the station 1 during the replacement of the removable battery pack 5 is described briefly below and is schematically illustrated in figures 2 to 6.

An operator in charge of the replacement of a first removable battery pack 5 first picks the station 1 up with appropriate equipment and places it on the motor vehicle V (Figures 2 and 3).

Next, the operator positions the coupling/uncoupling means 6 from the coupling
5 configuration to the uncoupling configuration. This way the first removable battery pack 5 is disconnected from the container body 2.

The operator then raises the container body 2 with the electric charging circuit 3, and separates it from the first removable battery pack 5, to place it on top of a second removable battery pack 5 (Figures 4 and 5).

10 The operator then positions the coupling/uncoupling means 6 from the uncoupling configuration to the coupling configuration. This way the second removable battery pack 5 is locked together with the container body 2.

At this point, the operator can reposition the station 1 to the location intended for the charging of the electric vehicles (Figure 6).

15 It has in practice been found that the described invention achieves the intended objects.

CLAIMS

- 1) Upgraded mobile charging station (1), comprising at least a bearing structure (2), at least an electric charging circuit (3) of the battery of an electric vehicle (V), said electric charging circuit (3) being supported by said bearing structure (2) and having at least an output connector (4) connectable to said electric vehicle (V), characterized by the fact that it comprises at least a removable battery pack (5) and coupling/uncoupling means (6) of said removable battery pack (5) which can be positioned in a coupling configuration, wherein said removable battery pack (5) is locked together with said bearing structure (2) and is connected to said electric charging circuit (3), or in an uncoupling configuration, wherein said removable battery pack (5) can be removed from said bearing structure (2).
- 2) Station (1) according to claim 1, characterized by the fact that said bearing structure (2) comprises at least an outer container body (2) having at least a housing seat (7) for said removable battery pack (5).
- 3) Station (1) according to one or more of the preceding claims, characterized by the fact that said housing seat (7) has at least an opening (8) for the insertion and removal of said removable battery pack (5).
- 4) Station (1) according to one or more of the preceding claims, characterized by the fact that said housing seat (7) is formed at a substantially lower portion of said container body (2).
- 5) Station (1) according to one or more of the preceding claims, characterized by the fact that said opening (8) of the housing seat (7) is made substantially at the bottom of said container body (2).
- 6) Station (1) according to one or more of the preceding claims, characterized by the fact that it comprises at least a hermetic closure element of said opening (8) of the housing seat (7).
- 7) Station (1) according to one or more of the preceding claims, characterized by the fact that said coupling/uncoupling means (6) comprise at least a grip element made at at least one portion of said removable battery pack (5) and at least one hook associated with said bearing structure (2) and movable between said uncoupling configuration, wherein said hook is substantially moved away

from said grip element, and said coupling configuration, wherein said hook is engaged on said grip element for the fixing of said removable battery pack (5) to said bearing structure (2).

- 8) Station (1) according to one or more of the preceding claims, characterized
5 by the fact that it comprises locking means of said coupling/uncoupling means (6) in said coupling configuration and electronic identification and authentication means which are operatively connected to said locking means and adapted to disable said locking means to allow the movement of said coupling/uncoupling means (6) from said coupling configuration to said
10 uncoupling configuration.

9) Station (1) according to one or more of the preceding claims, characterized by the fact that said electronic identification and authentication means comprise at least a radio wave receiving device adapted to receive at least an identification signal.

- 15 10) Station (1) according to one or more of the preceding claims, characterized by the fact that said electric charging circuit (3) comprises at least a pair of laminar contacts positioned inside said housing seat (7) and in contact with the poles of said removable battery pack (5), when said removable battery pack (5) is arranged inside said housing seat (7) and coupled to said bearing structure (2).

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Fig. 1

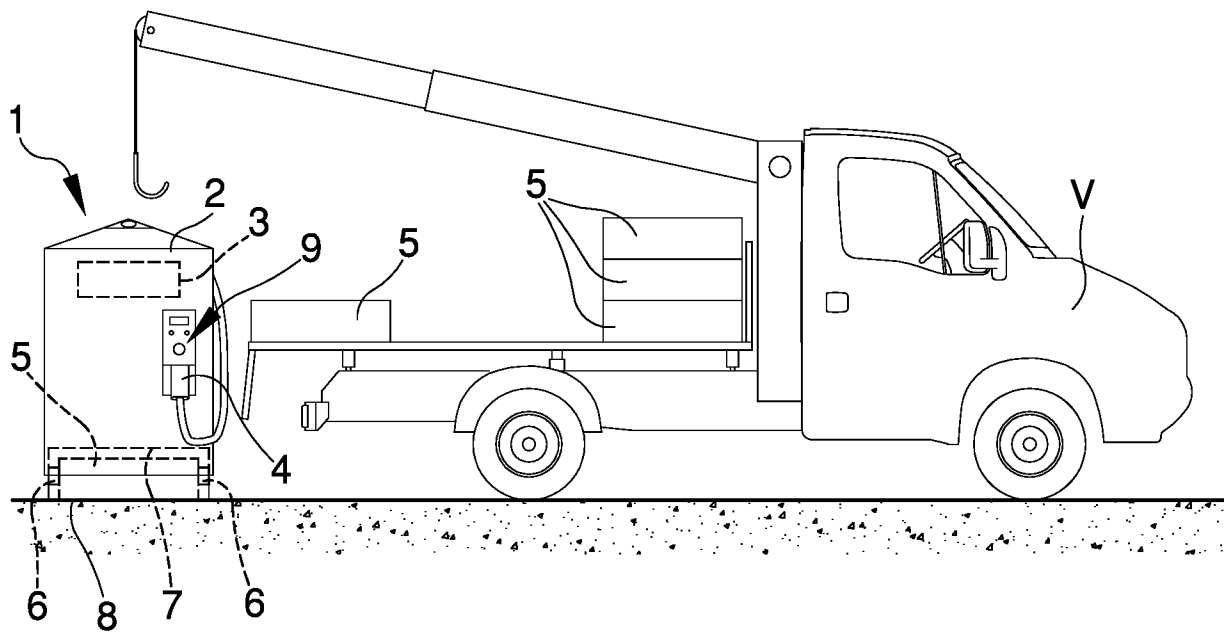
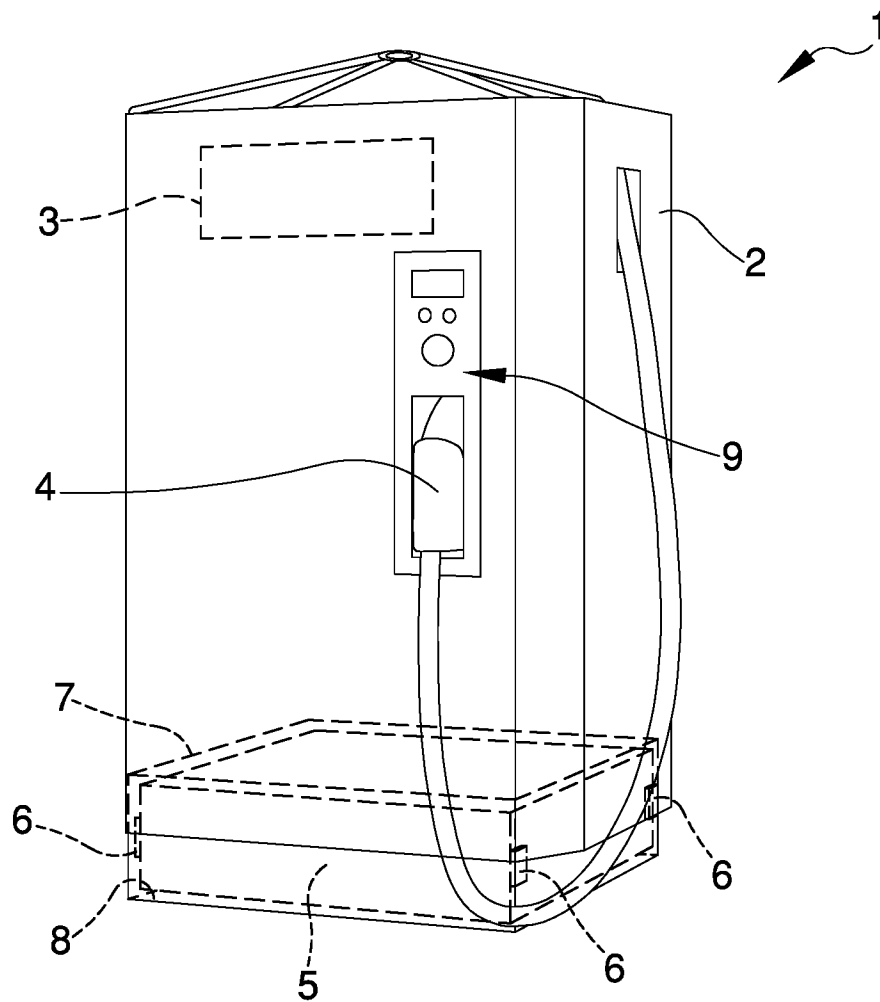


Fig. 2

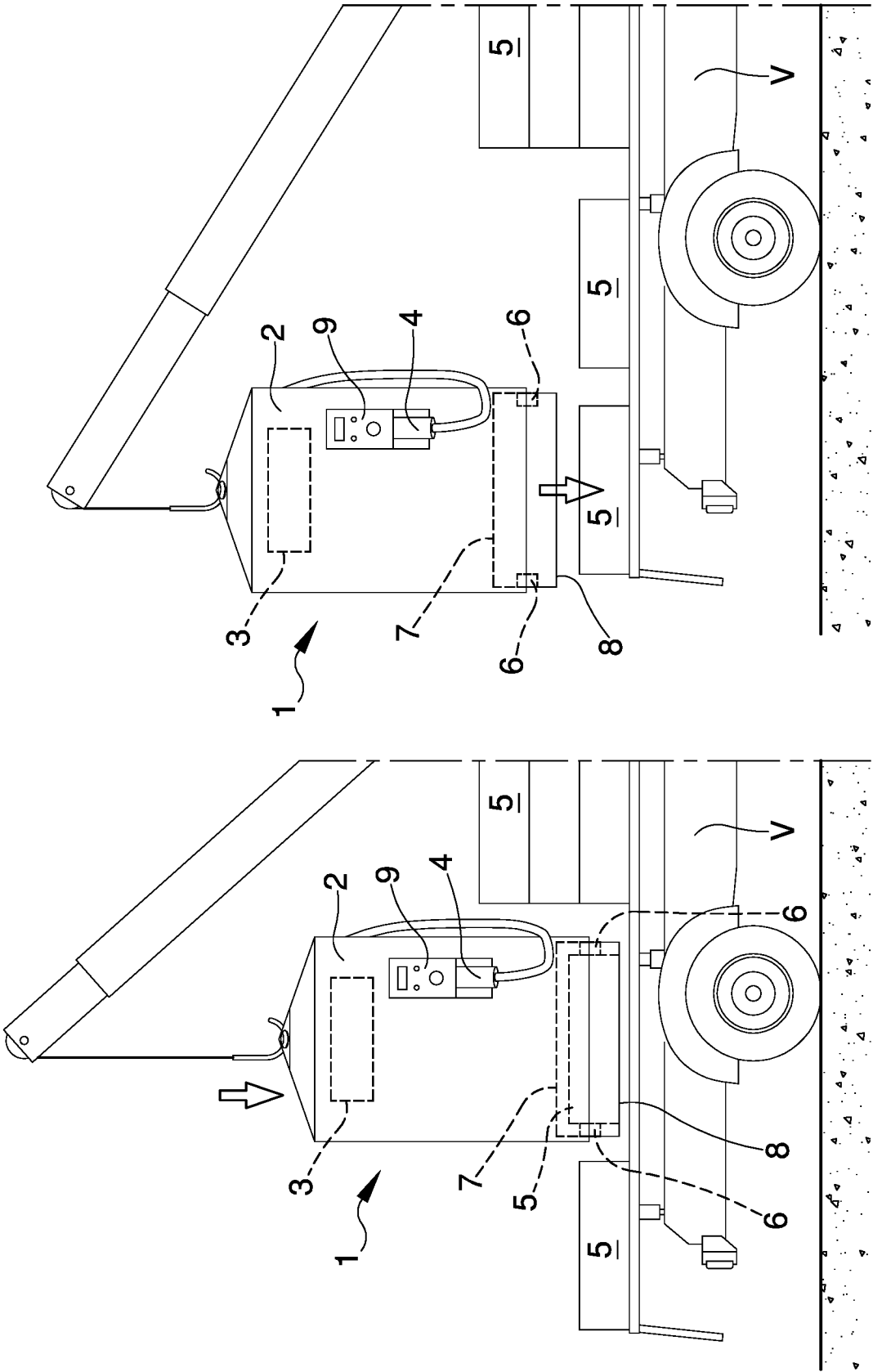


Fig. 4

Fig. 3

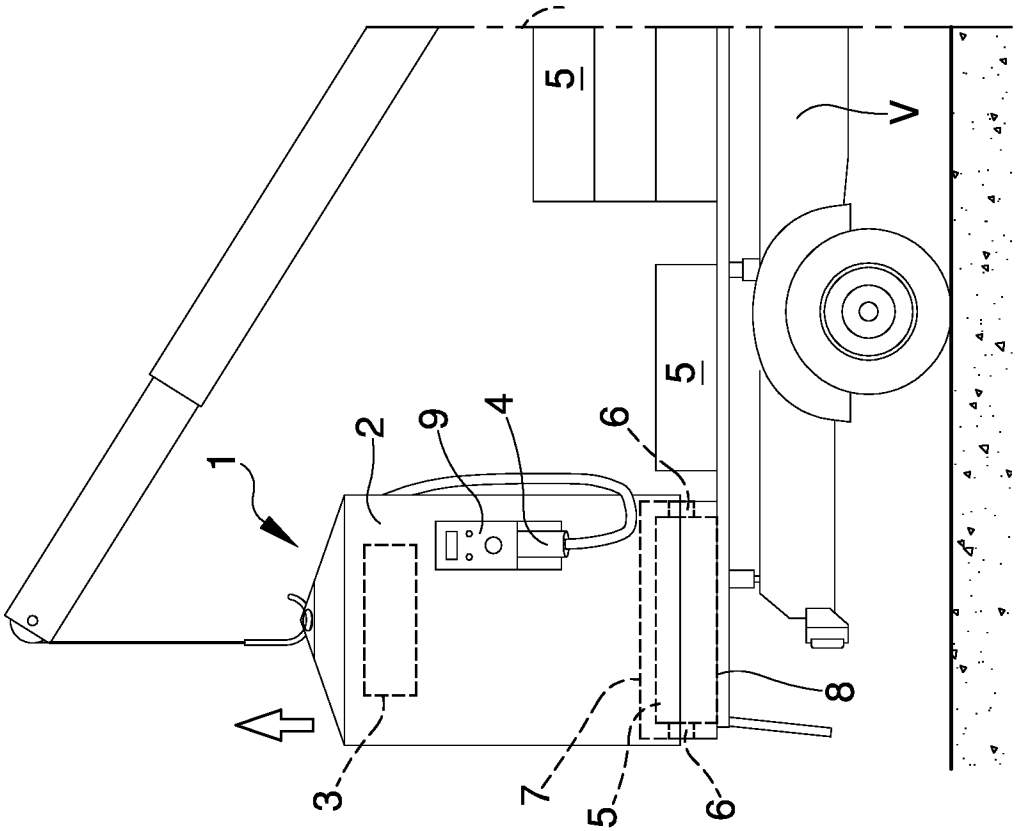


Fig. 5

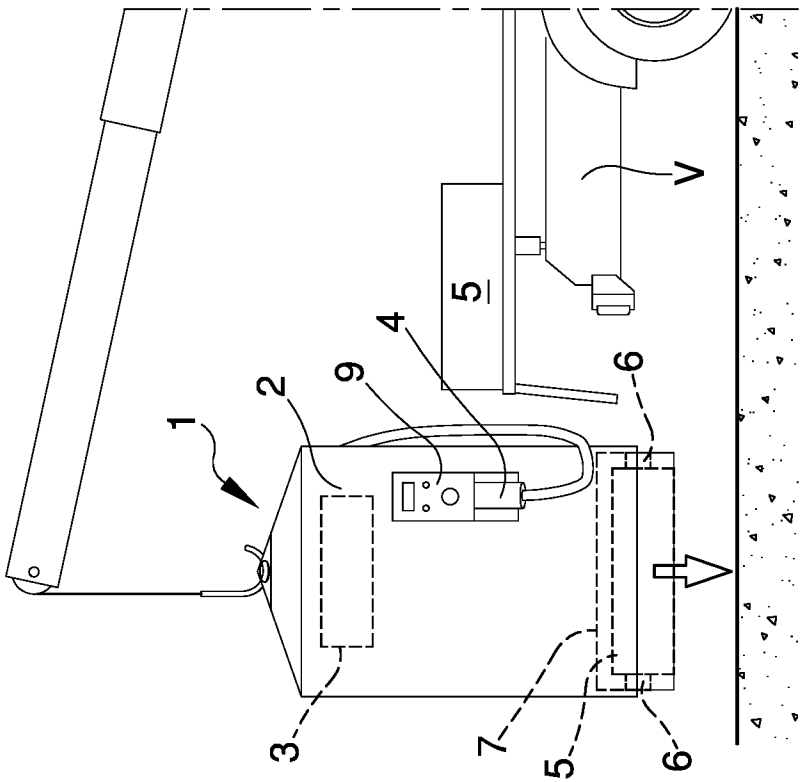


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/053521

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02J7/00
ADD.

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)
H02J

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2015/054460 A1 (EPSTEIN MICHAEL L [US] ET AL) 26 February 2015 (2015-02-26) paragraph [0023] - paragraph [0047]; figure 1	1-10
A	----- EP 2 006 974 A2 (NEC CORP [JP]) 24 December 2008 (2008-12-24) paragraph [0020] - paragraph [0024]; figure 1	1-10
A	----- EP 2 572 923 A2 (HITACHI LTD [JP]) 27 March 2013 (2013-03-27) abstract; figure 1A	1-10
A	----- WO 2011/019855 A1 (AEROVIRONMENT INC [US]; HAYASHIGAWA LARRY [US]; CONVER TIM [US]; MACCR) 17 February 2011 (2011-02-17) abstract; figure 1A -----	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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