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(54) Title: CHARGING STATION FOR ELECTRIC VEHICLES

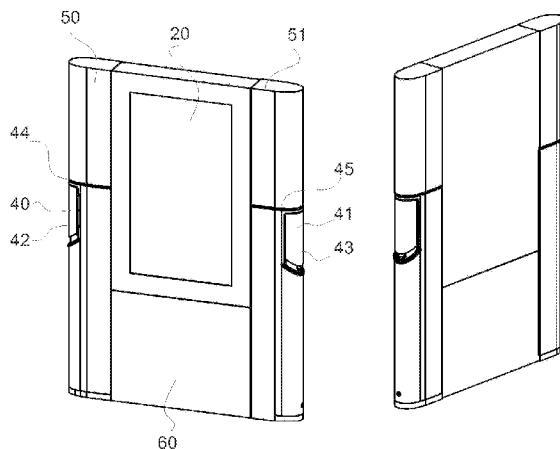


Fig. 1

(57) Abstract: The invention discloses a charging station for an electric vehicle, comprising a first digital signage display (20) capable of displaying an image to an audience. Another aspect of the invention is a computer implemented method, comprising collecting data by a computing device relating to a number of charging stations for an electric vehicle comprising a digital signage display (20).

CHARGING STATION FOR ELECTRIC VEHICLES

FIELD OF THE INVENTION

The invention relates to charging of electric vehicles. More specifically, the invention relates to
5 a charging station for a public parking space.

BACKGROUND OF THE INVENTION

Public parking spaces or car parks are used to occasionally park a car. Car parks must be suitable
10 for all types of automobiles. As electric cars, plug-in vehicles or plug-in hybrid vehicles become more common, they need more convenient places to charge the batteries. Usually the charging period for an electric
15 vehicle is too long to be accomplished during a specific stop-over as with traditional fuel powered vehicles. When the vehicle is being parked for a longer period, the battery may be sufficiently charged.

There is a need to provide a charging station to public parking spaces. However, charging stations
20 for electric vehicles are expensive devices which could make installing a sufficient number of charging stations to a car park economically impossible.

After installing a large amount of charging stations to a car park, the car park could become dif-
25 ficult to manage. Charging stations are traditionally poles standing on the ground. As these are equipped through the car park, cleaning process from debris, sand, litter or removing snow from the area becomes more difficult. As there may be also other standing
30 structures such as advertisements or signboards, the problem is even more difficult.

The purpose of the present invention is to remove or at least alleviate said problems.

SUMMARY

The invention discloses a charging station for an electric vehicle. The charging station comprises a first digital signage display capable of displaying an image to an audience. The audience is able to detect the image from a distance, according to one example, at least from the distance defined by the vehicle to be charged. In other words the image is visible to a spectator located behind a passenger car, at a pavement or to a person driving by the parking space.

In one embodiment a first charging station outlet is configured to the side of the first digital signage display. In one embodiment a second charging station outlet is configured to the side of the first digital signage display and to the opposite side of the first charging station outlet. In one embodiment the charging station comprises a second digital signage display at the opposite side to the first digital signage display. The charging station and the digital signage display are arranged together wherein the charging outlet is at the side of the display unit. Different configurations are possible, with charging outlet arranged on either one or both sides; or the display unit only on one side or on both sides.

In one embodiment the charging station outlet is part of a charging station module. The charging station module comprises a filler piece corresponding to the profile of the charging station module, and the height of the filler piece corresponds to the height of the digital signage display structure. In one embodiment the height of the filler piece corresponds to the height of the digital signage display structure. The form factor of the installation is simple, providing clean lines. Such form is easy to keep clean, which is very important for public structure.

In one embodiment the digital signage display comprises opening at the side for cooling the display

by removing hot air from inside the display to the charging station module. Different embodiments for placing the opening are at one side or both sides of the display assembly, at the same side as the display, at the same side as both displays or at the opposite side to the display. The charging station module comprises a cooling system, which in one example comprises openings at the filler piece. Digital signage displays may have high operating temperatures and removing the temperature from the display structure is very important.

In one embodiment the charging station comprises at least one apparatus of the group of: a mobile base station, a weather station, a camera or a touch screen interface. The charging station that has a digital signage display can be used as an information center, for example a city may provide interactive information to tourists.

Another aspect of the invention is a computer-implemented method, comprising collecting data by a computing device relating to a number of charging stations for an electric vehicle comprising a digital signage display. One embodiment comprises calculating, by a computing device, a fee based on the number of digital signage displays. One embodiment comprises calculating a fee based on the number of active digital signage displays. Service providers offering content platforms such as digital signage displays may use the number of displays combined with charging stations for electric vehicles as the basis of charging. Similarly, the cost of the charging station may be compensated by the fees collected from the advertising space provided by the digital signage display. The charging stations as such may be very expensive regarding the repayment period of the original investment. The combination of charging stations and digital signage displays lowers the cost of charging stations,

as the advertising space and corresponding rewards reduce the repayment period.

Another aspect of the invention is a business method, comprising collecting payment for an advertisement displayed on the digital signage display comprising a charging station for an electric vehicle and funding the installation of the charging station with the payment received from the advertising. The installation may be executed by an advertising company that gains revenues from the advertising space. The electric energy supplied from the charging station may be invoiced from the user of the charging station or the electric energy may be supplied free of charge, wherein the funding is received from the advertising.

The invention also improves the utilization of terrain in the parking areas, as the combination of displays and charging stations reduces the numbers of objects mounted on the ground. Both elements, the displays and the charging stations share the power feed. This makes the installing easier as this requires less planning for routing the cables. Retrofitting to existing digital signage displays is possible without tearing off the asphalt.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

Figs. 1-4 are exemplary illustrations of a charging station according to the invention with different display and charging module configurations.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

5 Figure 1 is an example of a charging station arrangement according to the invention. The digital signage display 2 is arranged between two charging station outlets 40, 41. Outlets 40, 41 are configured to the charging station modules 10, 11. In this example outlets 40, 41 are covered with hatches 42, 43. 10 The charging station outlets 40, 41 may be configured with or without the hatch. With the lockable hatch, the technology of the charging station is also protected from weather damage and vandalism. The charging 15 cable may be fixed to the charging station or the cable may be provided separately. In one alternative solution the charging is arranged by induction.

Examples of the charging station outlet are a Model single-phase socket (16 A), a Mode3 connector (3 20 x 32 A) complying with the IEC standard, or both, underneath an electrically locking protective hatch. After the charging has ended, a local display under the hatch 42 reports the amount of energy supplied. The digital signage display 20 may be used to provide this 25 information, for example by assigning a small portion of the display for the usage of the charging station.

On top of the hatches 40, 41 are illuminating elements 44 for informing the status of the charging station or the charging process. Illuminating elements 30 44 may be implemented by LED (Light Emitting Diode) lights. In one example a three-color LED indicator 44 shows the station's charging status or any error situations.

In one example the charging station modules 35 10, 11 comprise on top of the illuminating elements 44 filler pieces 50, 51. Filler pieces 50, 51 are arranged to match the profiles of charging stations 10,

11. In one example the filler piece 50, 51 matches the height of the digital signage display structure 20.

The digital signage display 20 has openings on the side of the structure for cooling the display. Hot air is transferred from the digital signage display structure 20 either to one charging station module 10 or to both sides 10, 11. Displays 20 are known to generate a lot of heat. The charging station module 10, 11 has openings for removing the hot air transferred from the display 20. Openings may be arranged on the filler piece 50, 51. The charging station module 10, 11 may also comprise a fan to boost the heat transfer out of the structure.

Different combinations of charging stations and displays are illustrated in Figures 1 to 4. Figures include two separate views from different angles showing both sides of the same installation. Figure 1 illustrates a configuration in which the digital signage display is only on one side of the structure and charging station modules are on both sides of the display. Figure 2 illustrates a configuration in which the digital signage displays are on both sides of the structure and charging station modules are on both sides of the display. Figure 3 illustrates a configuration with the digital signage display on both sides of the structure and the charging station module only on one side of the display. Figure 4 illustrates a configuration with the digital signage display on one side of the structure and the charging station module on one side of the display. For the combinations lacking the second charging station module, the filler piece may be extended from ground to top, enabling a later fitting of a second charging station module. Different configurations may be utilized based on the visibility of the display or the location of parking space. Also traditional charging poles without the digital signage display may be used within the same

car park. Traditional charging poles may utilize the information infrastructure provided by the digital signage displays.

The control electronics and the common power
5 feed to the display 20 and the charging station 40, 41 are arranged to the display stand 60. The control electronics may comprise a computer or programmable logic to enable several functions. Such functions may be specific to the display 20 or to the charging sta-
10 tion 40, 41. Some functions may be common to both elements. For example charging or billing information may be presented on the digital signage display. Only a portion of the digital signage display area may be assigned to functions related to charging a vehicle. Ex-
15 amples of common functions are billing information, presenting information related to billing or charging as QR codes or similar barcodes, linking the charging procedure to a backend system via mobile phone.

A general purpose computer, being one example
20 of a computing device, may be used to collect data from the charging stations that are combined with digital signage displays. The data may comprise the number of such installations, the number of active installations or the usage rate of each installation.
25 The data may be retrieved from the backend system or directly from the charging stations. The number of installations may be used to calculate the fee for the content provider or the provider of the advertising space. Fees collected in this manner may be used to
30 cover the costs of maintaining the charging stations and the display.

Embodiments of the present invention may be implemented in software, hardware, application logic or a combination of software, hardware and application
35 logic. In an example embodiment, the application logic, software or instruction set is maintained on any one of various conventional computer-readable media.

In the context of this document, a "computer-readable medium" may be any media or means that can contain, store, communicate, propagate or transport the instructions for use by or in connection with an instruction execution system, apparatus, or device, such as a computer. A computer-readable medium may comprise a computer-readable storage medium that may be any media or means that can contain or store the instructions for use by or in connection with an instruction execution system, apparatus, or device, such as a computer. The exemplary embodiments can store information relating to various processes described herein. This information can be stored in one or more memories, such as a hard disk, optical disk, magneto-optical disk, RAM, and the like. One or more databases can store the information used to implement the exemplary embodiments of the present inventions. The databases can be organized using data structures (e.g., records, tables, arrays, fields, graphs, trees, lists, and the like) included in one or more memories or storage devices listed herein. The processes described with respect to the exemplary embodiments can include appropriate data structures for storing data collected and/or generated by the processes of the devices and subsystems of the exemplary embodiments in one or more databases.

All or a portion of the exemplary embodiments can be conveniently implemented using one or more general purpose processors, microprocessors, digital signal processors, micro-controllers, and the like, programmed according to the teachings of the exemplary embodiments of the present inventions, as will be appreciated by those skilled in the computer and/or software art(s). Appropriate software can be readily prepared by programmers of ordinary skill based on the teachings of the exemplary embodiments, as will be appreciated by those skilled in the software art. In ad-

dition, the exemplary embodiments can be implemented by the preparation of application-specific integrated circuits or by interconnecting an appropriate network of conventional component circuits, as will be appreciated by those skilled in the electrical art(s).
5 Thus, the exemplary embodiments are not limited to any specific combination of hardware and/or software.

If desired, the different functions discussed herein may be performed in a different order and/or
10 concurrently with each other.

Furthermore, if desired, one or more of the above-described functions may be optional or may be combined. Although various aspects of the invention are set out in the independent claims, other aspects
15 of the invention comprise other combinations of features from the described embodiments and/or the dependent claims with the features of the independent claims, and not solely the combinations explicitly set out in the claims.

20 It is obvious to a person skilled in the art that with the advancement of technology, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not limited to the examples described above; instead they
25 may vary within the scope of the claims.

CLAIMS

1. A charging station for an electric vehicle, characterized in that the charging station comprises a first digital signage display capable
5 of displaying an image to an audience.

2. The charging station according to claim 1, characterized in that a first charging station outlet is configured to the side of the first
10 digital signage display.

3. The charging station according to claim 1, characterized in that a second charging station outlet is configured to the side of the first
15 digital signage display and to the opposite side of the first charging station outlet.

4. The charging station according to claim 1, characterized in that the charging station
20 comprises a second digital signage display at the opposite side to the first digital signage display.

5. The charging station according to claim 1, characterized in that the charging station
25 outlet is part of a charging station module; and the charging station module comprises a filler piece corresponding to the profile of the charging station module; and the height of the filler piece corresponds to the height of the digital signage display structure.
30

6. The charging station according to claim 5, characterized in that the height of the filler piece corresponds to the height of the digital
35 signage display structure.

7. The charging station according to claim 5, characterized in that the digital signage display comprises opening at the side for cooling the

display by removing hot air from inside the display to the charging station module; and the charging station module comprises a cooling system.

5 8. The charging station according to claim 5, characterized in that the cooling system comprises openings at the filler piece.

10 9. The charging station according to claim 1, characterized in that the charging station comprises at least one of the group of: a mobile base station, a weather station, a camera or a touch screen interface.

15 10. A computer-implemented method, comprising collecting data by a computing device relating to a number of charging stations for an electric vehicle comprising a digital signage display.

20 11. A method according to claim 9, comprising calculating, by a computing device, a fee based on the number of digital signage displays.

25 12. A method according to claim 10, comprising calculating a fee based on the number of active digital signage displays.

30 13. A business method, comprising collecting payment for an advertisement displayed on the digital signage display comprising a charging station for an electric vehicle and funding the installation of the charging station with the payment received from the advertising.

35

1/4

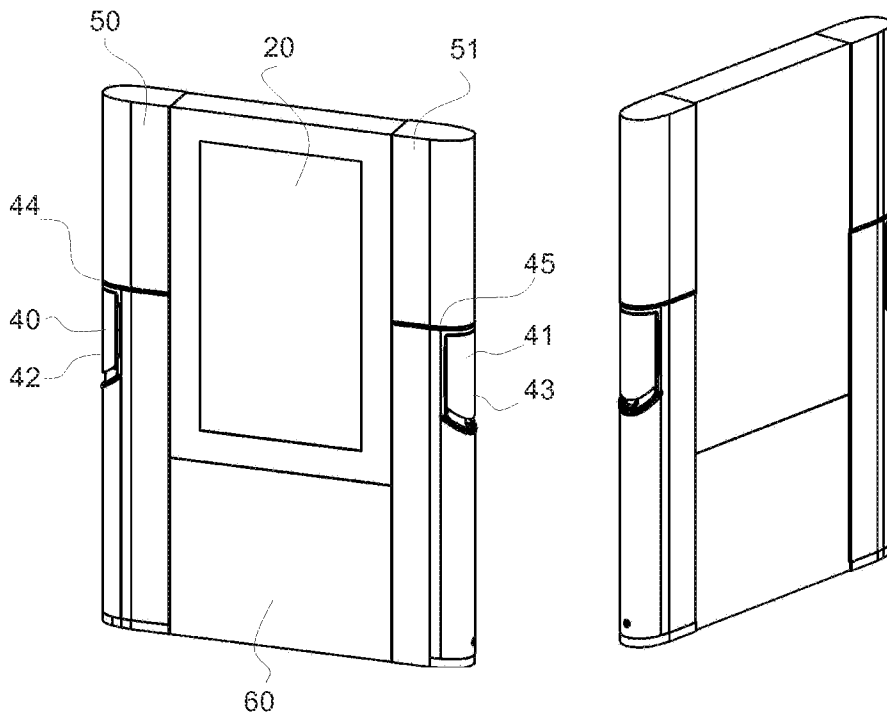


Fig. 1

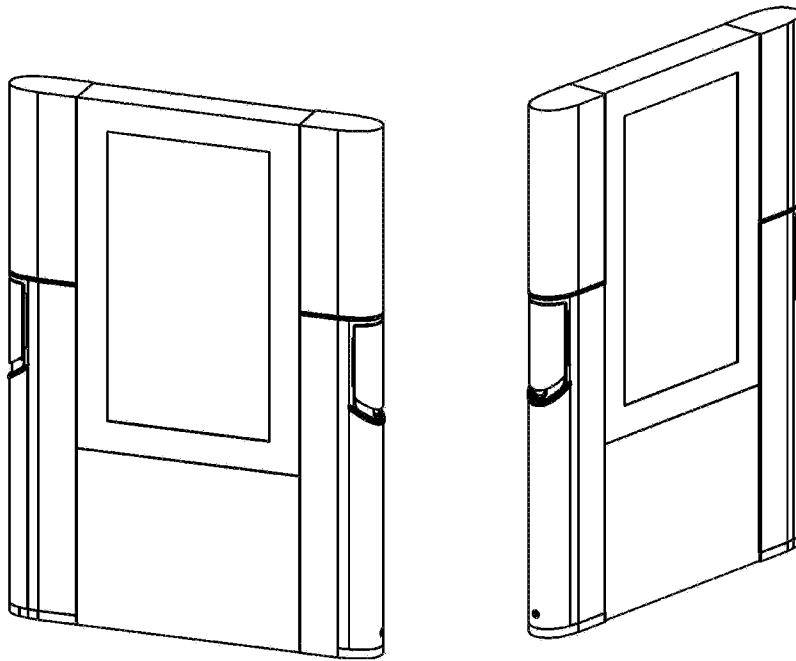


Fig. 2

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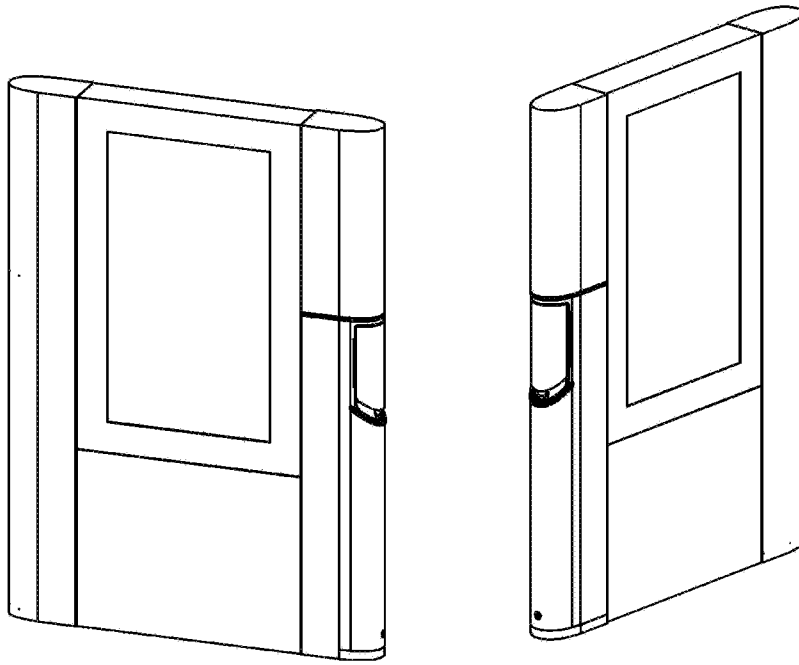


Fig. 3

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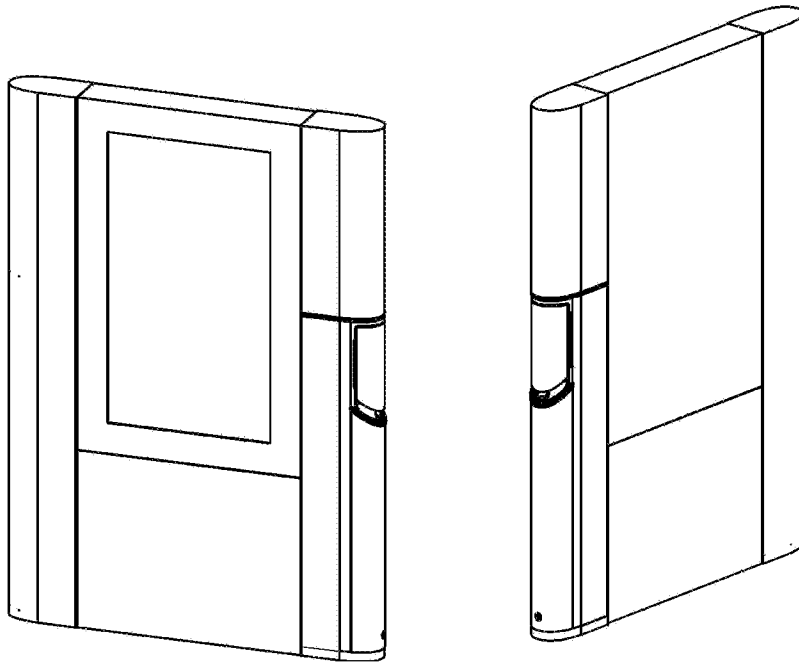


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2013/050604

A. CLASSIFICATION OF SUBJECT MATTER 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: B06L, G06Q, G09F, H02J Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched FI, SE, NO, DK Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011204847 A1 (TURNER DEXTER [US]) 25 August 2011 (25.08.2011) abstract, claims, paragraphs 0004 – 0006, 0008, 0048, 0049, 0071, 0086, 0105 – 0107, and figures	1 - 13
X	US 2011140656 A1 (STARR GARY [US] et al.) 16 June 2011 (16.06.2011) abstract, claims, paragraphs 0007, 0010, 0011, 0038, 0041, 0042, 0061, 0063, and figures	1 - 13
X	US 2012016815 A1 (DEBARTOLO III JACK [US] et al.) 19 January 2012 (19.01.2012) abstract, claims, paragraphs 0012, 0067, and figures	1 - 13
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 27 February 2014 (27.02.2014)		Date of mailing of the international search report 28 February 2014 (28.02.2014)
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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