(19) SUOMI - FINLAND
(FI)

PATENTTI- JA REKISTERIHALLITUS
PATENT- OCH REGISTERSTYRELSEN
FINNISH PATENT AND REGISTRATION OFFICE

(10) **FI/EP3328681 T3**

(12) **EUROOPPAPATENTIN KÄÄNNÖS**
ÖVERSÄTTNING AV EUROPEISKT PATENT
TRANSLATION OF EUROPEAN PATENT SPECIFICATION

(45) Käännöksen kuulutuspäivä - Kungörelsedag av översättning - Translation available to the public **11.12.2023**

(97) Eurooppapatentin myöntämispäivä - Meddelandedatum för det europeiska patentet - Date of grant of European patent **06.09.2023**

(51) Kansainvälinen patenttiluokitus - Internationell patentklassificering - International patent classification
B60L 53/60 (2019 . 01)

(96) Eurooppapatenttihakemus - Europeisk patentansökan - European patent application EP16766474.7

(22) Tekemispäivä - Ingivningsdag - Filing date **27.07.2016**

(97) Patenttihakemuksen julkiseksitulopäivä - Patentansökans publiceringsdag - Patent application available to the public **06.06.2018**

(86) Kansainvälinen hakemus - Internationell ansökan - International application **27.07.2016 PCT/DE2016200345**

(30) Etuoikeus - Prioritet - Priority

27.07.2015 DE DE102015214164

(73) Haltija - Innehavare - Holder

1• POWERJames GmbH , Cecil-Taylor-Ring 12-18 , 68309 Mannheim , (DE)

(72) Keksijä - Uppfinnare - Inventor

1• STECKENBORN, Thomas , Zähringer Strasse 51 , 68239 Mannheim , (DE)
2• GANTER, Axel , Walter-Bothe-Straße 12 , 68169 Mannheim , (DE)
3• MOSSLER, Jonas Carl , Königsbacher Strasse 18 , 68549 Ilvesheim , (DE)

(74) Asiamies - Ombud - Agent

Papula Oy , P.O.Box 981 , 00101 Helsinki , (FI)

(54) Keksinnön nimitys - Uppfinningens benämning - Title of the invention

JÄRJESTELMÄ JA MENETELMÄ SÄHKÖISEN KULUTTAJAN ENERGIANSYÖTTÖÖN SEKÄ ENERGIA-ASEMA

SYSTEM AND METHOD FOR SUPPLYING ENERGY TO AN ELECTRICAL CONSUMER AND AN ENERGY STATION

SYSTEM AND METHOD FOR SUPPLYING ENERGY TO AN ELECTRICAL CONSUMER AND AN ENERGY STATION

The invention relates to a system and a method for supplying energy to an electrical consumer, in particular for charging a battery-operated device, preferably a vehicle having an electric drive. Furthermore, the invention relates to an energy station for supplying energy to an electrical consumer.

Methods and systems as well as energy stations, namely charging stations, for charging a battery-operated device have been known for years from the prior art. For example, electric vehicles are charged at charging stations designated as power filling stations. In the simplest case, these are designed as a socket at which the electric vehicle can be charged via a wired connection.

Document EP 2 861 451 A1 describes a charging station for electric vehicles having a measuring device measuring a power consumption of a connected electric vehicle, a computing device converting a measured value of the measuring device into data, and a communication device transmitting at least the data to a central computer. The data are transmitted to the central computer when the communication device is configured to establish a near field communication connection with a mobile communication device such that a wide area connection, suitable for transmitting data, can be established to the central computer via the near field communication connection to the communication device.

Building out electrical mobility has been a declared goal of politics and economics for several years. In addition to developing higher performance and more reliable vehicles, building out the network of charging stations is an essential criterion to increase the acceptance of these new technologies with consumers. A relatively fine-meshed network of charging stations is necessary due to the usually short range of the electric vehicles and the rather long charging time.

So-called "smart charging stations" are known for billing the costs arising due to the charging process to the user of the electric vehicle. These require a permanent Internet connection in order to exchange the data required for the billing with a billing device – for example a server or a computer. The billing device bills the costs arising due to the charging process to the respective user.

The location at which such a charging station is installed therefore has to provide a wired or at least a wireless Internet connection. Therefore, for example, the installation of smart charging stations in an already existing parking garage is linked to significant expenditure. Parking garages generally do not have any wiring to provide an Internet connection. Furthermore, implementing a wireless network is only implementable with significant expenditure due to the solid construction of parking garages.

In practice, this problem is solved in that the charging stations are read out individually by employees of the operator company, in order to be able to bill the respective users with the costs arising due to their charging process. The effort linked with such a procedure causes high costs.

Due to the above-mentioned problems, it is therefore only possible with significant design, time, and financial expenditure to install charging stations to improve the power filling station network at arbitrary locations.

Furthermore, energy stations for supplying energy to electrical consumers at publicly accessible locations such as water boilers on a camping site, a boat at a mooring, etc., are previously known from practice. It is also problematic in this case that the energy station has to have an Internet connection to bill the costs arising with the supply of energy to the correct user.

The present invention is therefore based on the object of specifying a system and a method, using which an electrical consumer can be supplied with energy

using simply design means and the costs arising in this case are uniquely assignable to the user in a simple manner. Furthermore, a corresponding energy station is to be specified.

The above object is achieved according to the invention by the features of Claim 1. Accordingly, a system for supplying energy to an electrical consumer, in particular for charging a battery-operated device, preferably a vehicle having an electric drive, comprising an energy station, a mobile terminal, and a computing device is claimed, wherein the energy station has a communication device for exchanging data with the mobile terminal, and wherein data can be transmitted from the mobile terminal to the computing device via a transmitting device. The system is characterized in that data can also be transmitted from the energy station to the computing device via the mobile terminal when the mobile terminal cannot set up a connection to the computing device in the immediate vicinity of the energy station, wherein the mobile terminal transmits the data to the computing device as soon as the mobile terminal has such a connection, and in that the mobile terminal, in particular billing data, relating to at least one previous user from the energy station and can transmit the data relating to the previous user to the computing device.

It has been recognized here in a manner according to the invention that the underlying object can be achieved in a surprisingly simple manner in that a mobile terminal is designed such that it can communicate with both the energy station and the computing device. The mobile terminal is thus used to transmit the billing data from the energy station to the computing device, similarly to a “messenger”. Even if the mobile terminal cannot set up a connection to the computing device in the immediate vicinity of the energy station, since no wireless Internet connection is available inside a parking garage, for example, the mobile terminal will sooner or later have such a connection available due to its mobile character. For example, after leaving the parking garage the mobile terminal can transmit the billing data previously transmitted from the energy station to the billing device via a wireless Internet connection.

Furthermore, it is conceivable that the mobile terminal "carries along" "further data", such as configuration data, information data, and software updates and transmits them to the energy station so that bidirectional communication takes place. The energy station could thus both receive data from the mobile terminal and also transmit data to the mobile terminal for transmission to an external computing unit, such as a billing device. Furthermore, the mobile terminal could transmit, for example, prepaid data to the energy device in order to thus directly pay the costs arising due to the supply of energy.

In the system according to the invention, it is furthermore advantageous that a mobile terminal can also receive data from the energy station of the charging station and/or transmit them thereto when no supply of energy at all takes place. For example, the mobile terminal of a user of the system can automatically receive data, in particular billing data, of third parties from the energy station, as soon as he is in the vicinity of the energy station or charging station, so that a connection can be established via the communication device. The mobile terminal can transmit the "foreign" data to the computing device or billing device as soon as a corresponding connection is available. Alternatively or additionally, the mobile terminal could transmit "further data", in particular configuration data, information data, software updates, etc. to the energy station as soon as a connection can be established via the communication device.

With respect to the claimed system and the claimed method, it is to be noted that the "energy station" can be designed, for example, as a charging station and/or as a power supply unit. The electrical consumer can be camping equipment – for example a water boiler – a boat, a power tool, and/or a construction machine. Furthermore, the electrical consumer can be designed as a battery-operated device, in particular as a vehicle having an electric drive.

Furthermore, the expression "mobile terminal" is to be understood in the broadest meaning. It can be, for example, a mobile telephone, a smart phone,

handheld computer, tablet computer, etc. Furthermore, it is conceivable that the mobile terminal is integrated into the electric vehicle to be charged, i.e., is implemented by the electric vehicle. It is solely essential that the mobile terminal has interfaces for communication with the energy station or the charging station and the computing device or the billing device. The term "computing device" is to be understood, for example, as a server or a computer having an Internet connection. The computing device can specifically be designed as a billing device, using which the costs arising due to the supply of energy, for example a charging process, can be billed to the respective user. Alternatively or additionally, the computing device can be used to evaluate consumption data, for example, of a construction machine and/or a power tool, so that the system provides a gateway in the "Internet of things".

The energy station, for example, a charging station, does not necessarily have to have an Internet connection. Rather, the energy station communicates, preferably exclusively, with the mobile terminal. The energy station can thus be installed at arbitrary locations, wherein solely a connection to a power supply system is required. Due to this refined design, it is possible, for example, to equip the parking spaces of a parking garage to form so-called "park and charge" spaces, at which electric vehicles are chargeable, wherein the costs thus arising can be billed to the user in a simple manner. The energy station is thus installable at greatly varying locations.

Advantageously, a plug for implementing the connection to the power supply system is arranged. The energy station can thus be connected to a typical socket, for example, a Schuko socket. It is thus particularly easily possible to install the energy station.

Furthermore, it is conceivable that the means for transmitting electrical energy are implemented by at least one coil for inductive charging. This design permits a wireless and therefore extremely convenient possibility for supplying electrical consumers with energy, for example, for charging the battery-

operated device. Alternatively or additionally, the means for transmission can be implemented by a plug. The plug can be, for example, a Schuko plug, a camping plug (CEE blue), or a three-phase plug (CEE red). A plug connection is distinguished by its simple design and safe transmission of the electrical energy.

To implement a reliable data connection between the energy station and the mobile terminal, the communication device can be implemented as a near field communication interface (NFC interface) and/or a Bluetooth interface and/or an infrared interface. Specifically, any type of wireless or also wired communication device is conceivable which ensures a data connection between energy station and mobile terminal.

An input device can be arranged for inputting information, for example, relating to the identification of the user and/or the charging process. The input device can be designed, for example, for inputting voice commands. Alternatively or additionally, it is also conceivable that a touch display is provided as an input device.

Furthermore, it is to be noted that the above-described energy station can be part of the system according to Claim 1. The features and advantage specifications relating to the claims of the energy station also relate to the system according to the invention.

The underlying object is furthermore achieved by the method according to Claim 6. Accordingly, a method for supplying energy to an electrical consumer, for example for charging a battery-operated device, in particular a vehicle having an electric drive, preferably using a system according to Claim 1 and/or an energy station according to one of Claims 1 to 5, is claimed, comprising the following method steps of:

- transmitting data, for example identification data and possibly charging data, to the energy station by means of a mobile terminal,

- activating the supply of energy, in particular the charging process, by the energy station and transmitting data, in particular billing data, from the energy station to the mobile terminal,
- transmitting the data, in particular the billing data, to a computing device by way of the mobile terminal via a network, preferably a mobile network.

The method is characterized in that data are also transmitted from the energy station to the computing device via the mobile terminal when the mobile terminal cannot set up a connection to the computing device in the immediate vicinity of the energy station, wherein the mobile terminal transmits the data to the computing device as soon as the mobile terminal has such a connection, and in that the mobile terminal belonging to a user of the energy station can receive data, in particular billing data, relating to at least one previous user from the energy station and can transmit the data relating to the previous user to the computing device.

According to the invention, identification data can first be transmitted by means of a mobile terminal to the energy station, for example a charging station. This can take place via an NFC interface, a Bluetooth interface, and/or an infrared interface. The identification data can be any data which enable the costs arising with the supplying energy to the electrical consumer to be assigned to the correct user. The data transmitted from the mobile terminal can alternatively or additionally be “further data”, such as configuration data, information data, or software updates, so that a bidirectional communication takes place. The energy station could therefore both receive data from the mobile terminal and transmit data for transmission to an external computing unit, for example a billing device, to the mobile terminal. Furthermore, the mobile terminal could transmit prepaid data to the energy device, for example, in order to thus pay directly for the costs arising due to supplying energy.

It is furthermore conceivable year that before, during, and/or after the transmission of the identification data or the "further data", additional data, for example, charging data relating to the charging process are transmitted from the mobile terminal to the energy station or the charging station. The charging data can comprise, for example, information with respect to the desired charging period, the required power, the device to be charged, etc. The charging station then activates the charging process. The charging station can transmit billing data to the mobile terminal even before the activation of the charging process and/or during or after the charging process. The same communication interface can be used for this purpose via which the identification data are transmitted from the mobile terminal to the charging station. The charging station can therefore advantageously only have a single communication device for the preferably exclusive communication with the mobile terminal. Alternatively or additionally, it is conceivable that the data are controlled data for the energy station or the charging station, so that all data are also transmittable without an Internet connection in a smart grid. It is to be noted at this point that the data described with respect to the method according to the invention also represent a part of the disclosure of the system according to the invention and energy station according to the invention.

As soon the mobile terminal has a connection to a network – for example the Internet – the data, for example the billing data, are transmitted to the computing device, for example a billing device. The costs arising can be billed to the correct user by the billing device.

Alternatively or additionally, at least a part of the data or the charging data can be transmitted to the energy station by means of a voice command. It is conceivable here that the voice command is recognized directly by the energy station or is recorded by the mobile terminal – for example a smart phone – and transmitted to the energy station.

In a particularly advantageous manner, additional data, in particular billing data, of at least one prior user of the energy station can be transmitted to the mobile terminal, wherein the data of the prior user are then transmitted from the mobile terminal via the network to the billing device. Therefore, billing is performed reliably for every user of the energy station even if he has not personally transmitted his data via his mobile terminal to the computing device or billing device.

The mobile terminal can be integrated, for example, in the electrical consumer or the battery-operated device – the electric vehicle – and/or can be designed as a smart phone, tablet PC, handheld PC, etc.

It is to be noted at this point that the above-explained features of the method according to the invention can also have an embodiment according to the device. A combination of these features with the features relating to the system and/or the energy station is not only possible but advantageous.

There are now various possibilities for designing and refining the teaching of the present invention advantageously. For this purpose, reference is to be made, on the one hand, to the claims dependent on Claims 2 and 7 and, on the other hand, to the following explanation of preferred exemplary embodiments of the invention on the basis of the drawing. Preferred embodiments and refinements of the teaching are also explained in general in conjunction with explanation of the preferred exemplary embodiments of the invention on the basis of the drawing. In the figures

Figure 1 shows a schematic representation of an exemplary embodiment of a system according to the invention,

Figure 2 shows a schematic representation of an exemplary embodiment of an energy station according to the invention, and

Figure 3 shows a flow chart of an exemplary embodiment of a method according to the invention.

Figure 1 shows a schematic representation of an exemplary embodiment of a system according to the invention. The system comprises an energy station 1, a mobile terminal 2, and a computing device 3.

The energy station 1 is designed, for example, as a charging station 1 and is used for charging a battery-operated device, for example, a vehicle having an electric drive. A first data connection 5, via which data can be exchanged, between the energy station 1 and the mobile terminal 2 is implemented via a communication device 4. The communication device 4 is not shown in Figure 1. The mobile terminal 2 thus has an interface that can be linked to the communication device 4 of the energy station 1 in order to implement the first data connection 5.

Furthermore, the mobile terminal 2 comprises a transmitting device or a transmitting device, in order to communicate via a second data connection 6, preferably an Internet connection, in particular via a mobile network, with the computing device 3, for example, a billing device.

It is clear from Figure 1 that the energy station 1 exclusively exchanges data with the mobile terminal 2 and transmits the data to the mobile terminal 2 here. As soon as the mobile terminal 2 has a second data connection 6, it transmits these data to the computing device 3. The energy station designed as a charging station 1 can thus be implemented, for example, without an Internet connection and nonetheless does not have to be manually read out by employees of the operating firm for the purpose of billing.

Figure 2 shows a schematic representation of an exemplary embodiment of an energy station 1 according to the invention. The energy station 1 comprises a connection 7 to a power supply system, wherein the connection 7 is

implemented by a plug 7 in the exemplary embodiment shown here. Furthermore, means 8 are provided for transmitting electrical energy to the consumer. The means 8 are also implemented as a plug 8. Furthermore, it is conceivable that the means 8 for transmitting electrical energy are implemented by means of at least one coil for inductively charging the consumer.

Furthermore, the energy station 1 comprises a communication device 4 for exchanging data with the mobile terminal 2 (not shown). It is clear from Figure 2 that due to the modular structure of the energy station 1, it is usable in a particularly simple manner in particular for equipping an arbitrary parking space – for example in a parking garage.

Figure 3 shows a flow chart of an exemplary embodiment of a method according to the invention.

In a first method step 9, data, in particular identification data and optionally charging data, are transmitted by the mobile terminal 2 to the energy station 1. In a second method step 10, the supply of energy by the energy station 1 is activated, so that electric power is transmitted via the means 8 from the energy station 1 to the consumer – the electric vehicle. Furthermore, data, in particular billing data, are transmitted from the energy station 1 to the mobile terminal 2. The data can relate here in particular both to the currently executed charging process and also comprise billing data of a prior user.

In a third method step 11, the data are transmitted from the mobile terminal 2 via the second data connection 6 to a computing device 3, preferably a billing device 3. The transmission specifically takes place via an Internet connection, preferably a mobile Internet connection.

To avoid repetitions, reference is made to the general part of the description and to the appended claims with respect to further advantageous embodiments

of the device according to the invention and the method according to the invention.

Finally, it is to be expressly noted that the above-described exemplary embodiments of the devices according to the invention and the method according to the invention are used solely to explain the claimed teaching, but do not restrict it to the exemplary embodiments.

List of reference numerals

1	energy station
2	mobile terminal
3	computing device
4	communication device
5	first data connection
6	second data connection
7	connection
8	means for transmitting electrical energy
9	first method step
10	second method step
11	third method step

PATENTTIVAATIMUKSET

1. Järjestelmä sähköisen kuluttajan energiansyöttöön, erityisesti akkukäyttöisen laitteen, erityisesti sähkökäyttöisen ajoneuvon, lataamiseen, sisältäen energia-aseman (1), mobiilipäätelaitteen (2) ja tietokonelaitteen (3), jolloin energia-asemassa (1) on tiedonsiirtolaite (4) tietojen vaihtamiseksi mobiilipäätelaitteen (2) kanssa ja jolloin tietoja on siirrettävissä mobiilipäätelaitteesta (2) lähetyslaitteen välityksellä tietokonelaitteeseen (3), t u n n e t t u siitä, että tietoja on siirrettävissä myös silloin, kun mobiilipäätelaite (2) ei kykene luomaan energia-aseman (1) välittömässä läheisyydessä yhteyttä tietokonelaitteeseen (3), energia-asemasta (1) mobiilipäätelaitteella (2) tietokonelaitteeseen (3), jolloin mobiilipäätelaite (2) siirtää tiedot tietokonelaitteeseen (3) heti, kun mobiilipäätelaitteella (2) on sellainen yhteys, ja että järjestelmän käyttäjän mobiilipäätelaite (2) kykenee vastaanottamaan tietoja, ainakin energia-aseman (1) yhden aiemman käyttäjän tietoja, erityisesti laskutustietoja, ja siirtämään aiemman käyttäjän tiedot tietokonelaitteeseen (3).

2. Patenttivaatimuksen 1 mukainen järjestelmä, t u n n e t t u siitä, että siihen on järjestetty pistoke yhteyden (7) luomiseksi virtaverkkoon.

3. Patenttivaatimuksen 1 tai 2 mukainen järjestelmä, t u n n e t t u siitä, että välineet (8) sähköisen energian siirtämiseksi on toteutettu ainakin yhdellä käämillä induktiiviseen lataamiseen ja/tai pistokkeella.

4. Jonkin patenttivaatimuksista 1 – 3 mukainen järjestelmä, t u n n e t t u siitä, että tiedonsiirtolaite (4) on toteutettu NFC-liitäntänä ja/tai Bluetooth-liitäntänä ja/tai infrapunaliitäntäntä.

5. Jonkin patenttivaatimuksista 1 – 4 mukainen järjestelmä, t u n n e t t u siitä, että siihen on

järjestetty syöttölaite, erityisesti puhekomentojen syöttämiseen.

6. Menetelmä sähköisen kuluttajan energiansyöttöön, esimerkiksi akkukäyttöisen laitteen, erityisesti sähkökäyttöisen ajoneuvon, lataamiseen, edullisesti käyttäen jonkin patenttivaatimuksista 1 – 5 mukaista järjestelmää, sisältäen seuraavat menetelmävaiheet:

- tietojen, erityisesti tunnistustietojen ja mahdollisesti lataustietojen, siirtäminen, mobiilipäätelaitteella (2) energia-asemaan (1),
- energiansyötön, erityisesti latausvaiheen, aktivointi energia-asemalla ja tietojen, erityisesti laskutustietojen, siirtäminen energia-asemasta (1) mobiilipäätelaitteeseen (2),
- tietojen, erityisesti laskutustietojen, siirtäminen edullisesti mobiiliverkon välityksellä mobiilipäätteellä (2) tietokonelaitteeseen (3), t u n n e t t u siitä, että tietoja siirretään myös silloin, kun mobiilipäätelaite (1) ei kykene luomaan energia-aseman (1) välittömässä läheisyydessä yhteyttä tietokonelaitteeseen (3), energia-asemasta (1) mobiilipäätelaitteella (2) tietokonelaitteeseen (3), jolloin mobiilipäätelaite siirtää tiedot tietokonelaitteeseen heti, kun mobiilipäätelaitteella (2) on sellainen yhteys, ja että energia-aseman (1) käyttäjän mobiilipäätelaite (2) kykenee vastaanottamaan ainakin energia-aseman (1) yhden aiemman käyttäjän tietoja, erityisesti laskutustietoja, ja siirtämään aiemman käyttäjän tiedot tietokonelaitteeseen (3).

7. Patenttivaatimuksen 6 mukainen menetelmä, t u n n e t t u siitä, että tiedot, erityisesti lataustiedot, välitetään energia-asemaan (1) puhekomennolla.

8. Patenttivaatimuksen 6 tai 7 mukainen menetelmä, t u n n e t t u siitä, että mobiilipäätelaitteena

(2) käytetään kyseistä sähköistä kuluttajaa ja/tai älypuhelinta.

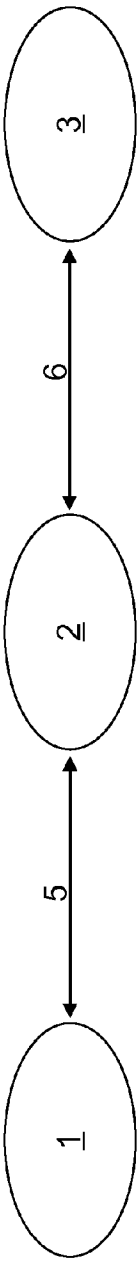

Fig. 1

Fig. 2

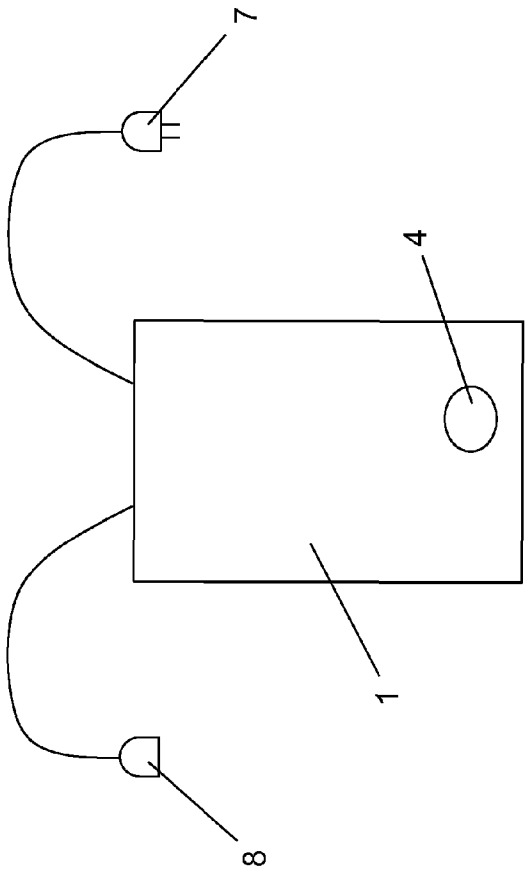

Fig. 3