(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 February 2019 (28.02.2019)

WIPO | PCT

(10) International Publication Number
WO 2019/038023 A1

(51) International Patent Classification:
F25B 49/04 (2006.01) *B60H 1/00* (2006.01)

(21) International Application Number:
PCT/EP2018/070390

(22) International Filing Date:
27 July 2018 (27.07.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10 2017 214 941.8
25 August 2017 (25.08.2017) DE

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

(54) Title: RECREATIONAL VEHICLE, COOLING DEVICE, CONTROLLING SYSTEM AND METHOD FOR CONTROLLING THE COOLING DEVICE

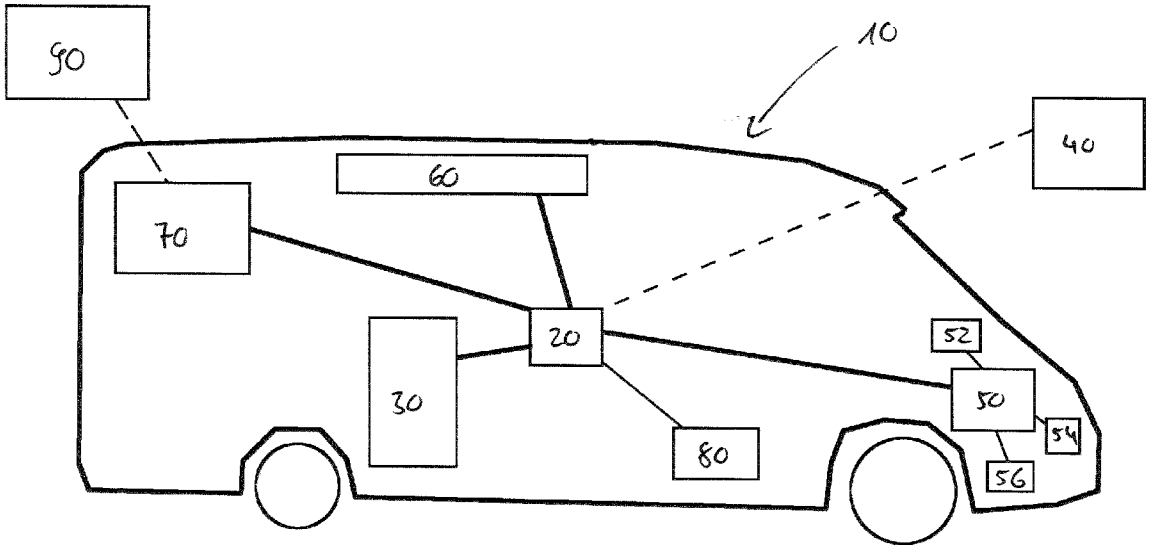


FIG. 1

(57) Abstract: The present invention refers to a controlling system (20) configured to be installed in caravan or recreational vehicle (10), cooling devices (30) for a caravan or recreational vehicle (10) comprising or coupled to such controlling systems (20), a caravan or recreational vehicle comprising such controlling systems (20) and methods for controlling cooling the above said cooling devices (30). According to the present invention, the controlling system (20) comprises a central processing unit, a read out unit and a controlling unit and is configured to be coupled to a plurality of electronic devices (30, 40, 50, 60, 70, 80) and/or sensors (52, 54, 56) of the caravan or recreational vehicle (10). The read out unit of the controlling system (20) is configured to read out data from the electronic devices (30, 40, 50, 60, 70, 80) and/or sensors (52, 54, 56) of the caravan or recreational vehicle (10) coupled to the controlling system (20) and to forward the read out data to the central processing unit. The central processing unit is configured to receive and to process the

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SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

read out data received from the read out unit and to forward processed data to the controlling unit. The controlling unit is configured to receive the processed data from the central processing unit and to control at least one of the electronic devices (30, 40, 50, 60, 70, 80) coupled to the controlling system based on at least some of the processed data, wherein in particular the one of the electronic devices is the cooling device (30).

Recreational vehicle, cooling device, controlling system and method for controlling the cooling device

The present invention refers to caravan or recreational vehicle, a cooling device for a caravan or recreational vehicle, a controlling system for such a caravan or recreational vehicle and/ or cooling device and methods for controlling the cooling device.

Today, a plurality of electronic devices is provided in caravan or recreational vehicle, in the following defined as RV, to increase the functionality of the RV and thus to make a ride with the RV as pleasant as possible. Such electronic devices are for example an air conditioning system, a lighting system, various cooking devices and in particular cooling devices as refrigerators and, preferably, absorption refrigerators, the latter being preferred due to its low energy consumption and noise generation. However, conventionally, these electronic devices of an RV are provided and controlled independently from each other. This shows the drawback, that each of the electronic devices of an RV has to be equipped with its own sensors and logic units to determine and process data required to choose the best operation mode for the respective device. This results in a huge increase in the costs for each of the provided electronic devices. Furthermore, frequently it arises, that at least some of the provided electronic devices require the same data, as for example an ambient temperature, to optimize their operation mode. Thus, as each of the devices has its own sensors and logic unit for determining and processing these date, the costs for the overall entirety of the provided electronic devices is increased substantially due to multiple provided sensors and logic unit for determining and processing the same data. Further, each of the electronic devices only has access to the data generated by its own, which limits the available functionality of each of the provided devices substantially. Finally, controlling all of the different electronic devices of the RV is cumbersome for the user.

Accordingly, it is the task of the present invention to provide a RV, a cooling device for RV's and/ or a controlling system for RV's overcoming the above described drawbacks and thus decreasing the costs for the RV and the entirety of the therein provided electronic devices while increasing the functionality of the caravan and the therein provided devices.

This task is solved by the RV, the cooling device for RV's, the controlling system for RV's and/ or the method according to independent claims 1, 14, 15 and 16. Advantages on embodiments thereof are disclosed in the dependent claims.

According to the present invention, a controlling system configured to the installed in a caravan or recreational vehicle (RV) comprises a central possessing unit, a read out unit and a controlling unit. The controlling system is configured to be coupled to a plurality of electronic devices and/ or sensors of the RV. The read out unit is configured to read out data from the electronic devices and/ or sensors of the RV coupled to the controlling system and to forward the read out data to the central possessing unit. The central processing unit is configured to receive and to process the read out data received from the read out unit and to forward the processed data to the controlling unit. The controlling unit is configured to receive the processed data from the central processing unit and to control at least one of the electronic devices coupled to the controlling system based on at least some of the processed data.

Caravan or recreational vehicle (RV) in the sense of the present invention has to understood in its broadest interpretation including, besides others, campers and mobile homes. Reading out in the sense of the present invention not only means to actively obtain data but also to passively receive data. The received data also can be instructions and/ or commands. The plurality of electronic devices can for example comprise an air conditioning system of the RV, a lighting system thereof, provided cooking devices as well as computers and or mobile devices like mobile phones and tablets. Furthermore, also additionally provided sensors like motion detectors, photo sensors, tilting sensors and temperature sensors can serve as electronic devices in the sense of the present invention. Sensors of the RV are basically sensors provided in the RV as part of the electronic controlling unit of the RV or at least coupled thereto. Examples for such sensors are a tachometer, a sensor for determining the filling of the fuel and/ or gas tank of the RV, a battery sensor and or temperatures sensors of the RV. Processing in the sense of the present invention has to be understood not just as customizing data but also as analyzing data and or generating new data from the data. However, processing also can mean keeping the data in the read out configuration without customizing them.

In other words, the controlling system according to the present invention collects data from electronic devices coupled thereto and analyses and/ or processes the collected data centrally. Finally, the controlling system utilizes the analyzing data and/ or the processed data to control at least one of the electronic devices coupled to the controlling system. Thus, it is possible, to use data determined by one or more of the electronic devices coupled to the controlling system for determining an optimized operation mode for the at least one of the electronic devices and to forward instructions to the at least one of the electronic devices in order to operate this device according to the determined optimized operation mode. Thus, it is for example possible to optimize the operation mode of a refrigerator provided in the RV based on ambient temperature data obtained from an air conditioning system and/ or a temperature sensor of the RV itself. Accordingly, the refrigerator has not to be provided with an own ambient temperature sensor. In sum, having such a central controlling system allows optimizing the overall system of the RV and of the plurality of electronic devices in view of highly decreased costs thereof, as no sensor has to be

provided several times in the respective electronic devices, and/ or RV. Furthermore, it is possible to use data, which until now due to cost and effort expenditure was not used, to optimize the operation mode of some of the electronic devices to optimize its operation mode. For example, while until now the operation mode of a cooling device was not optimized based on a weather forecast, because such a configuration would be complex and expensive, using the controlling system enables this optimizing based on a weather forecast easily, when, for example, the controlling system is coupled to the internet and configured to read out and analyze data with regard to weather forecast. This results, besides the highly-decreased costs for the overall system, in a highly-increased functionality of the overall system of the RV and its electronic devices.

Altogether, the above disclosed controlling system provides huge possibilities for optimizing overall systems of a RV and electronic devices in view of highly decreased costs for such systems and highly increased functionality thereof.

Advantageously, the controlling system further comprises a memory unit. The memory unit is configured to store information defining how to control the at least one of the electronic devices based on the read out data. The central processing unit further is configured to read out the stored information from the memory unit and to use this information to process the read out data. In doing so, it is possible to influence the processing of the read out data reliably and, thus, to optimize the processing of the read out data and, thus, in the end the controlling of the at least one of the electronic devices freely. For example, the stored information can be some user profiles and/ or various selectable operation modes defining the operation of the controlling system due to specific requirements, which has to be considered when processing and controlling the at least one of the electronic devices. For example, via the stored information it can be defined, that when operating the air conditioning system at maximum cooling power, the refrigerator has to be operated at an energy saving operation mode to reduce the overall energy consumption of the overall system comprising the air conditioning system and the refrigerator.

Advantageously, the central processing unit further is configured to generate and to process data. Such data, in particular, can be time related data. Therewith it is possible to increase the functionality of the controlling system substantially. Besides, the costs for the overall system can be reduced as specific data is generated by the processing unit and does not have to be determined via additionally provided sensors. One example for such self-generated data is time related data like a real clock time and or relative times as used for timers.

Preferably, the processed data can be derived from the user's behavior. The behavior of the users is relatively similar over time in a RV, e.g. breakfast and/ or dinner are usually taken the same time every day or showering is also done mostly at the same time, for instance in the morning. Thus, based on the

read out data from the electronic devices and/ or the sensors, the central processing unit can evaluate the users' behavior which in turn can again be used to further optimize the operation mode and to reduce the overall energy consumption.

Advantageously, the controlling system comprises or is coupled to a display unit. The central processing unit further is configured to forward at least a part of the processed data to the display unit, while the display unit is configured to receive and display said part of the processed data. This configuration allows to display a specific selection of the processed data to a user and thus assists the user in deciding for specific settings and/ or commands for controlling the controlling system. Thus, for example, a charge level of various energy storages of the RV, like the gas tank or the automotive battery, can be displayed via the display to support the user in deciding which energy source should be used to supply the at least one of the electronic devices with energy, and/ or whether and when it is necessary to refill at least one of the provided energy storages.

Advantageously, the controlling system is configured to be coupled to electronic devices via wireless data connection, and in particular to receive und process commands from the electronic devices coupled to the controlling system as read out data. Examples for such wireless data connections are local and or global radio network connections, Bluetooth connections, infrared connections and or near range communication connections. Thus, it is possible to provide a communication between the controlling system and electronic devices without the necessity of providing an often unattractive and confusing cable based connection. This results, next to increased flexibility, in decreased costs and decreased required space for the controlling system as not for each of the electronic devices coupled to the controlling system an independent connection port has to be provided.

Advantageously, the entirety of the electronic devices comprises an electric control unit of the RV, mobile and/ or stationary equipment of the RV, other controlling systems and or BUS-systems provided in the RV, additionally provided sensors, and/ or external mobile devices. By coupling the controlling system to at least one of these exemplary electronic devices, the controlling system is able to obtain data determined by the respective electronic devices and to use this data to control at least one of the electronic devices. Thus, the functionality of the controlling system is further increased. For example, data with regard to the operation mode of the motor of the RV obtained via the electric control unit of the RV can be used to optimize the operation mode of a refrigerator provided in the RV by, for example, operating the refrigerator at a high-power level via the automotive battery of the RV when the motor of the RV is in operation and, thus, enough energy is provided in the automotive battery of the RV.

Advantageously, the processing unit of the controlling system is sourced out at least partially to one or more of the electronic devices coupled to the controlling system. Thus, the controlling system can resort to

the processing power of the one or more of the electronic devices coupled to the controlling system. Therewith, it is possible to increase the effective processing power of the controlling system substantially and/ or to decrease the costs for the controlling system by decreasing the processing power of the controlling system itself while keeping up and/ or even increasing the effective processing power for the controlling system.

Advantageously, the read out unit is coupleable to the internet and configured to read out data from the internet automatically when coupled thereto. In this configuration, the controlling system has access to the almost infinite information from the internet, which results in a huge increase in the accessible functionality of the controlling system. For example, the controlling system can obtain information with regard to the real clock time and/ or weather forecast from the internet and use this information to control a cooling device provided in the RV and coupled to the controlling system as defined by a user and/ or in an optimized manner with regard to cooling efficiency.

In addition, the external information can also be used to inform the user about expected power limitations based on the current settings of the controlling system. For instance, in case the weather forecast predicts rather high ambient temperatures during daytime, the user can be informed that more energy might be needed for cooling purposes. Preferably, the controlling system gives ideas for improvement to the user in case power limitations are expected. Thus, the user can directly alter the settings based on the suggestions of the controlling system, e.g. chose a different energy source for one of the electronic devices or completely shut down one of the electronic devices temporarily. Preferably, the settings of the controlling system are changed in case the user confirms the suggestion. Thus, this greatly enhances ease of use and allows to reduce the overall energy consumption.

Advantageously, the controlling system is coupleable to various energy storages of the RV provided to supply energy to the at least one electronic device, and configured to control, which one of the provided energy storages is used to supply energy to the at least one electronic device. This configuration enables an optimization of the energy consumption of the overall system and of the utilization of the provided energy storages. For example, when the RV is coupled to a socket for external energy supply on a camping ground, the controlling system can be able to guarantee that a provided cooling device is supplied with energy from the socket and not with energy provided by gas burner supplied with gas from a gas tank of the RV.

Advantageously, the controlling system provides various operation modes selectable by a user for controlling the at least one electronic device in a specific manner. Examples for such operation modes are an energy saving mode, in which the at least one electronic device is operated in view of a minimum energy consumption, a high-power mode, in which the at least one electronic device is operated without

attention on the energy consumption at its highest available cooling power, and/ or a silent mode, in which the at least one electronic device is operated as silent as possible. The respective controlling parameters for the various operation modes can be for example stored in a memory unit coupled to the controlling system and/ or can be read out respectively received from one of the electronic devices, like for example a mobile phone or a tablet coupled to the controlling system wirelessly. At least some of the provided operation modes can contain information for controlling respectively operation various of the electronic devices. This allows a fast and reliably controlling of the controlling system and thus of the at least one of the electronic devices coupled to the controlling system.

Advantageously, the at least one of the electronic devices is a cooling device for RV's and/ or a device configured to define and/ or control an operation mode of the cooling device. In particular, such a cooling device can be a refrigerator, and preferably an absorption refrigerator due to its low energy consumption and low noise generation. Thus, by the controlling system, it is possible to optimize the operation mode of the cooling device based on a huge variety of data obtained from various electronic devices coupled to the controlling system without the need of providing sensors in the cooling device configured to determine each of these data. Accordingly, this configuration results in decreased costs for the cooling device and, thus, of the overall system of the RV and the electronic devices coupled to the controlling system while, at the same time, in a substantial increase of the functionality of the cooling device.

Further advantageously, the controlling system is configured to control the operation mode of the cooling device based on a huge variety of data. For example, the operation mode of the cooling device can be controllable by the controlling system based on a real clock time, such as for example during night times the cooling device is operated in a silent mode and/ or an energy saving mode. Usually, during night time, the required energy for cooling the internal space of the cooling device is less than during day time due to lower ambient temperatures. In contrast to this, during day time the cooling device can be operated in a high-performance mode to ensure a sufficient cooling of the cooling space of the cooling device.

Furthermore, during night time the cooling device can be operated in a defrosting mode. Usually, during night time, the cooling device will not heat up as much during defrosting than during day time due to the lower ambient temperature. Above that, the operation mode of the cooling device can be controlled based on a relative time, such as for example in the course of a boost mode, in which for a specific time frame, the cooling power of the cooling device is maximized to intercept an expected temperature decrease within the cooling space of the cooling device, for example occurring after shopping and filling in the warm goods from the shopping bag into the cooling space. Additionally and/ or alternatively thereto, the operation mode of the cooling device can also be controllable based on a global location of the RV. In doing so, it is for example possible to select the allowed energy source for providing the cooling device with energy automatically, as for example on ferry boats, it is when the caravan or RV is located, globally

seen, on an expanse of water like a lake, the cooling device is not allowed to be provided with energy from the gas tank due to safety technical regulations. Thus, to comply with the safety regulations, when the controlling system determines, that the caravan is on a lake, it can ensure, that the cooling device is only provided with energy from the automotive battery.

Alternatively, the controlling system can determine via the global location of the RV the specific climate zone in which the RV remains and then can optimize the operation mode of the cooling device based on the therewith supposed temperature and/ or humidity. Furthermore, the operation mode of the cooling device can be controllable by the controlling system based on operation information of the RV. Thus, for example, when the controlling system recognizes from the operation information of the RV that the RV is driving, the cooling device usually has not to be operated in a frequently less energy efficient silent mode due to the high driving noise, and thus switch the operation mode of the cooling device from a silent mode, for example, to an energy saving mode automatically.

Besides, the controlling system could choose to operate the cooling device with energy supplied by the automotive battery of the RV as during the RV is motor-driven as then the automotive battery is recharged automatically. According to another example, the operation mode of the cooling device can be controllable by the controlling system in view of tilting information for the RV and/ or of the cooling device. Thus, for example the controlling system is able to initiate an emergency shutdown of the cooling device when the tilting of the RV and/ or of the cooling device exceeds a predetermined critical value, to prevent danger emanating from a cooling device tilted over during operation.

Besides, the controlling system can be configured to control the operation mode of the cooling device based on an internal and/ or ambient temperature of the cooling device and/ or the RV. This allows to operate the cooling device in an optimized operation mode selected not only dependent on the internal or ambient temperature of the cooling device but also dependent from the ambient temperature of the RV and, thus, of the outdoor temperature. The controlling system can also be configured to control the operation mode of the cooling device based on operation information of the cooling device itself. In other words, at least a part of a central processing unit of the cooling device can be outsourced to the controlling system to reduce the costs of the cooling device.

Furthermore, the current weather situation or a weather forecast can be determined by the controlling system and can be used by the controlling system to control the operation mode of the cooling device. For example, the controlling system can operate the cooling device in a high-power mode when extreme hot weather is forecast to ensure a sufficient cooling of the cooling space of the cooling device while, In case of a cold outside condition with decreased or low outside temperature, the cooling device can be controlled by the controlling system to operate in an energy saving mode. Alternatively and/or in

additionally, the controlling system can be configured to control the operation mode of the cooling device based on a charging level and/ or the availability of various energy storages and/ or sources. In this configuration, the controlling system is able to optimize a utilization of various energy sources and storages coupled to the controlling system. For example, when a photovoltaic system of the RV provides enough energy for operating a cooling device, not gas from a gas tank has to be used to provide the required energy for operating the cooling device, and/ or the cooling device is operated in an energy saving mode, then the charging level of each of the available energy sources is below 10%.

Furthermore, the controlling system can be configured to control the operation mode of the cooling device based on a sound level of the cooling device and/ or a sound level within the RV. In view of this, the controlling system can be able to decide when it is necessary to operate the cooling device, for example, in a silent mode, which is, for example, not the case when the sound level within the RV already is at a high level. Another example for data based on which the controlling system can be configured to control the operation mode of the cooling device is the energy consumption of the cooling device. Thus, for example, when the controlling system determines that the energy consumption of the cooling device is too high, the controlling system can instruct the cooling device to execute a defrosting cycle to restore an optimized cooling efficiency of the cooling device.

Finally, the controlling system can also be configured to control the operation mode of the controlling device based on specific operation instructions programmed to the central processing unit, stored in a memory coupled to the central processing unit and/or received via or read out from one or more of the electronic devices coupled to the controlling system. These configurations enable various possibilities to modify and optimize the controlling of the operation mode of the cooling device by the controlling system in view of various technical necessities and/ or requests of a user. Thus, for example, the user is able to instruct the controlling system how to control the operation mode of the cooling device regardless of other programmed instructions and thus to satisfy the user's expectations towards the controlling system and/ or the operation of the provided cooling device.

Further advantageously, the controlling system is configured to control an operation mode of a heater and/ or of a compressor of the cooling device. These two options are the most common and effective ways of controlling an operation mode of a cooling device and thus provide an easy as well as reliable and efficient controlling of the operation mode of the provided cooling device of the RV.

A cooling device for a caravan or recreational vehicle (RV) according to the present invention comprises or is coupled to a controlling system according to anyone of the above described configurations. The cooling device in particular can be a refrigerator and preferably an absorption refrigerator, as in particular an absorption refrigerator has proven itself to be very advantageous to be used in RVs due to its low

generation of noise and energy consumption. This configuration allows to reduce the overall costs of the cooling device while increasing its functionality and efficiency substantially, dependent on other devices coupled to the controlling system.

A caravan or recreational vehicle (RV) according to the present invention comprises anyone of the above described controlling systems and/ or a cooling device as described before. This allows to transfer the above set forth advantages, in particular in view of reduced costs and increased efficiency and functionality to the RV.

Finally, according to the present invention, a method for controlling an operation mode of a cooling device for a caravan or recreational vehicle (RV), in particular a refrigerator and preferably an absorption refrigerator, comprises the following steps. First, data and/ or instructions are read out and/ or received from electronic devices and sensors of the RV. In a next step, the read out data is processed. Finally, at least a part of the processed data is used to control the operation mode of the cooling device. This method allows to use a huge variety of data determined by various electronic devices and/ or sensors of the RV to identify a best mode of operation for the cooling device and to control the cooling device in accordance with the identified best mode of operation. Therefore, it is possible to reduce the costs for the cooling device as the cooling device itself not has to be provided with sensors for each of the data required to determine the best mode of operation for the cooling device. Above that, the operation of the cooling device can be optimized substantially, as an immense plurality of data can be used to optimize the operation mode of the cooling device without the necessity of increasing the costs for the cooling device substantially.

Advantageously, controlling the operation mode of the cooling device is based on various data as it already has been explained above with reference to the controlling system. For example, controlling the operation mode of the cooling device is based on data with regard to the real clock time, a relative time, a global location of the RV, operation information of the RV, tilting information of the RV and/ or of the cooling device, an internal and/ or ambient temperature of the cooling device and/ or of the RV, operation information of the cooling device itself, a current weather situation and/ or weather forecast, a charging level and/ or availability of various energy storages and/ or sources, a sound level of the cooling device and/ or within the RV, a current energy consumption of the cooling device, and/ or specific operation instructions programmed to the central processing unit, stored in a memory coupled to the central processing unit and/ or received from and/ or red out from one or more of the electronic devices. Exemplary advantages for the above set forth distinct data used to control the operation mode of the cooling device already have been described above, which is why for the sake of brevity they are not repeated here.

In the following, embodiments of the present invention will be described to substantiate the understanding of the above said with reference to the drawings, wherein in

Fig. 1 a caravan or recreational vehicle (RV), a cooling device and a controlling system according to exemplary embodiments of the present invention are illustrated;

Figs.2A to 2C several control modes of an exemplary embodiment of an electronical device configured to be coupled to the controlling system and/ or cooling device shown in Fig. 1 and being configured to provide the controlling system with several instructions for controlling the other electronic devices coupled to the controlling system and to display processed date received from the controlling system is illustrated;

Fig. 3 an exemplary method for controlling a cooling device for RV's according to an advantageous embodiment of the present invention is visualized;

Figs. 4A and 4B two control modes of another exemplary embodiment of an electronic device configured to be coupled to the controlling system and/ or cooling device shown in Fig. 1 and being configured to provide the controlling system with several instructions for controlling the other electronic devices coupled to the controlling system and to display processed date received from the controlling system is illustrated; and

Fig. 5 an explicit operation mode of the exemplary controlling system of Fig. 1 is depicted.

As illustrated in Fig. 1, the caravan or recreational vehicle (RV) 10 comprises a controlling system 20. The controlling system 20 is coupled to several electronic devices 30, 40, 50, 60, 70 and 80. In the depicted example, electronic device 30 is a cooling device in the form of an absorption refrigerator, electronic device 40 is a mobile device in the form of a mobile phone, electronic device 50 is the electronic control unit of the RV, electronic device 60 is an air conditioning system of the RV, electronic device 70 is a router which is configured to communicate with the internet 90 and electronic device 80 is an additionally provided motion sensor monitoring movements within the RV. As indicated by the continuous lines, in the present embodiment the controlling system 20 is coupled to the electronic devices 30, 50, 60, 70 and 80 via hard wires, while the controlling system 20 is coupled to the mobile phone 40 via a wireless data connection in the form of a Bluetooth connection. However, also another distribution of the kinds of connections or other methods of coupling are imaginable without departing from the scope of the present invention.

The electronic control unit 50 of the caravan 10 is further coupled via hard wires to some sensors 52, 54 and 56 of the RV 10, and, thus, provides a coupling between the sensors 52, 54, 56 and the controlling system 20. In the depicted example, the first sensor 52 is a speed sensor for determining the travel speed of the RV 10, the second sensor 54 is a temperature sensor for determining the ambient temperature of the RV 10 and the third sensor 56 is a charge level sensor for determining the charge level of the automotive battery of the RV 10. However, more or less and/ or other sensors are imaginable.

The controlling system 20 comprises a read out unit, which is configured to read out and receive data from the electronic devices 30, 40, 60, 70 and 80 and from the sensors 52, 54 and 56 of the RV 10. Furthermore, the controlling system 20 comprises a central processing unit and a controlling unit. The processing unit is configured to receive and process the said read out respectively received data, which is forwarded from the read out unit to the central processing unit. The central processing unit further comprises an internal clock to generate information with regard to at least a relative time. The controlling unit of the controlling system is configured to receive processed data forwarded from the central processing unit to the controlling unit, and to control the absorption refrigerator 30 based on at least some of the processed data received from the processing unit. The controlling system is further configured to communicate via the router 70 with the internet and to obtain information therefrom. In the illustrated example, the controlling system 20 is able to obtain real clock time information and weather forecast information for the current position of the RV 10 from the internet 90. Furthermore, the controlling system 20 is configured to communicate with the mobile phone 40 to transmit data to the mobile phone 40 and/ or to receive data from the mobile phone 40. Hence, status and other relevant information dedicated to the user can be displayed by the mobile phone 40. Further, the user can input instructions into the mobile phone 40 to control the electronic devices 30, 40, 60, 70 and 80 via the controlling system 20.

As indicated in Figs. 2A to 2C the mobile phone 40 is configured to display data received from the controlling unit 50 and to receive as well as to forward instructions for operating the controlling system 20 to the controlling system 20. In the depicted embodiment, the mobile phone 40 is configured to display information and to forward instructions with regard to the climate of the RV 10, the energy supply of the RV 10, a water storage of the RV 10, a camera system of the RV 10 as well as the lighting system provided in the RV 10. Thus, additional electronic devices than the above described, in particular with regard to climate, energy, water, camera and or lights of the RV 10 can be coupled the controlling system 20 and controlled by the mobile phone 40 via the controlling system 20. However, for the sake of brevity and clarity, these further electronic devices are not illustrated in Fig.1.

In Fig. 2B, there are illustrated examples for information which can be obtained by the controlling system 20 and, after transmitting the same to the mobile phone 40, displayed by the mobile phone 40 to the user. Besides others, the controlling system 20 and the mobile phone 40 are configured to determine and

display data with regard to the temperature 41 within the RV 10, the operation mode 42 of the air conditioning system 60, the charging level 43 of the automotive battery 56 of the RV 10, the filling level 44 of a water tank of the RV and the date 45 of the previous exchange of the water of the fresh water tank of the RV 10. Furthermore, the mobile phone 40 is able to display information that currently the mobile phone 40 is successfully connected to the controlling system 20 of a specific RV 10 of "Bob and Molly" and information about the mode the controlling system 20 is currently operated, here in the "night mode". Besides this information of course a huge variety of other information can be displayed by the mobile phone 40 dependent on the choice of electronic devices and sensors of the RV 10 coupled to the controlling system 20. The user may select and individualize the variety of information to be displayed within the software or application used on the mobile phone 40.

Finally, in Fig. 2C it is depicted, that via the mobile phone 40 a user select an operation mode to operate the controlling system 20. In the depicted example, there are four predefined operation modes available being a morning mode 46, a night mode 47, a sleep-summer mode 48 and a quick cool mode 49. Via the mobile phone 40, the user can edit the provided predefined modes and/ or can add further modes being individualized to his need as well as choose a specific mode as operation mode for the controlling system. Thus, the user can freely control the operation of the controlling system 20 and, thus, indirectly the distinct operation mode for operating the at least one of the provided electronic devices 30, 40, 60, 70, and 80. Here, the depicted predefined modes basically refer to operation modes of the air conditioning system 60 of the RV 10 and a lighting system provided in the RV 10. Other devices coupled to the controlling system 20 as, for example, the refrigerator 30 can be operated based on the information of a provided predefined mode. By the predefined modes, a user is able to control the operation mode of the controlling system 20 with regard to a plurality of electronic devices 30, 40, 60, 70, and 80 coupled to the controlling system 20 simultaneously, thus, achieving a huge facilitation in controlling all the provided electronic devices 30, 40, 60, 70 and 80.

In Fig. 3, a method for controlling an operation mode of a cooling device 30 of the RV 10 according to the present invention is depicted. It is noted that the controlling system 20 disclosed above is able to at least carry out the steps of this method. In a first step S1, various data are read out respectively received from electronic devices 30, 40, 60, 70, and 80 and/ or sensors 52, 54 and 56 of the RV 10. In the next step S2, the read out and/ or received data is processed. Finally, in a third step S3, at least a part of the processed data is used to control the operation mode of the cooling device 30 in an optimized matter.

In the following, to underline the advantages and potential of the present invention, examples for controlling the operation mode of the cooling device 30 advantageously will be described.

As illustrated in Figs. 4A and 4B the controlling system 20 is able to select the energy source used to operate the cooling device 30. The selection can be performed automatically and or manually via a mobile device 40 coupled to the controlling system 20. Furthermore, it is possible to select one or more of a list of various settings to define the operation mode of the cooling device 30. For example, the various settings indicate, that the cooling device 30 is controlled based on specific data as already described above, and again will be described in the following. Above that, the controlling system 20 can be able to determine and display a status of the cooling device 30 via the mobile device 40.

An example for a correlation between read out data and displayed data is depicted in the diagram of Fig. 5. This diagram also is an example for information defining how to control the at least one of the electronic devices 30, 40, 60, 70 and 80 and which information is displayed based on the read out data. Here, five various temperature modes M1 to M5 are defined by several temperature ranges d1 to d5 within which the internal temperature of the cooling device 30 should be. According to the first mode M1, for example, the internal temperature of the cooling device 30 should be between 0°C and 2°C, according to the second mode M2 the internal temperature of the cooling device 30 should be between 2°C and 4°C, according to the third mode M3 the internal temperature of the cooling device 30 should be between 4°C and 6°C, according to the forth mode M4 the temperature within the cooling device 30 should be between 6°C and 8°C, and according to the fifth mode M5 the temperature within the cooling device 30 should be between 8°C and 10°C. For each of the five modes M1 to M5, there is defined a specific area surrounding the desired temperature range indicating temperatures outside the desired temperature range. Temperatures within these areas are still acceptable. This acceptable temperature range is predefined for every mode M1 to M5 from 2° below the lower limit of the relevant temperature range d1 to d5 to the lower limit of the depicted temperature range d1 to d5, and from the upper limit of the relevant temperature range d1 to d5 up to 4° above the upper limit of the relevant temperature range d1 to d5. Outside the relevant temperature range d1 to d5 and outside the acceptable temperature range for the specific operation mode M1 to M5, the temperature within the cooling device 30 is not acceptable. For example, when the temperature within the cooling device 30 is within the desired temperature range d2 during operation in mode M2, the cooling device 30 is operated in an energy saving mode. As soon as the temperature exceeds the desired temperature range but still is within the acceptable temperature range a2 above the desired temperature range d2, the cooling device 30 can be operated in a normal operation mode to cool down the cooling space towards the desired temperature range d2. If the temperature within the cooling device 30 even exceeds the acceptable temperature a2 above the desired temperature range d2, the cooling device 30 is operated in a high-performance mode to cool down the inner of the cooling device 30 as soon as possible at least until an acceptable temperature range is reached. In the present example, this high-performance mode lasts until an acceptable temperature range b2 below the desired temperature range d2 is reached. Thus, it is prevented that the temperature within the cooling device 30 just oscillates between the upper acceptable temperature range a2 and an upper not acceptable

temperature range na2, which would have the effect that the desired temperature range d2 is never reached. On the other hand, when the temperature within the cooling device 30 falls below the desired temperature range d2 to the lower acceptable temperature range b2, the controlling system 20 is configured to operate the cooling device 30 in a defrosting operation mode to defrost the cooling device to recover the cooling device. If the temperature within the cooling device 30 even falls below the lower acceptable temperature range b2, the controlling system 20 is configured to switch off the cooling device 30 to initiate a fast temperature increase in the cooling device 30 towards to the desired temperature range d2. The above set forth with regard do mode M2 can easily be transferred to the other modes M1 and M3 to M5. Besides the above-described functionality, also various other advantages possibilities are imaginable without leaving the scope of the present invention.

Again, returning to Figs. 4A and 4B depicting the mobile device 40, there are still some further features which can be controlled by the controlling system 20 and displayed by the display unit of the mobile device 40. For example, the cooling device 30 can comprise a fan which is activated when the temperature within the cooling device 30 falls below the lower acceptable temperature range, to blow warm air into the interior of the cooling device 30 for accelerating the desired heating up within the cooling device 30. Furthermore, the controlling system 20 is configured to control a frame heater of the cooling device 30 for defrosting the cooling device 30. Finally, the controlling system 20 is configured to monitor the status of the door of the cooling device 30 being closed or open. For example, this can be achieved by controlling the status of an interior illumination device positioned within the cooling device 30, specifically, whether illumination is on or off. The mobile device 40 is configured to display the obtained information with regard to the operation modes of the fan, the frame heater an the illumination as depicted in Figs. 4A and 4B.

In the following, some other advantageous functions of the depicted controlling system 20 will be described.

The depicted controlling system 20 is configured to control the operation mode of the cooling device 30 based on a real clock time. The real clock time can be obtained automatically via the router from the internet 90. When it is not possible to get the information with regard to the real clock time from the internet 90, the controlling system 20 is configured to obtain the real clock time information from the mobile phone 40 coupled to the controlling system 20. The controlling system 20 uses the obtained data with regard to the real clock time to control the operation mode of the cooling device 30, for example, by activating an operation of the cooling device 30 by a specific time set. For example, the operation mode can be switched on every day at 8 a.m. and switched off at 8 p.m. on the same day. Thus, the cooling device 30 is operated during day time only and, thus, energy consumption during night time is reduced significantly. Furthermore, the controlling system 20 according to the present embodiment is configured to

initiate a boosted cooling operation of the cooling device 30, for example, during noon and to execute a defrosting cycle at midnight. Thus, unintended temperature increases during noon due to high ambient temperatures can be avoided while the defrosting cycle is executed when no considerable temperature increase has to be feared as it would be during noon. In particular, the operation mode of the controlling system 20 and thus the operation mode of controlling the electronic devices 30, 40, 60, 70 and 80 is adapted to a user's behavior pattern stored in a memory coupled to the controlling system 20 as well as an additionally provided user behavior control system comprising at least a movement sensor coupled to the controlling system 20.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on a relative time which is generated by the processing unit of the controlling system 20. For example, when the user activates a boost mode for the cooling device 30 via the mobile phone 40 coupled to the controlling system 20, for example for a duration of 45 minutes, starting with receiving the instruction to perform the boost mode, the cooling system 30 is operated at a high-performance mode without considering the energy consumption. Such a boost mode, for example, can be activated before the user intends to go for shopping such that, a temperature increase due to the new items placed within the cooling device 30 after shopping is quenched.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on a global location of the RV obtained by the mobile phone 40 and/ or via the router 70 from the internet 90. For example, the controlling system 20 recognizes when the RV 10 is at home and, by recognizing this home position, switches off the cooling device 30 of the RV 10.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on operation information of the RV 10 by selecting the energy source for supplying the cooling device 30 based on the driving mode of the RV. Thus, when the RV 10 is motor-driven, the cooling device 30 is provided with energy from the automotive battery, while when the RV 10 is in a parked condition, the cooling device 30 is supplied with energy gained from the gas or fuel tank.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on an internal temperature and ambient temperature of the cooling device 30 and of the RV 10. For example, when the ambient temperature of the RV 10 is high while the internal temperature of the RV 10 is relatively low, the controlling system 30 is operated with an increased cooling power to provide a reliable cooling of the cooling space.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on tilting information for the RV 10 and, thus, for the cooling device 30. In particular, when the

RV 10 and, thus, also the cooling device 30 is tilted above a critical predefined value, the cooling device 30 is automatically shutdown to prevent damages thereto and/ or danger emanating from undesired effects when the cooling device 30 is tilted over while being operated.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on operation information of the cooling device 30 itself. In particular, when the controlling systems 20 determines that the cooling efficiency of the cooling device 30 drops, it controls the cooling device 30 to operate a defrosting cycle to restore the desired cooling efficiency.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on the current weather situation or the weather forecast for the current location of the RV 10. In particular, when the ambient temperature is high but soon strong rainfall or another temperature drop is expected according to the forecast, the cooling device 30 is not operated at its high-performance mode, because soon a drop in the ambient temperature is expected. Thus, the cooling device 30 is operated at a higher energy efficiency.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on a sound level of the cooling device 30 and the sound level within the RV 10. In particular, when the sound level of the cooling device 30 is high compared to the overall sound level within the RV 10, the cooling device 30 is controlled to operate in a silent mode by reducing the fan speed. Thus, users staying inside within the RV 10 are not acoustically disturbed by the operation of the cooling device 30, especially during night times.

The controlling system 20 further is configured to control the operation of the cooling device 30 based on the charging level and availability of various energy storages and sources. Exemplary energy sources are on-board systems like an automotive battery of the RV 10 or an internal gas tank and external electrical power supply, for example provided on a camping ground or at home, as indicated in Figs. 4A and 4B. In particular, when the controlling system 20 recognizes that an external energy supply is coupled to the RV 10 and is available, the cooling device 30 is operated with the energy from the external energy supply, but not with the energy from the on-board systems. This helps significantly to preserve the energy stored in the on-board systems.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on a determined energy consumption of the cooling device 30. In particular, when the energy consumption of the cooling device 30 is above an acceptable value, a defrosting operation is executed such that the desired cooling efficiency of the cooling device 30 is restored.

Furthermore, the controlling system 20 is configured to control the operation mode of the cooling device 30 based on further specific operation instructions programmed to the central processing unit, stored in a memory coupled to the central processing unit of the controlling system 20 and received via the mobile phone 40 or read out from the internet 90 via the router 70. In particular, each command received from the mobile phone 40 and, thus, intended by a user will be carried out by the controlling system 20 regardless of other programmed or stored information. This ensures that the controlling system 20 controls the cooling device 30 as it is desired by the user.

It is obviously, that the controlling system 20 has to be coupled to corresponding electrical devices providing the data required to control the operation mode of the cooling device 30 in the above-described advantages manners.

REFERENCE SIGNS

10:	recreational vehicle
20:	controlling system
30:	cooling device
40:	mobile device
41:	internal temperature
42:	operation mode of air-con
43:	charging level of automotive battery
44:	filling level of water tank
45:	last date of exchanging water of the water tank
46:	morning mode
47 :	night mode
48:	sleep-summer mode
49:	quick cool mode
50:	electronic control unit
52:	speed sensor
54:	temperature sensor
56:	charging level sensor
60:	air con
70:	router
80:	movement sensor
90:	internet

S1 to S3:	method steps
M1 to M5:	temperature modes
d1 to d5:	desired temperature ranges
a2:	acceptable temperature range above desired temperature range d2
b2:	acceptable temperature range below desired temperature range d2
na2:	non-acceptable temperature range above desired temperature range d2
nb2:	non-acceptable temperature range below desired temperature range d2

CLAIMS

1. A controlling system (20) configured to be installed in a caravan or recreational vehicle (10), wherein the controlling system (20) comprises a central processing unit, a read out unit and a controlling unit, wherein the controlling system (20) is configured to be coupled to a plurality of electronic devices (30, 40, 50, 60, 70, 80) and/or sensors (52, 54, 56) of the caravan or recreational vehicle (10),
characterized in that,
the read out unit of the controlling system (20) is configured to read out data from the electronic devices (30, 40, 50, 60, 70, 80) and/ or at least one of the sensors (52, 54, 56) of the caravan or recreational vehicle (10) coupled to the controlling system (20) and to forward the read out data to the central processing unit,
the central processing unit is configured to receive and to process the read out data received from the read out unit and to forward processed data to the controlling unit, and
the controlling unit is configured to receive the processed data from the central processing unit and to control at least one of the electronic devices (30, 40, 50, 60, 70, 80) coupled to the controlling system based on at least some of the processed data.

2. The controlling system (20) according to claim 1,
wherein the controlling system (20) further comprises a memory unit,
wherein the memory unit is configured to store information defining how to control the at least one of the electronic devices (30, 40, 50, 60, 70, 80) based on the read out data,
wherein the central processing unit further is configured to read out the stored information from the memory unit and to use these information to process the read out data.

3. The controlling system (20) according to any one of the preceding claims,
wherein the central processing unit further is configured to generate and to process data, in particular time related data.

4. The controlling system (20) according to any one of the preceding claims,
wherein the controlling system (20) comprises or is coupled to a display unit (40),
wherein the central processing unit further is configured to forward at least a part of the processed data to the display unit (40), and the display unit (40) is configured to receive and display said part of the processed data.

5. The controlling system (20) according to any one of the preceding claims, wherein the controlling system (20) is configured to be coupled to electronic devices (30, 40, 50, 60, 70, 80) via wireless data connection and in particular to receive and process commands from the electronic devices (30, 40, 50, 60, 70, 80) coupled to the controlling system (20) as read out data.

6. The controlling system (20) according to any one of the preceding claims, wherein the plurality of the electronic devices (30, 40, 50, 60, 70, 80) comprises an electric control unit (50) of the caravan or recreational vehicle (10), mobile and stationary equipment of the caravan or recreational vehicle (30, 60, 70), other controlling systems and/ or BUS-systems provided in the caravan or recreational vehicle (10), additionally provided sensors (80) and/ or external mobile devices (40).

7. The controlling system (20) according to any one of the preceding claims, wherein the processing unit of the controlling system (20) is sourced out at least partially to one or more of the electronic devices (40) coupled to the controlling system.

8. The controlling system (20) according to any one of the preceding claims, wherein the controlling system (20) is coupleable to the internet (90) and configured to read out data from the internet (90) automatically when coupled thereto.

9. The controlling system (20) according to any one of the preceding claims, wherein the controlling system (20) is coupleable to various energy storages of the caravan or recreational vehicle (10) and/ or controlling systems (56) for such energy storages provided to supply energy to the at least one electronic device (30), and configured to control, which one of the provided energy storages is used to supply energy to the at least one electronic device (30).

10. The controlling system (20) according to any one of the preceding claims, wherein the controlling system (20) provides various operations modes (46, 47, 48, 48, M1 to M5), preferably an energy saving mode, a high power mode and/ or a silent mode, selectable by a user for controlling the at least one electronic device (30) in a specific manner.

11. The controlling system (20) according to any one of the preceding claims, wherein the at least one of the electronic devices (30, 40, 50, 60, 70, 80) is a cooling device (30) for a caravan or recreational vehicle (10), in particular a refrigerator and preferably an absorption refrigerator, and/ or a device responsible to define and/ or control an operation mode of the

cooling device (30).

12. The controlling system (20) according to claim 11,
wherein the controlling system (20) is configured to control the operation mode of the cooling device (30) based on data with regard to a real clock time, a relative time, a global location of the caravan or recreational vehicle (10), operation information of the caravan or recreational vehicle (10), tilting information for the caravan or recreational vehicle (10) and/ or of the cooling device (30), an internal and/ or ambient temperature of the cooling device (30) and/ or the caravan or recreational vehicle (10), operation information of the cooling device (30) itself, a current weather situation and/ or weather forecast, a state of charge and/ or availability of various energy storages and/ or sources, a sound level of the cooling device (30) and/ or within the caravan or recreational vehicle (10), a current energy consumption of the cooling device (30), and/ or specific operation instructions programmed to the central processing unit, stored in a memory coupled to the central processing unit and/ or received via or read out from one or more of the electronic devices (30, 40, 50, 60, 70, 80).

13. The controlling system (20) according to any one of the preceding claims 11 to 12,
wherein the controlling system (20) is configured to control an operation mode of a heater and/ or a compressor of the cooling device (30).

14. A cooling device (30) for a caravan or recreational vehicle (10), in particular a refrigerator and preferably an absorption refrigerator,
wherein the cooling device (30) comprises or is coupled to a controlling system (20) according to any one of the preceding claims 1 to 10.

15. A caravan or recreational vehicle (10),
comprising a controlling system (20) according to claim any one of the preceding claims 1 to 13 and/ or a cooling device (30) according to claim 14.

16. A method for controlling an operation mode of a cooling device (30), in particular a refrigerator and preferably an absorption refrigerator, for a caravan or recreational vehicle (10) comprising the steps of:
reading out data from electronic devices (30, 40, 50, 60, 70, 80) and/ or sensors (52, 54, 56) of the caravan or recreational vehicle (10);
processing the read out data; and
controlling the operation mode of the cooling device (30) based on at least a part of the

processed data.

17. The method according to claim 16,
wherein controlling the operation mode of the cooling device (30) is based on data with regard to the real clock time, a relative time, a global location of the caravan or recreational vehicle (10), operation information of the caravan or recreational vehicle (10), tilting information for the caravan or recreational vehicle (10) and/ or of the cooling device (30), an internal and/ or ambient temperature of the cooling device (30) and/ or the caravan or recreational vehicle (10), operation information of the cooling device (30) itself, a current weather situation and/ or weather forecast, a state of charge and/ or availability of various energy storages and/ or sources, a sound level of the cooling device (30) and/ or within the caravan or recreational vehicle (10), a current energy consumption of the cooling device (30), and/ or specific operation instructions programmed to the central processing unit, stored in a memory coupled to the central processing unit and/ or received via or read out from one or more of the electronic devices (30, 40, 50, 60, 70, 80).

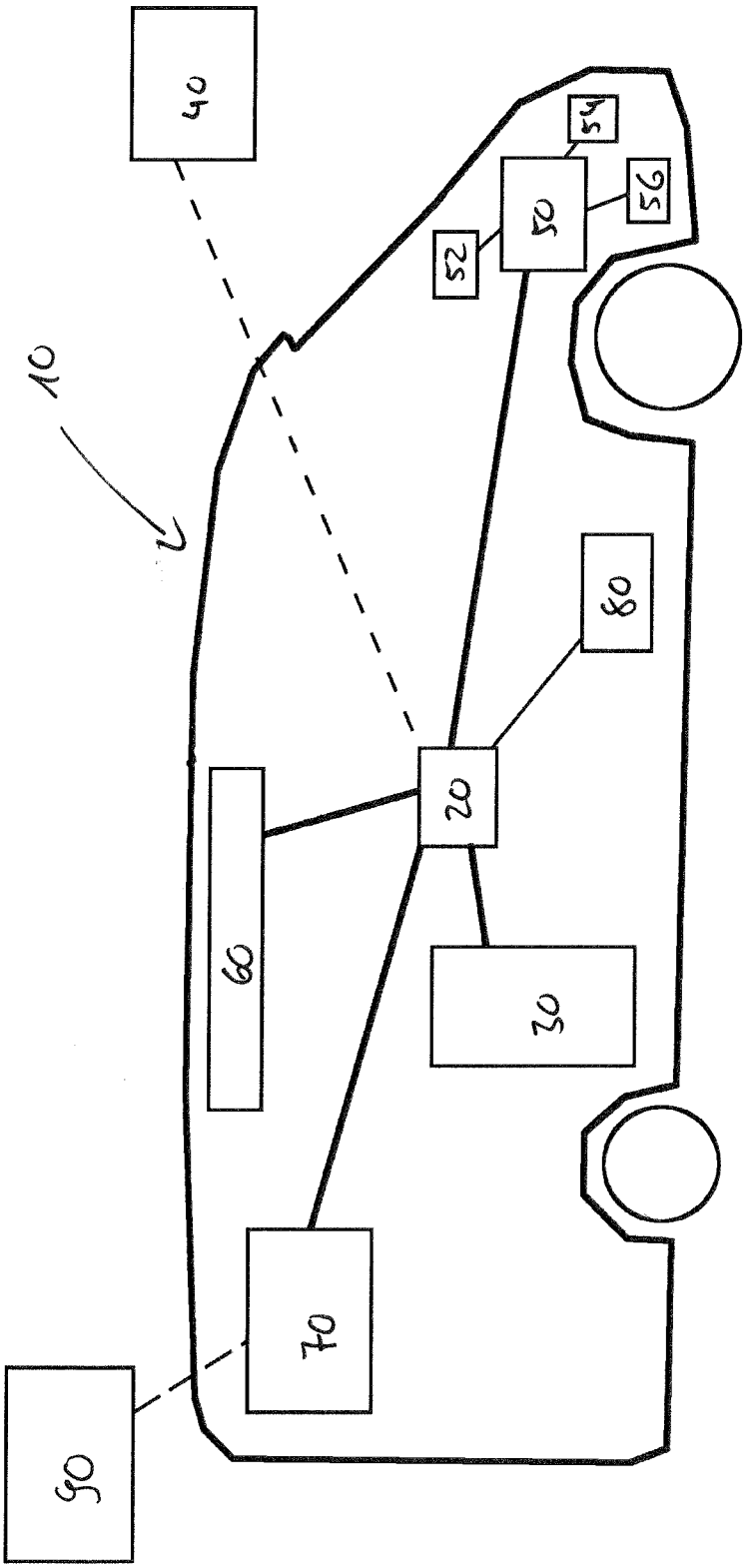


FIG. 1

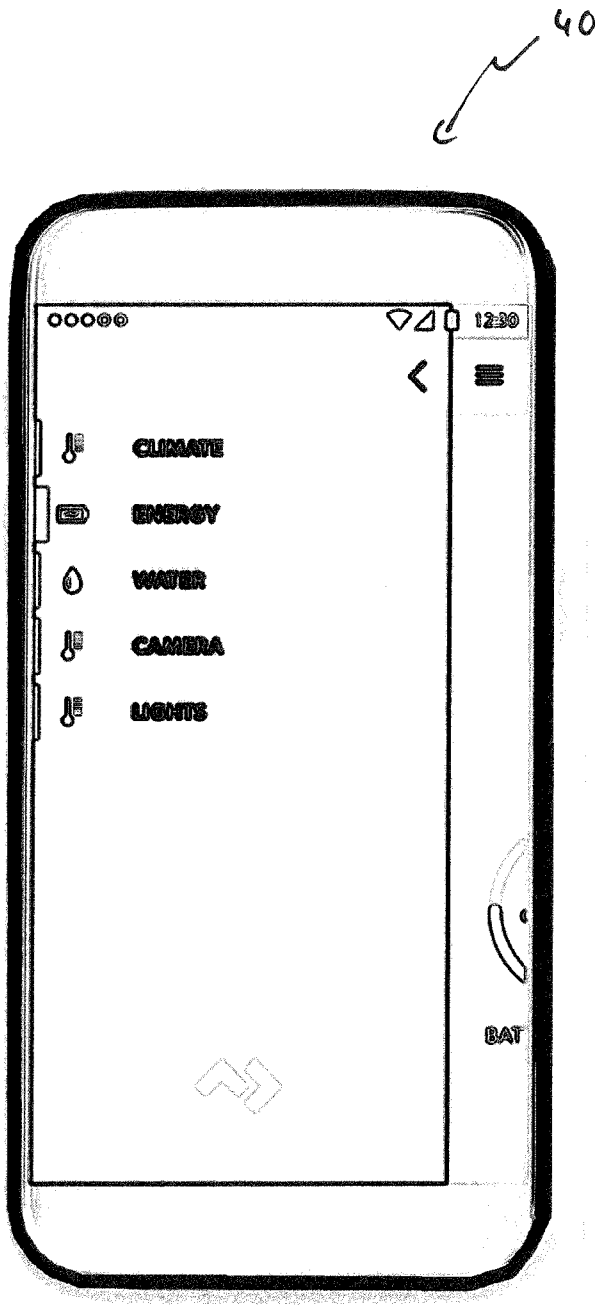


FIG. 2A

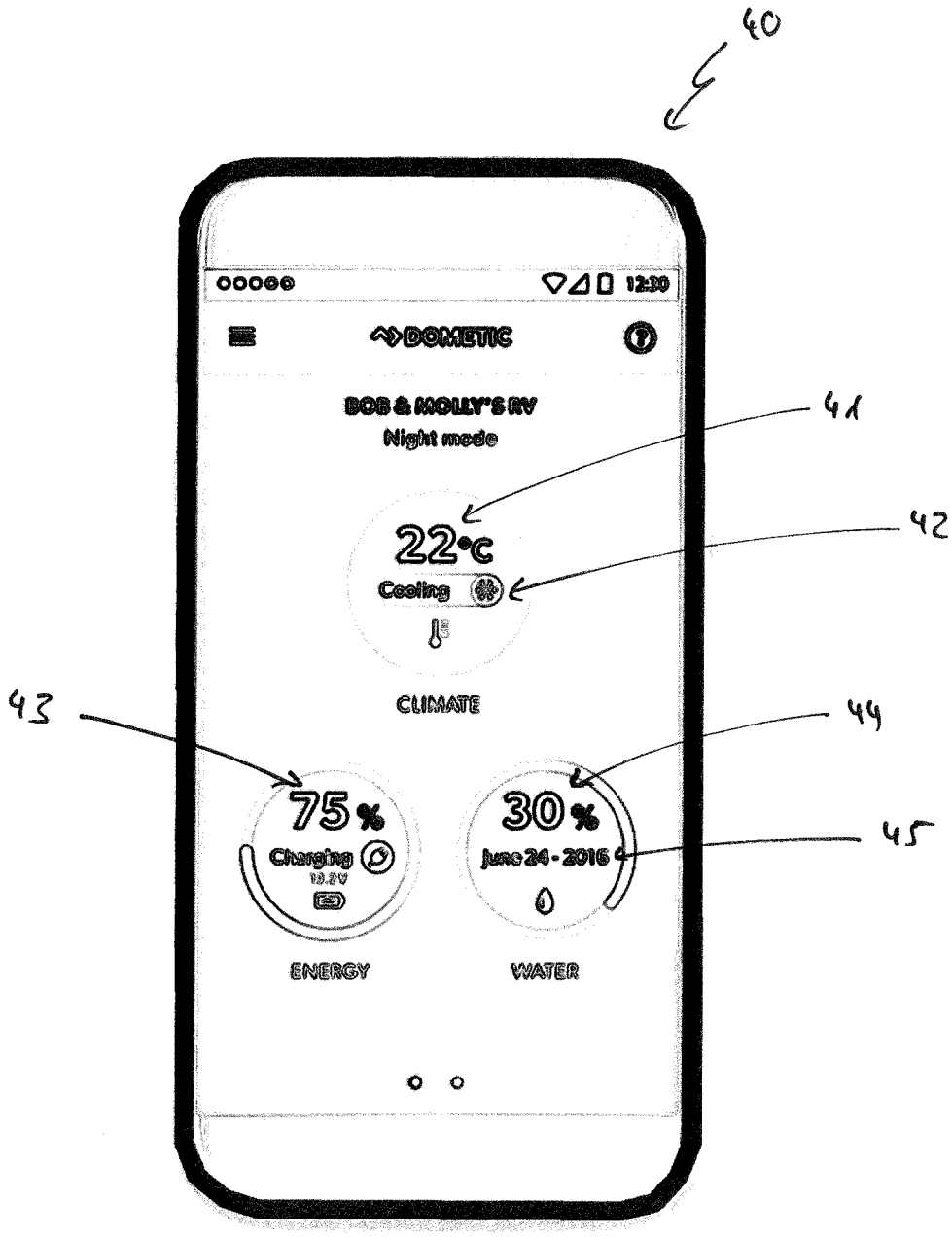

40
12:30
DOMETIC
BOB & MOLLY'S RV
Night mode
41
22°C
42
Cooling
CLIMATE
43
44
75 %
Charging
13.2V
30 %
June 24 - 2016
45
ENERGY
WATER

FIG 2B

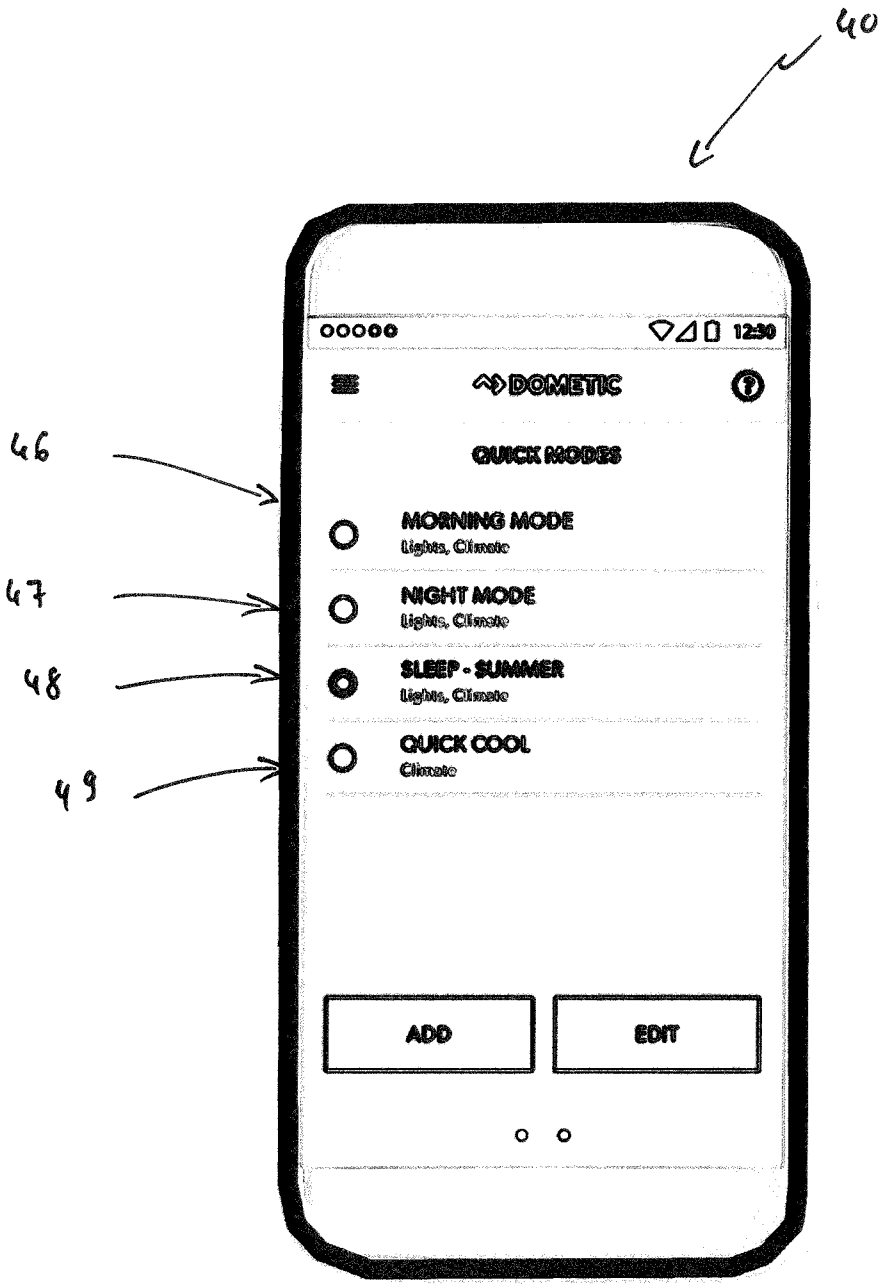

40
46
47
48
49
12:30
DOMETIC
QUICK MODES
MORNING MODE
Lights, Climate
NIGHT MODE
Lights, Climate
SLEEP - SUMMER
Lights, Climate
QUICK COOL
Climate
ADD
EDIT

FIG. 2C

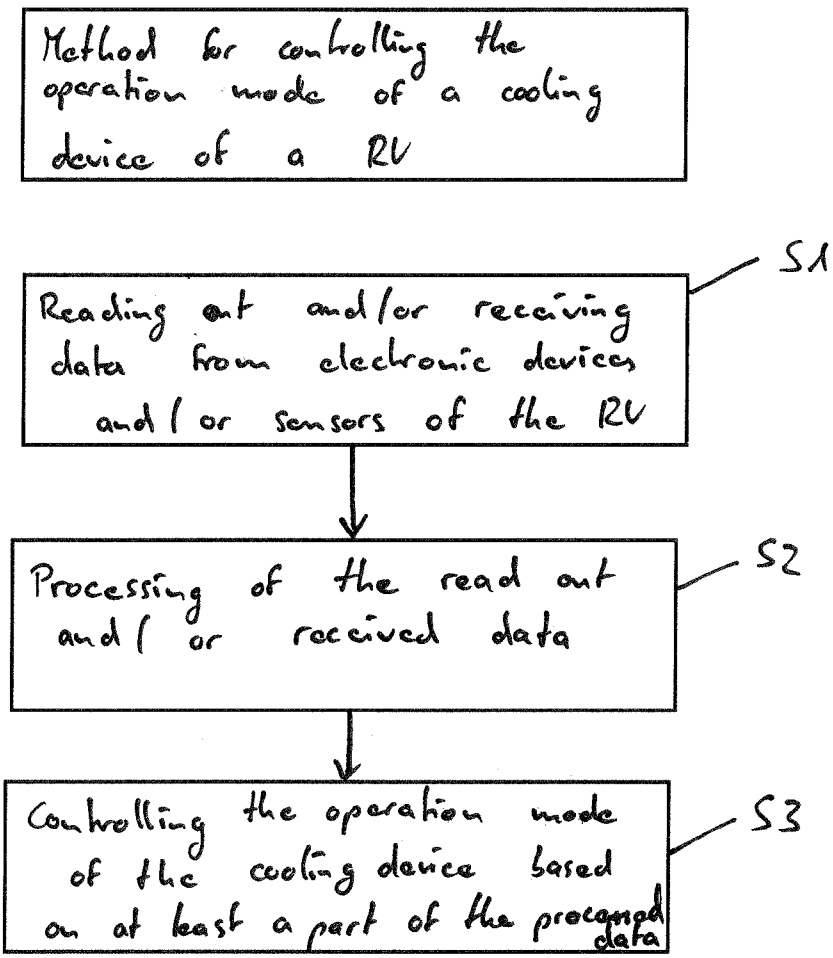

Method for controlling the operation mode of a cooling device of a RV
Reading out and/or receiving data from electronic devices and/or sensors of the RV
S1
Processing of the read out and/or received data
S2
Controlling the operation mode of the cooling device based on at least a part of the processed data
S3

FIG. 3

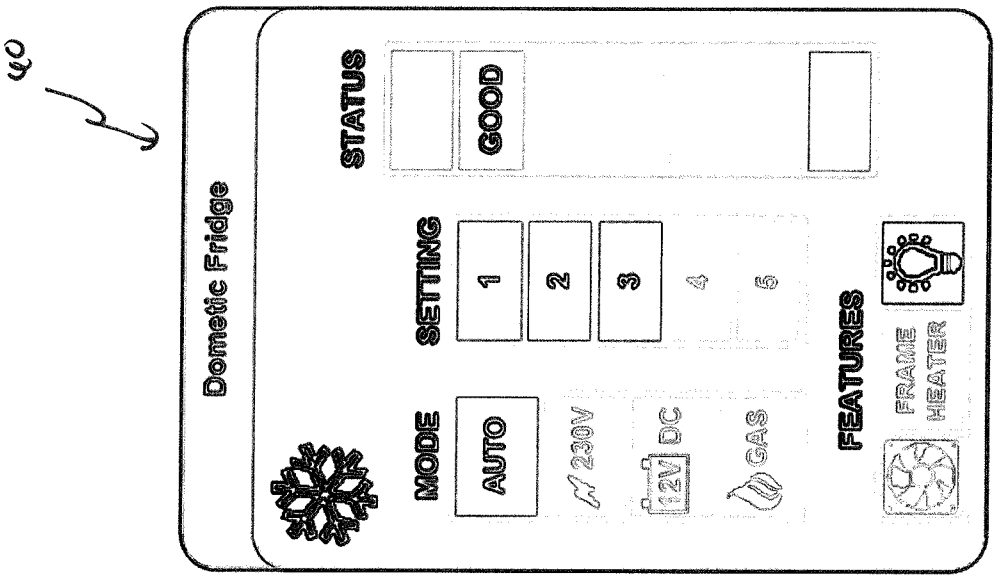

40
Dometic Fridge
STATUS
GOOD
SETTING
1
2
3
4
5
MODE
AUTO
230V
12V DC
GAS
FEATURES
FRAME HEATER

FIG. 4B

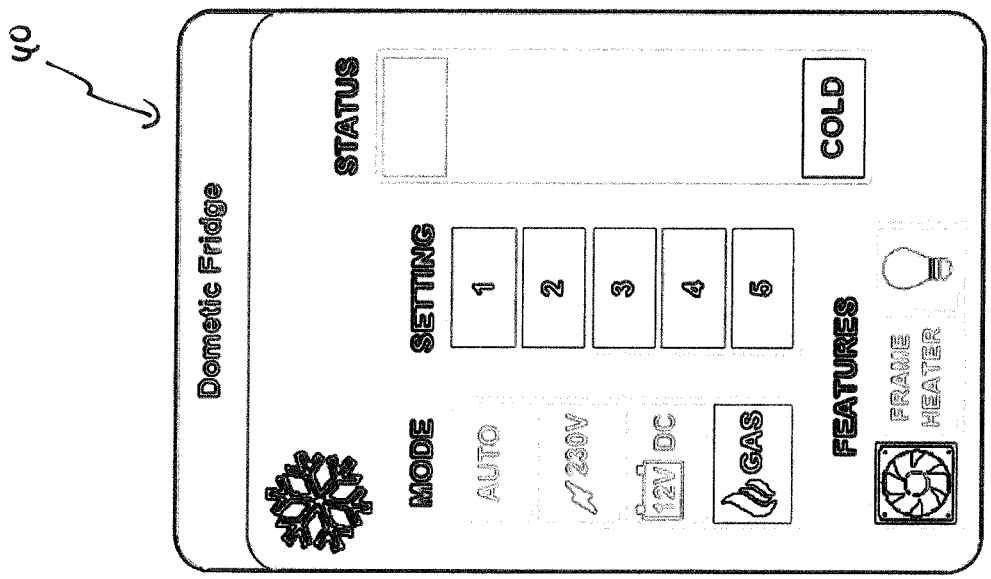

40
Dometic Fridge
STATUS
COLD
SETTING
1
2
3
4
5
MODE
AUTO
230V
12V DC
GAS
FEATURES
FRAME HEATER

FIG. 4A

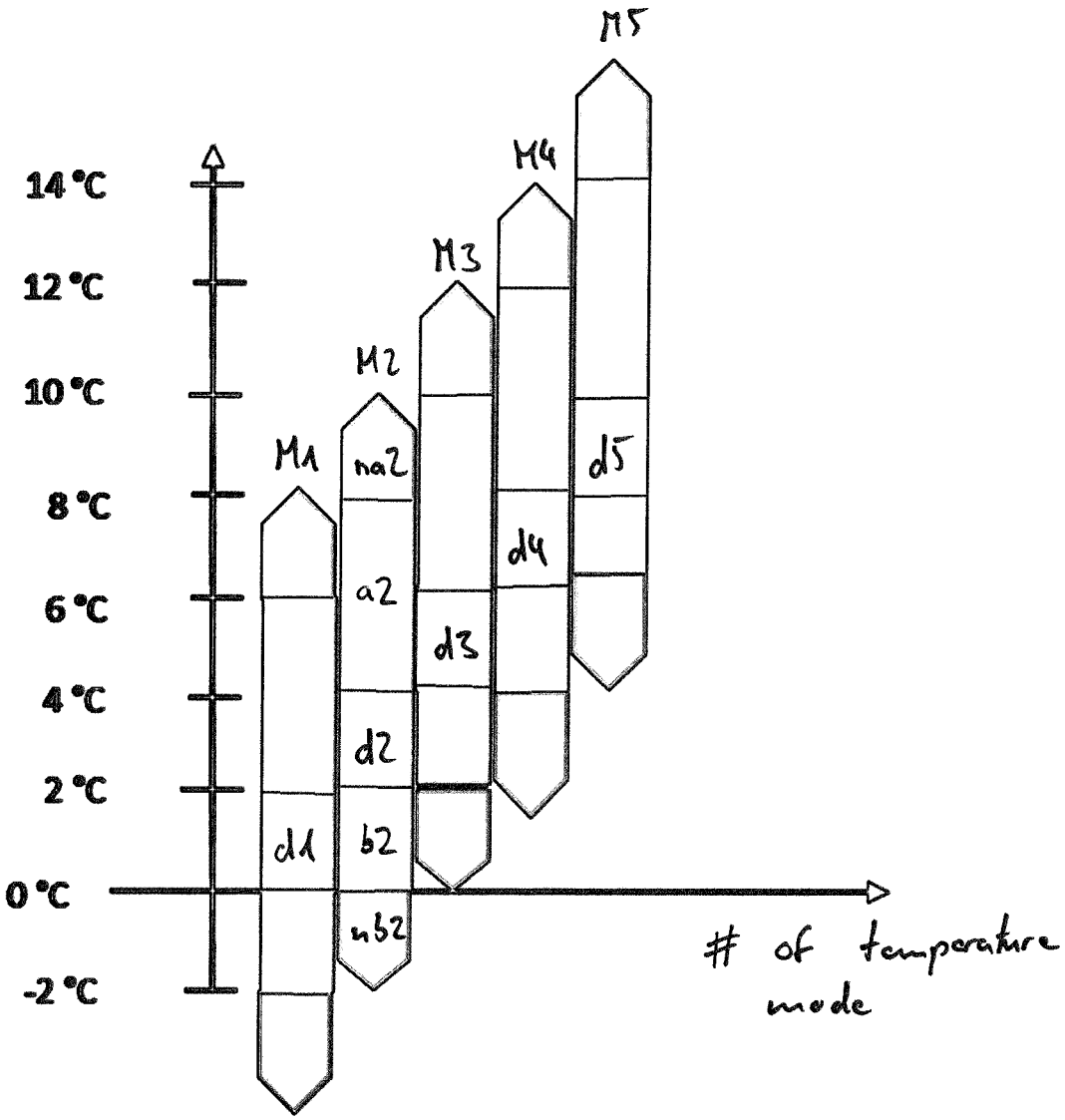

M5
M4
M3
M2
M1
14 °C
12 °C
10 °C
8 °C
6 °C
4 °C
2 °C
0 °C
-2 °C
na2
a2
d5
d4
d3
d2
d1
b2
nb2
# of temperature mode

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/070390

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25B49/04 B60H1/00
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)
F25B G05D

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.
X Y	US 2008/115513 A1 (UNMACK PAUL NEILSON [US]) 22 May 2008 (2008-05-22) paragraph [0122]; claims 1-4; figures 1A, 1B	1-4,6,7, 10-17 5,8,9

X Y	WO 2012/122390 A2 (ATWOOD MOBILE PRODUCTS LLC [US]; LEISTNER DAVID WILLIAM [US]; HEAGEY R) 13 September 2012 (2012-09-13) paragraphs [0019], [0030] - [0037]; claims 1,4,5; figures 3A-3C, 4	1-4,6,7, 10-17 5,8,9

Y	WO 2016/000041 A1 (TRIS INNOVATIONS PTY LTD [AU]) 7 January 2016 (2016-01-07) paragraphs [0073], [0074]; claim 1; figure 1	5,8,9

☐ Further documents are listed in the continuation of Box C.

☒ 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	Date of mailing of the international search report
12 September 2018	21/09/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Camerer, Stephan

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2018/070390

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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