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(54) **System for controlling electric and electronic devices in a travelling means**

(57) A control system (1) for controlling a plurality of electric and electronic devices installed on a travelling means such as a caravan (5), a motor caravan (6), a watercraft (7) or alike travelling means, comprising a central processing unit (10) for controlling said plurality of

electric and electronic devices, wherein said central unit (10) is apt to receive and send signals from/to said electric and electronic devices by means of electromagnetic waves.

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Description

[0001] The present invention refers to a control system for controlling electric and electronic devices installed on a travelling means, such as a motor caravan, a caravan, a watercraft, or alike travelling means.

[0002] Thanks to technological development, to the means of transport in general a number of devices have gradually been added that carry out many ancillary functions with respect to the primary function of the means of transport.

[0003] In particular, motor caravans, caravans and also watercrafts to date are equipped with instrumentations, devices and functions that make safer, more comfortable and easier the onboard stay and the utilization of said means.

[0004] Consider, e.g., inside and outside lighting management, white and grey water tank level control, power consumptions and battery charge control, tilt and parking sensors, or sensors for detecting the approaching to obstacles, internal air-conditioning control, turning on or off car radios and TV sets, antitheft alarms, operation of other ancillary devices such as an external step or chromotherapy spotlights. Evidently, this list represents only some of the functions that can be implemented on a caravan, a watercraft or alike travelling means, as it is possible to increase the comfort level by adding additional devices assisting a user in meeting specific needs.

[0005] An element common to said devices carrying out said functions is anyhow that of having the need to interface with the user to send signals and/or to interface with the user to receive commands therefrom.

[0006] Therefore, there is the problem of making a system allowing a user's easy control of the functions implemented in the means he/she is using.

[0007] In known-art caravans, watercrafts and the like it is usually found that each device dedicated to one of the abovementioned functions is provided with its own screen or the like to communicate data and information to the user, and/or is provided with its own keyboard or the like to receive control commands.

[0008] Hence, this entails a remarkable scattering of the control spots, as said screen and/or said keyboard are located near the device itself; note that such a configuration entails both a waste of space and a certain lack of comfort, due to the fact that the user has to move around in the means in order to control the various functions.

[0009] Moreover, these control interfaces (screen and keyboard) typically provide forms and logics which are different for each device: therefore, in order to best exploit their potentialities the user has to "specialize" for each of them and adapt to different interface modes. This can prove exacting for a user less than familiar with said devices, in particular in case of an occasional and non-permanent use of the means. Accordingly, a user might experience difficulties in controlling said functions, and/or he/she might limit him/herself to a basic use of said de-

vices without being able to best exploit their potentialities.

[0010] Moreover, the installing of a device, and in particular the installing of its control system to make it usable by a user, entails the need to make electrical connections by means of cables: therefore, e.g., suitable raceways have to be laid in the wall claddings of the means, and said cables have to be run along paths not interfering with normal use of the travelling means. Accordingly, this entails restrictions to the installing position of the device, as said position has to be compatible with cabling requirements; apart from the work required to perform the cabling, this entails the need of a compromise between said requirements and the installing position optimal for the functionality of the device itself.

[0011] Some functions are anyhow not manageable by a known-art control system. Consider, e.g., the adjustment of the tilt of the means once parked: evidently, the plane of the means should be located in a horizontal position, both for users' comfort and for correct operation of some devices, like e.g. the tank level meter.

[0012] Therefore, usually the tilt of the means is checked roughly, or with an inclinometer, and adjusted by putting shims under it until reaching approximate horizontality. This operation is substantially manual, therefore not manageable by means of a known-art control system.

[0013] Object of the present invention is to solve the above-mentioned problems of the known art; this is attained by providing a control system for controlling a plurality of electric and electronic devices installed on caravans, motor caravans, watercrafts and the like as defined in independent claim 1. Secondary features of the present invention are defined in the corresponding claims thereof.

[0014] A first advantage of the present invention lies in providing a control system for caravans and alike means, allowing function control from any spot internal to the means and even from the outside of the means itself.

[0015] A second advantage of the present invention lies in providing a control system that be installable in a simple manner and with reduced (or no) need of cabling; moreover, the control system may be installed in a position most convenient from the standpoint of a user's ease of use.

[0016] Another advantage of the present invention lies in providing a control system of simple and versatile use, as the controlling of various devices can be carried out in a unified manner by means of a single remotely-operating portable device. Moreover, the devices configuration and their interfacing with a central control unit are made easier.

[0017] Yet another advantage of the present invention lies in providing a control system allowing easy adjustment of the tilt of the means.

[0018] Other advantages, features and operation steps of the present invention will be made apparent in the following detailed description of a preferred embod-

iment thereof, given by way of example and not for limitative purposes.

[0019] However, it is evident how each embodiment described in the present invention may have one or more of the advantages listed above; in any case, it is not required for each embodiment to concomitantly have all of the advantages listed.

[0020] Reference will be made to the figures of the annexed drawings, wherein:

- Fig. 1 depicts a control system for controlling a plurality of electric and electronic devices according to the present invention;
- Fig. 1A depicts a detail of the control system of Fig. 1 applied to a motor caravan;
- Fig. 2 schematically depicts some of the functions controlled by the control system of Fig. 1;
- Figs. 3A and 3B depict a method of adjusting the tilt of a motor caravan by means of the control system of Fig. 1.

Fig. 1 shows some typologies of travelling means, such as a caravan 5, a motor caravan 6, a watercraft 7 or alike travelling means or means of transport, comprising a control system according to the present invention; said control system is denoted by reference number 1.

As it is shown in Figs. 1A and 2, a control system 1 is apt to control a plurality of electric and electronic devices installed on a travelling means. Hereinafter the present invention will be described with specific reference to a motor caravan 6, though it is applicable in a substantially identical manner also to other means mentioned above.

[0021] Said control system 1 comprises a central processing unit 10 for controlling said plurality of electric and electronic devices, which is in communication with the same electric and electronic devices. In particular, said central unit 10 is apt to receive signals output from the electric and electronic devices, and in turn to send signals to the devices themselves. Such signals are transmitted by means of electromagnetic waves, preferably having a frequency ranging in the spectrum of from 0 to 300 GHz, corresponding to radio waves. There may be provided user-settable transmission channels for said waves.

[0022] The installing of said central unit 10 on the means 6 is unconstrained by cabling needs, since the unit, operating by means of radio waves, requires no electrical cable connection to the controlled devices; the central unit 10 is then mounted in a substantially removable manner on the means 6 and it can be placed in the spot most convenient for the user, so that its dimensions (however reduced) does not interfere with normal use of the spaces internal to the means 6. Evidently, also the installing of the control system 1 proves to be greatly simplified with respect to the known art.

[0023] The power supply of said central unit 10 is provided by at least one rechargeable electric accumulator, like e.g. a known-art rechargeable battery included in the

central unit 10 itself. Therefore, also a suitable battery charger 15 will be provided.

[0024] Each of said electric and electronic devices is in turn equipped with means for transmitting and receiving electromagnetic waves, making it capable of communicating with said central unit 10 by using a suitable communication protocol. Such receiving and transmitting means, as well as the communication protocol, can be construed as substantially known to the art and therefore are not described in greater detail.

[0025] Hence, the entire control system 1 appears as a set of electronic cards communicating and interacting thereamong by means of radio waves.

[0026] The control system 1 further comprises a remote portable device 20 apt to remotely communicate with said central unit 10 by means of electromagnetic waves, such as radio waves. Said remote portable device 20 is substantially a remote control or a palmtop comprising a keyboard 21 by means of which a user can select the signals to be sent to the central unit 10 to command the activation, the adjustment, and the deactivation of said electric and electronic devices.

[0027] Thus, the user can remotely manage the functions actuated by said devices by using a single control unit, i.e. the remote portable device 20, which can be used both from any spot internal to the means 6 and from spots outside of the means 6 itself, as long as within a radius of, e.g., 20 metres, variable also according to the transmitting power of the remote portable device 20 itself. By means of an electronic voice recognition device 25 included in the remote portable device 20, said functions can also be verbally managed. Moreover, the remote portable device 20 can comprise a GSM modem 26.

[0028] Said remote portable device 20 further comprises an LCD screen 22 or equivalent system (like e.g. a LED system) allowing to display information received from said central unit 10, and therefore to interact more effectively therewith.

[0029] In a preferred embodiment, the remote portable device 20 allows to display any alarms and anomalies of the central unit 10 and of the devices controlled thereby, as the system 1 provides a check-up of the functions at preset time intervals: in case anomalies are detected, the related information are sent by the central unit 10 to the remote portable device 20. Besides the displaying on the screen 22, the remote portable device 20 can communicate data received from the central unit 10 by means of a pre-recorded voice or a voice synthesizer included in the remote device 20 itself.

[0030] The electric and electronic devices controlled by the central unit 10 may be several and belonging to different typologies. Fig. 2 schematically summarizes some of the functions implemented by such devices.

[0031] E.g., the central unit 10 may control the turning on, the turning off and the adjustment of the lighting power of lighting devices, such as lights inside and outside of the means 6; moreover, it is provided the option of controlling chromotherapy spotlights, e.g. of RGB led type,

in order to manage brightness and colouring inside of the means 6 and select preset chromotherapy programs.

[0032] The central unit 10 communicates with a voltmeter 50 to control, through voltage metering, the state of connection of the means 6 to the AC 220V electrical power system, or to the DC 12V electrical power system; likewise, in addition there can be controlled the voltage and the current intensity of solar panels 51 placed on the roof of the means 6. Moreover, said central unit 10 communicates with meters 52 and 53 to determine the charge level of electric accumulators, such as the battery of the engine 54 and the service battery of the electric and electronic devices of the means 6. Charge level is displayed by the remote portable device 20; in case of an insufficient or next-to-insufficient charge level, and in case of a charge level nearing dangerous discharge levels, it is provided a signalling by means of alarms on the remote portable device 20 and/or by means of SMS automatically sent to the user.

[0033] In addition, the central unit 10 controls level meters 56 for liquids in tanks 57; e.g., there are monitored the levels of fuel, white water, grey water tanks. Full-tank or empty-tank alarms are provided, as well as alarms for near-freezing temperature (e.g., 4°C), with optional SMS sending to the user.

[0034] Always on the basis of signals received from the remote portable device 20, the central unit 10 can activate, deactivate and/or control other devices and in particular electrical household appliances, such as a water pump 55, a refrigerator, a car radio 58, a TV set, an air-conditioning system, a thermometer 59, an anti-theft alarm 60. Moreover, it can be operatively connected to electric and electronic devices associated to a system for moving an external step and/or a ladder for boarding said travelling means; i.e., the central unit 10 can manage and control the motion and the position of an external step apt to facilitate a user's getting out of and getting into the means 6.

[0035] Status information sent by said devices is transmitted to the remote portable device 20 to be displayed on the screen 22 or communicated by means of said voice synthesizer. Moreover, the remote portable device can display other information, such as inside and outside temperature, and function as watch 61 and as alarm clock.

[0036] To enhance safety aboard the means 6, among said electric and electronic devices there can also be a gas concentration meter 62, in particular for the monitoring of carbon monoxide, methane, alcohol, organic vapours, which is operatively connected to the central unit 10. The central unit 10 receives the metered concentration values and, when the metered concentration is greater than a hazardous threshold value, it activates alarm devices placed both on the central unit 10 and the remote portable device 20.

[0037] The means 6, in particular when it is a caravan or a motor caravan, may be provided with parking sensors 63, i.e. sensors for metering the distance between

said travelling means and a reference external to the travelling means; the parking sensors are, e.g., placed both on the roof of the means 6 and in the rear of the means 6 itself. Said sensors 63 send increasingly frequent acoustic signals in proximity of an obstacle (e.g., a wall, a post, a tree, a bridge, a balcony...) and moreover, thanks to the communication with the central unit 10, allow to display on the remote portable device 20 the approximate distance from said obstacle.

[0038] Furthermore, among the mentioned electric and electronic devices a tilt meter 64 may be comprised, for metering the tilt of the means 6 with respect to a horizontal plane. Said tilt meter 64 could optionally be physically comprised in the central unit 10, and therefore communicate therewith by means of a cable rather than by means of electromagnetic waves.

[0039] Calibration parameters of the tilt meter 64 are set on a horizontal plane at the installing thereof; subsequently, said tilt meter 64 detects the tilt of the means 6 with respect to said plane and sends signals to the central unit 10. The central unit 10 receives the values of the tilt and transmits them to the remote portable device 20, where they are displayed on the screen 22. Said tilt meter 64 may be operatively connected with an antitheft alarm system 60, activating when the tilt changes with respect to preset values without said change having been authorised beforehand by the user, thereby indicating that the means is in undesired motion. Or, on a caravan, the alarm system 60 activates at the changing of the tilt, as this indicates that the caravan has been detached from the car and the tow bar has been lifted. The alarm can be acoustic, as well as with the sending of an SMS.

[0040] Moreover, the displaying on said remote portable device 20 of the tilt values of the travelling means detected by said tilt meter 64 allows the adjustment of the same tilt, in case the means is a caravan 5 or a motor caravan 6 or the like parked on a slope 75. By means of the remote portable device 20 a user can, even remaining outside of the means 6, send signals for the activation of tilt adjusting means 70. Said signals are received by the central unit 10 and transmitted to the adjusting means 70 itself, e.g. comprising plural motorised hydraulic jacks placed under the floor of the means 6. Said adjusting means 70, which therefore is operatively connected to the central unit 10, lifts the means 6 in a differentiated manner on its different sides, thereby changing its tilt; the user controls in real time on the screen 22 the tilt of the means 6 and, by acting on said remote portable device 20, activates the adjusting means 70 until reaching the desired tilt.

[0041] In a preferred embodiment, protection of electric and electronic devices from electrical overloads is attained not by means of traditional fuses, but by means of smart breakers that are operatively connected with the central unit 10. Said smart breakers continuously monitor electric power requests from the electric and electronic devices controlled by the central unit 10.

[0042] As a smart breaker detects the occurrence of

an overload (e.g. due to a short-circuit) in an electric device, it automatically breaks off power supply to the same device and sends a signal to the central unit 10, communicating the occurred electrical overload and which is the device involved.

[0043] The central unit 10 retransmits the signal to the remote portable device 20, which displays on the screen 22 the information related to the occurred overload and to the device involved. Thus, the user can immediately intervene to repair any failure and/or to disconnect the involved device from the electrical power system, thereby restoring normal operation of the control system 1 and of the central unit 10.

[0044] The present invention has hereto been described according to a preferred embodiment thereof, given by way of example and not for limitative purposes.

[0045] It is understood that other embodiments might be provided, all to be construed as falling within the protective scope thereof, as defined by the appended claims.

Claims

1. A control system (1) for controlling a plurality of electric and electronic devices installed on a travelling means such as a caravan (5), a motor caravan (6), a watercraft (7) or alike travelling means, comprising a central processing unit (10) for controlling said plurality of electric and electronic devices, wherein said central unit (10) is apt to receive and send signals from/to said electric and electronic devices by means of electromagnetic waves.
2. The control system (1) according to the preceding claims, wherein said electromagnetic waves are radio waves.
3. The control system (1) according to claim 1 or 2, wherein said central unit (10) is removably mounted on said travelling means (5, 6, 7).
4. The control system (1) according to any one of the preceding claims, wherein said central unit (10) comprises at least one rechargeable electric accumulator.
5. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise a tilt meter (64).
6. The control system (1) according to the preceding claims, further comprising an alarm system operatively connected with said tilt meter (64).
7. The control system (1) according to claim 5 or 6, comprising means (70) for adjusting the tilt of said travelling means (5) operatively connected to said central unit (10), for adjusting the tilt of said travelling means (5) on the basis of signals sent by said tilt meter (64).
8. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one device selected from a group comprising: lighting device and chromotherapy spotlight.
9. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one level meter (56) for a liquid in a tank (57).
10. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one device selected from a group comprising: charge meter (52, 53) of an electric accumulator (54) and voltmeter (50).
11. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one sensor (63) for metering a distance between said travelling means (5, 6, 7) and a reference external to said travelling means.
12. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one electrical household appliance.
13. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices are associated to a system for moving an external step or a ladder for boarding said travelling means.
14. The control system (1) according to any one of the preceding claims, wherein said electric and electronic devices comprise at least one gas concentration meter (62).
15. The control system (1) according to any one of the preceding claims, wherein said central unit (10) is operatively connected with alarm devices.
16. The control system (1) according to any one of the preceding claims, further comprising at least one smart breaker apt to detect an electrical overload in one of said electric and electronic devices and to break off power supply to said device, said smart breaker being operatively connected with said central unit (10) to signal said electrical overload.
17. The control system (1) according to any one of the preceding claims, further comprising a remote portable device (20) remotely communicating with said

central unit by means of electromagnetic waves.

- 18.** The control system (1) according to the preceding claims, wherein said remote portable device (20) comprises a screen (22) for displaying information received from said central unit (10). 5
- 19.** The control system (1) according to claim 17 or 18, wherein said remote portable device (20) comprises a keyboard (21) for selecting signals to be sent to said central unit (10). 10
- 20.** The control system (1) according to any one of the claims 17 to 19, wherein said remote portable device (20) comprises a voice synthesizer. 15
- 21.** The control system (1) according to any one of the claims 17 to 20, wherein said remote portable device (20) comprises a voice recognition device (25). 20
- 22.** The control system (1) according to claim 7 and to any one of claims 17 to 21, wherein said remote portable device (20) is apt to send a signal for the activation of said tilt adjusting means (70). 25
- 23.** Travelling means (5, 6, 7), such as a caravan (5), a motor caravan (6), a watercraft (7) or alike travelling means, comprising a control system (1) according to any one of the preceding claims. 30

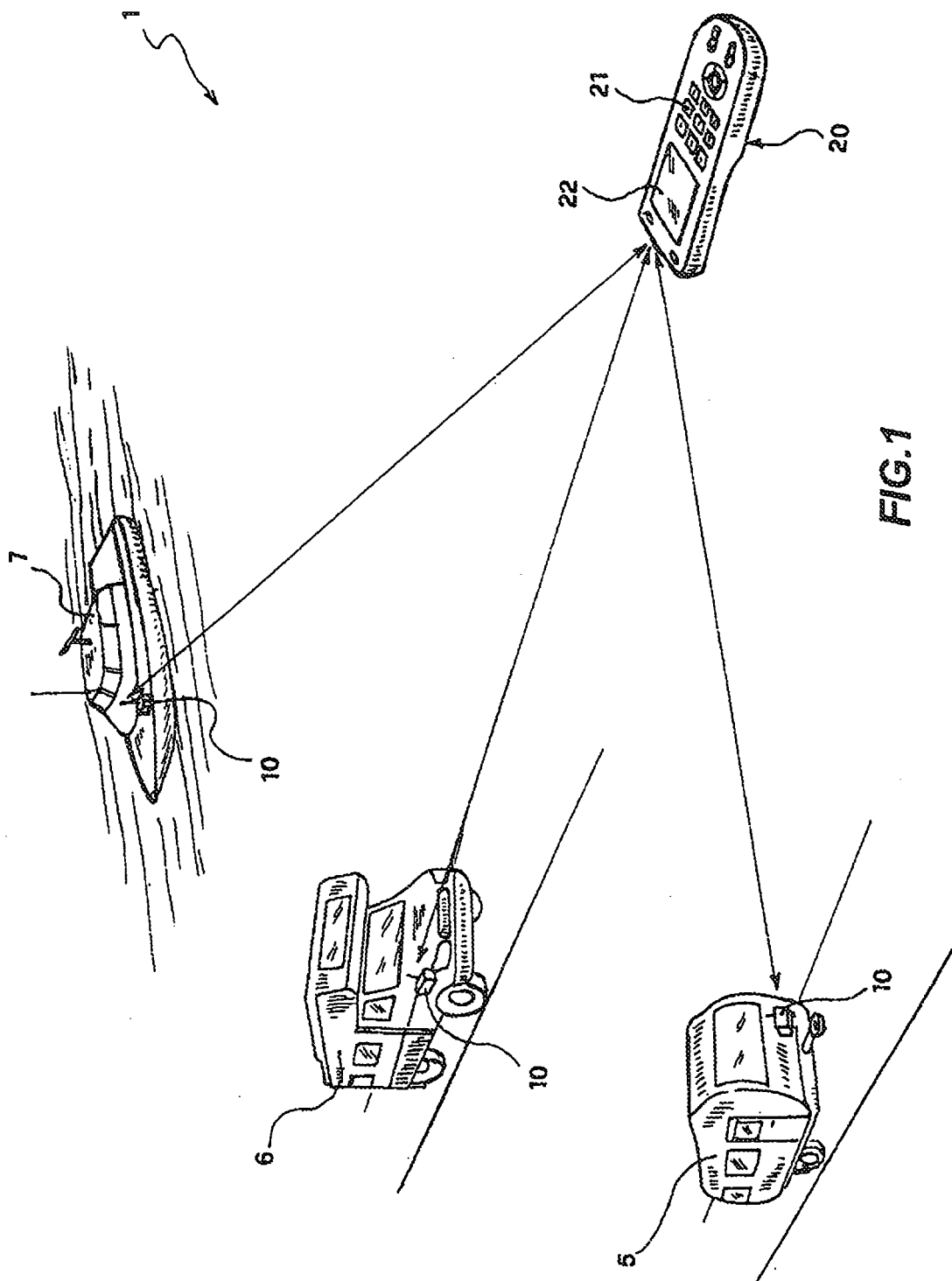
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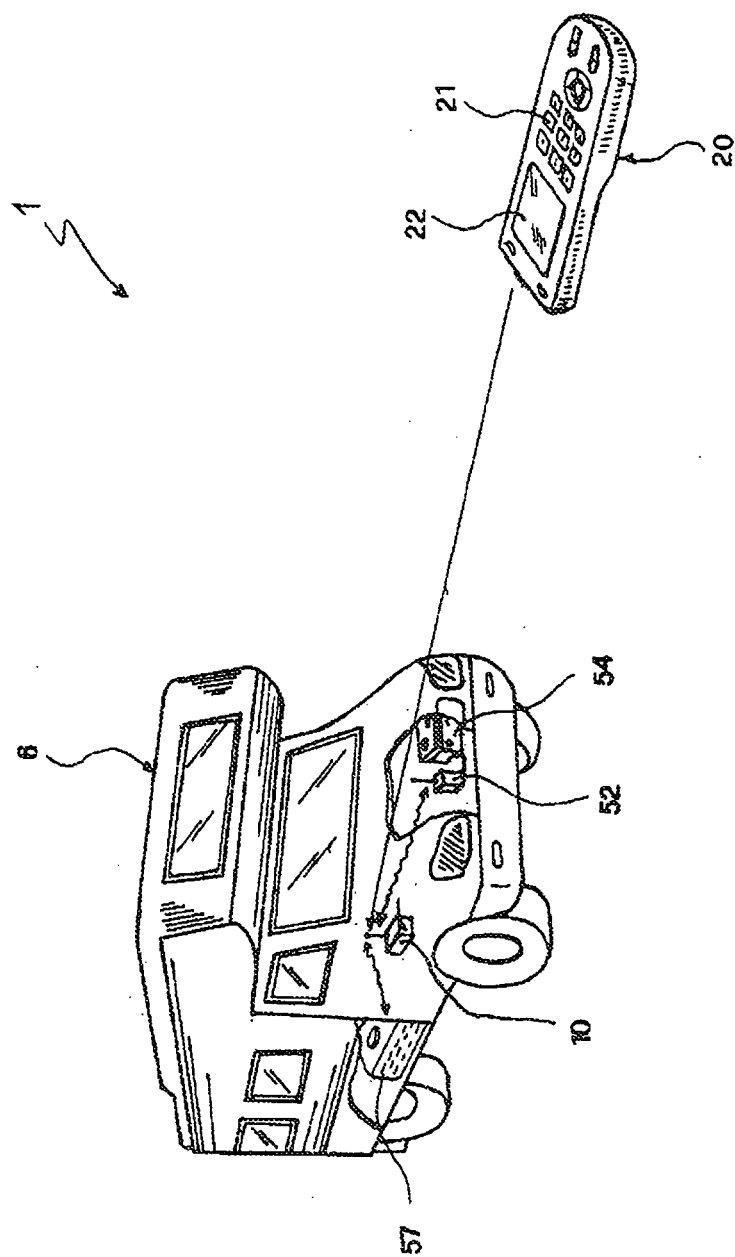


FIG. 1A

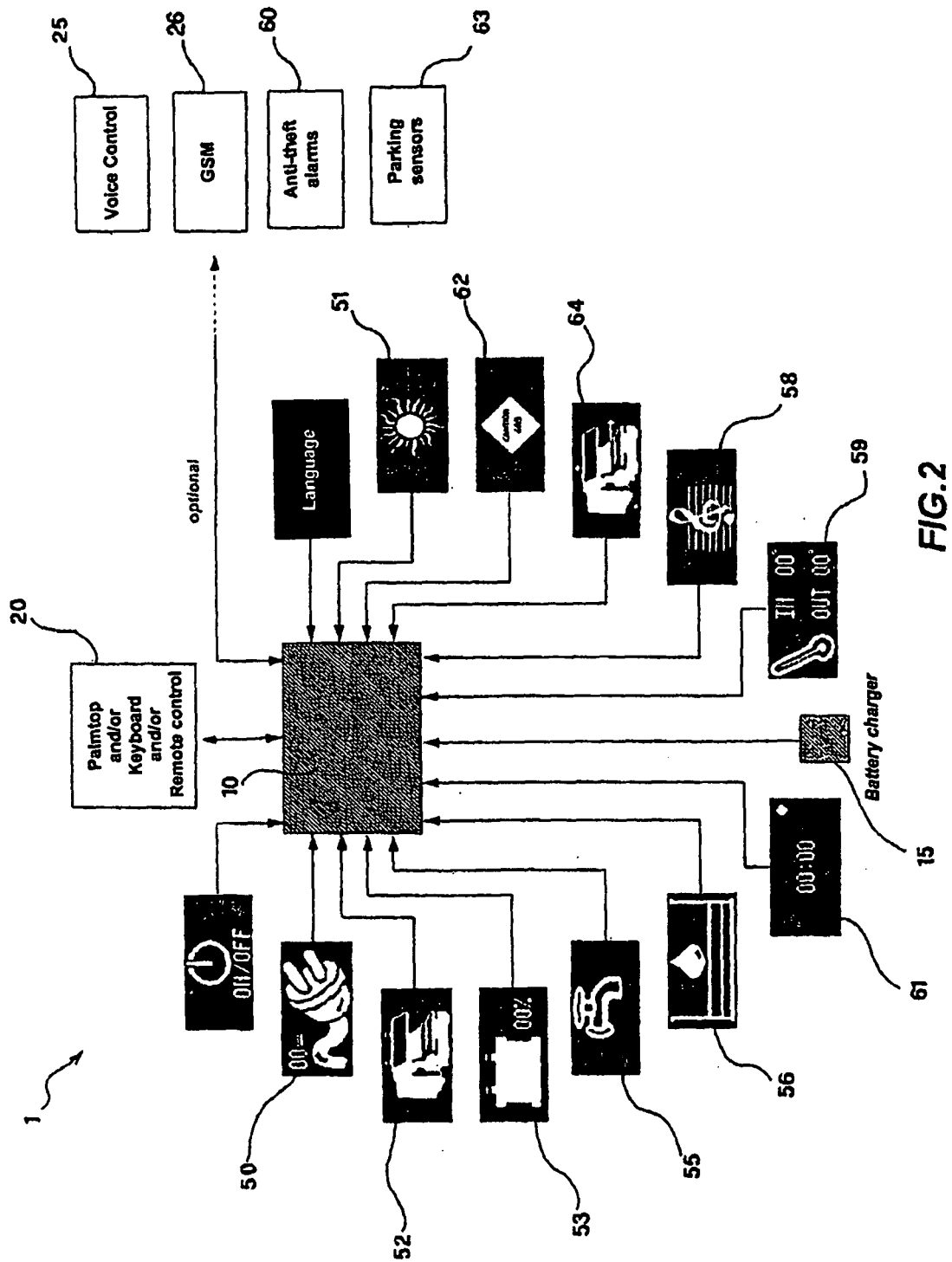


FIG.2

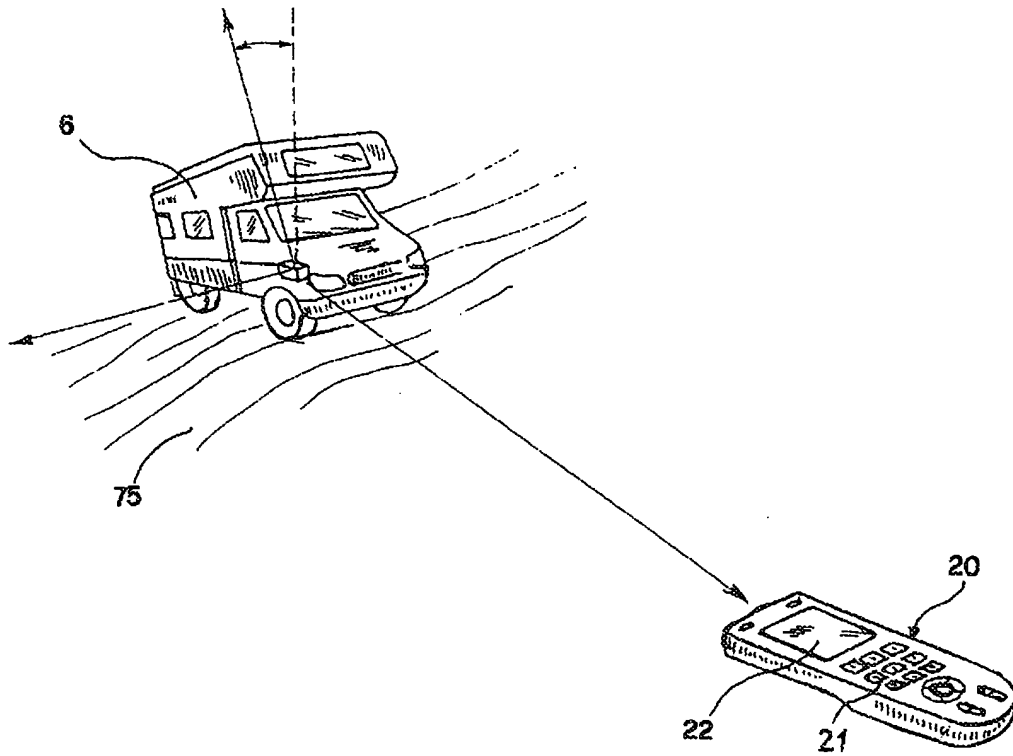


FIG. 3A

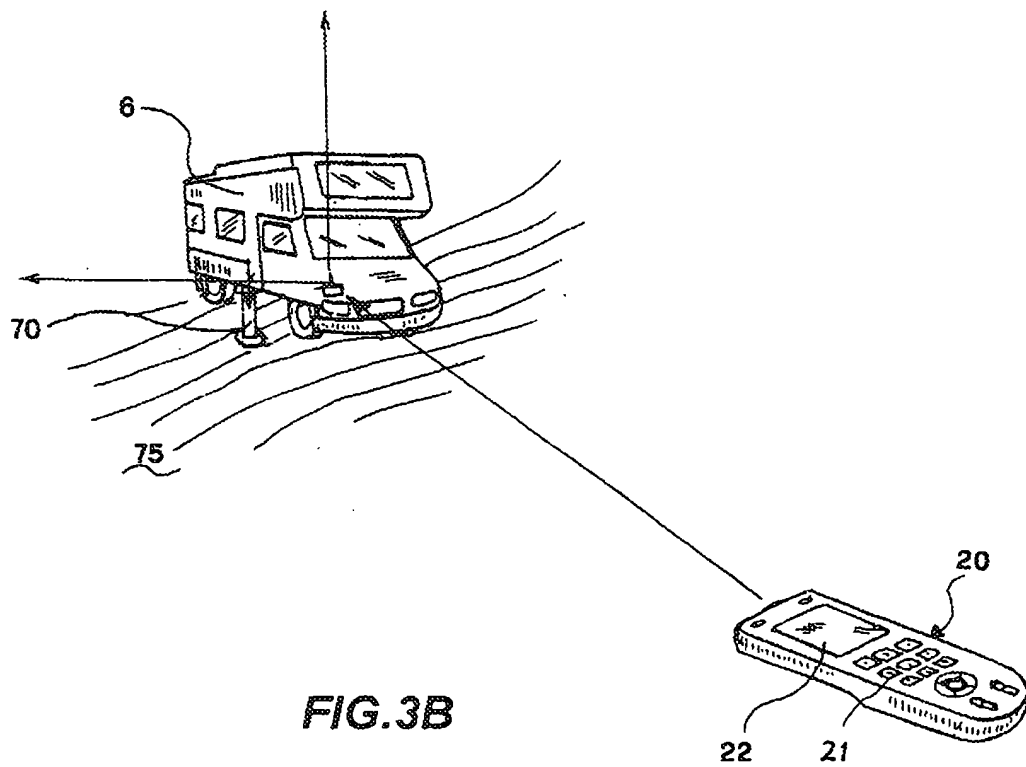


FIG. 3B