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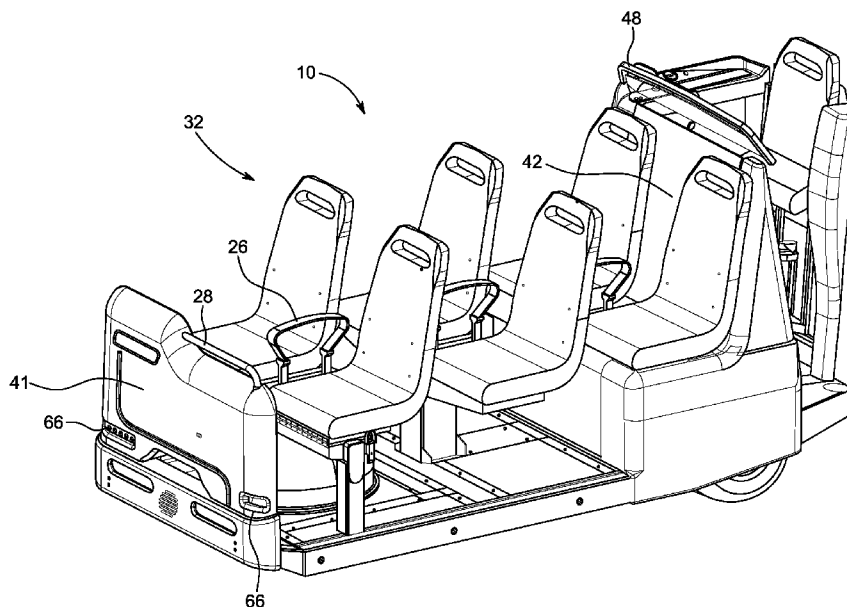


FIG. 7

(57) Abstract: A modular vehicle for transporting an individual, the vehicle comprising a main frame comprising a rear end and a front end opposite to the rear end, the main frame defining a longitudinal axis. The modular vehicle comprises at least two seats mounted side-by-side in a single row substantially perpendicular to the longitudinal axis, each of the at least two seats adapted for seating an individual, each of the two seats comprising a seat surface; and a backrest facing substantially toward the front end. The modular vehicle further comprises a driving area at the rear end of the main frame for driving the vehicle.



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MODULAR VEHICLE FOR PEDESTRIAN ENVIRONMENT

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from US patent provisional application 62/401,549 filed September 29 2016, the specification of which is hereby incorporated herein by reference in its entirety.

BACKGROUND

(a) Field

[0002] The subject matter disclosed generally relates to vehicles for pedestrian environments. More particularly, the subject matter disclosed relates to vehicles for transporting individuals/passengers in pedestrian environments such as airports, shopping centres, amusement parks, hotels, tourist areas, hospitals and the like.

(b) Related Prior Art

[0003] In many pedestrian environments, such as, without limitation, airports, shopping centres, amusement parks, hotels, tourist areas, hospitals, and the like, typical golf karts are often used to transport individuals (i.e., children, elderly people, travellers during their flight connections, etc.). Even if golf karts are very useful on golf playgrounds, they are often not the better option for other pedestrian environments.

[0004] For example, in airports, when travellers are late for a flight, airplane companies often transport them from one gate to another. Conventional golf karts are often used for this purpose even if it does not provide a safe environment for the airplane company's customers and enough space for travellers with their luggage. Furthermore, as the driver is located in front of the passengers transported by his conventional golf kart, he has no clue about what is going on in the golf kart (i.e., behind him) and behind the golf kart itself. Using golf karts to transport passengers in an airport can therefore be an unsafe practice.

[0005] On the other hand, a conventional golf kart may sometimes be hard to drive in pedestrian environments, as it needs to be driven as a conventional car. Objects or children can be located in front or in the back of the golf kart, and injuries can occur while the driver travels within a pedestrian environment.

[0006] Furthermore, conventional golf karts often provide room to transport a small number of individuals, while there is often a need to transport larger groups of individuals in the pedestrian environment.

[0007] Moreover, it is often not convenient for travellers to get in and out a conventional gold kart with their luggage due to actual configurations of golf karts.

[0008] There is therefore a need for vehicles for transporting individuals in pedestrian environments that are safe, easily accessible by individuals and easily manoeuvrable by drivers.

[0009] Features and advantages of the subject matter hereof will become more apparent in light of the following detailed description of selected embodiments, as illustrated in the accompanying figures. As will be realized, the subject matter disclosed and claimed is capable of modifications in various respects, all without departing from the scope of the claims. Accordingly, the drawings and the description are to be regarded as illustrative in nature, and not as restrictive and the full scope of the subject matter is set forth in the claims.

SUMMARY

[0010] According to an embodiment, there is disclosed a vehicle for transporting passengers, the vehicle comprising: a main frame comprising a rear end and a front end opposite the rear end, the main frame defining a longitudinal axis; a passenger area comprising more than one row of at least two seats mounted side-by-side, the more than one row being substantially perpendicular to the longitudinal axis whereby the at least two seats in each of the more than one row face the front end, each of the at least two seats adapted for seating a single passenger; and a driving area behind the passenger area at the rear end of the main frame.

[0011] According to an aspect, each of the at least two seats comprises: a seat surface; and a backrest facing substantially toward the front end.

[0012] According to an aspect, the driving area further comprises a driving console comprising a handheld controller operable by to operate the vehicle, wherein the handheld controller is operable by a driver in a standing or semi-standing position.

[0013] According to an aspect, the handheld controller is able to be tilted about a first plane and a second plane, wherein tilting the handheld controller about the first plane controls forward and backward displacement of the vehicle and tilting the handheld controller about the second plane controls direction of the vehicle.

[0014] According to an aspect, the handheld controller further controls at least one of speed of the vehicle and braking of the vehicle.

[0015] According to an aspect, the driving area comprise a side wall, wherein the driving console is mounted to the side wall thereby enabling one-hand operation of the handheld controller, and hence the vehicle, by the driver.

[0016] According to an aspect, the driving area comprises a side wall, a front wall and a back wall thereby closing off the driving area on three sides.

[0017] According to an aspect, the passenger area comprises a passenger area floor and the driving area comprises a driving area floor, wherein the driving area floor is higher than the passenger area floor.

[0018] According to an aspect, the vehicle further comprises two axles which are mounted to the main frame, wherein one of the two axles is for steering the vehicle, and wherein the driving area is located rearward of the two axles.

[0019] According to an aspect, the vehicle further comprises a left side and right side, wherein the left side and the right side are at least partially opened allowing individuals to board on the vehicle and to leave the vehicle from the left side and the right side of the vehicle.

[0020] According to an embodiment, there is disclosed a vehicle for transporting passengers, the vehicle comprising: a main frame comprising a front end and a rear end opposite to the front end, the main frame defining a longitudinal axis; a passenger area comprising a row substantially perpendicular to the longitudinal axis, the row having at least two seats mounted side-by-side with each seat being for seating a single passenger and wherein the at least two seats face the front end; and a driving area located behind the passenger area.

[0021] According to an aspect, the passenger area further comprises another row also comprising at least two seats which face the front end.

[0022] According to an aspect, each of the at least two seats comprises: a seat surface; and a backrest facing substantially toward the front end.

[0023] According to an aspect, the driving area further comprises a driving console comprising a handheld controller operable by a driver to operate the vehicle, wherein the handheld controller is operable by the driver in a standing or semi-standing position.

[0024] According to an aspect, the handheld controller is able to be tilted about a first plane and a second plane, wherein tilting the handheld controller about the first plane controls forward and backward displacement of the vehicle and tilting the handheld controller about the second plane controls direction of the vehicle.

[0025] According to an aspect, the handheld controller further controls at least one of speed of the vehicle and braking of the vehicle.

[0026] According to an aspect, the driving area comprise a side wall, wherein the driving console is mounted to the side wall thereby enabling one-hand operation of the handheld controller, and hence the vehicle, by the driver.

[0027] According to an aspect, the passenger area comprises a passenger area floor and the driving area comprises a driving area floor, wherein the driving area floor is higher than the passenger area floor.

[0028] According to an aspect, the vehicle further comprises two axles which are mounted to the main frame, wherein one of the two axles is for steering the vehicle, and wherein the driving area is located rearward of the two axles.

[0029] According to an aspect, the vehicle further comprises a left side and right side, wherein the left side and the right side are at least partially opened allowing individuals to board on the vehicle and to leave the vehicle from the left side and the right side of the vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] Further features and advantages of the present disclosure will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

[0031] Fig. 1 is an elevated perspective view of a modular vehicle for pedestrian environment in accordance with an embodiment;

[0032] Fig. 2 is a rear perspective view of the vehicle of Fig. 1;

[0033] Fig. 3 is a front perspective view of the vehicle of Fig. 1;

[0034] Fig. 4 is a top perspective view of the vehicle of Fig. 1;

[0035] Fig. 5 is a side perspective view of the vehicle of Fig. 1;

[0036] Fig. 6 is an opposite side perspective view of the vehicle of Fig. 1;

[0037] Figs. 7 and 8 are frontmost elevation views of one side and of the opposite side of the vehicle of Fig. 1;

[0038] Figs. 9 and 10 are rearmost elevation views of one side and of the opposite side of the vehicle of Fig. 1;

[0039] Fig. 11 is a frontmost elevated view of a modular vehicle for pedestrian environment according to an embodiment;

[0040] Fig. 12 is a back elevated view of the vehicle of Fig. 11; and

[0041] Fig. 13 is a schematic of the electric components and electric connections of a modular vehicle for pedestrian environment according to an embodiment.

[0042] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION

[0043] In embodiments, there are disclosed modular vehicles for pedestrian environment for transporting individuals/passengers in pedestrian environments such as, without limitation, airports, shopping centres, amusement parks, hotels, tourist areas, hospitals, and the like.

[0044] Referring now to the drawings, and more particularly to Figs. 1-6, there is shown a modular vehicle **10** for transporting one or more passenger(s) (not shown) in pedestrian environments in accordance with an embodiment. The modular vehicle **10** comprises a main frame **12**. The main frame **12** is mounted on two set of wheels **14**, namely a set of front wheels **142** and a set of rear wheels **144**, each mounted to its own axle. The main frame **12** defines a longitudinal axis **16** between the front end **20** of the main frame **12** and the rear end **18** of the main frame **12**. The modular vehicle **10** further comprises an electric motor **302** (see Fig. 13) which is mounted on the main frame **12**, and driving components (see Fig. 13) operatively connected to the motor via a controller **304** (see Fig. 13) for operating, namely steering and propelling, the main frame **12**.

[0045] The modular vehicle **10** further comprises a passenger area **46** and a driving area **30**. The modular vehicle **10** comprises, in the passenger area **46**, a seat assembly **32** comprising a plurality of seats **22** mounted in rows **222**, **224**, **226**, with each one of the rows **222**, **224**, **226** being individually mounted on the main frame **12**. As shown in Figs. 1-6, the seat assembly **32** comprises six seats **22**. Each one of the rows **222**, **224**, **226** comprises two seats **22**. Each one of the rows **222**, **224**, **226** is configured substantially perpendicular to the longitudinal axis **16** defined by the main frame **12**.

[0046] It is to be noted that the seat assembly **32**, according to alternative embodiments, comprise a lower number of rows (e.g. two), and a higher number of rows (e.g. three and four), each adapted for a number of seats **22** with each seat **22** able to receive one or more passengers. It is to be noted that the number of seats **22** per row vary according to embodiments. According to embodiments, one or more rows comprise either a single seat **22** or a larger number of seats **22** (e.g. three) depending on the specific body shape of the passengers who are intended to use these seats **22**. Further, in some embodiments the number of seats **22** will vary between rows.

[0047] As shown in Figs. 1-6, each seat **22** is intended for a single passenger, each defining a space for the passenger to sit (space for resting / supporting at least a passenger's legs, buttocks and back) and to place pieces of luggage. Each seat **22** comprises a seat surface **34**, a backrest **36** and (optionally, and not shown on Figs 1-6) one or more seat arms. The seat surface **34** and the backrest **36** are according to the shown embodiment a single-piece

component. It is to be noted that, according to alternative embodiments, the seats **22** are provided with alternative configurations and shapes, such as to allow a plurality of passengers to be easily and safely transported within the modular vehicle **10** for pedestrian environments. An example of an alternative configuration is a two-piece seat **22** with the seat surface **34** and the backrest **36** being independent from each other.

[0048] According to embodiments, the width and the depth of the seat surface **34** as the width and height of the backrest **36** vary. According to a shown embodiment, all seats **22** have the same width, depth and height. According to another embodiment (not shown), seats **22** have different width, depth and/or height for passengers of different body shapes. According to an embodiment (not shown), the height of the backrest **36** varies with the locations of the seats **22**, the height of the seats **22** increasing as the location of the seats **22** being farther from the front end **20** of the modular vehicle **10**.

[0049] The modular vehicle **10** comprises a driving area **30** closer to the rear end **18**, and more specifically according to the shown embodiment, substantially at the rear end **18** of the main frame **12**. A driver (not shown) operates the main frame **12** from the driving area **30**. From this position, the driver sees all passengers directly thereby providing better security, safety and control of the passengers.

[0050] As shown in Figs. 1-6, the passenger area **46** comprises a front safety rail **40** at or near the front end **20**, a rear passenger area wall **42** near the rear end **18** and a passenger area floor member **44** which extends between the front safety rail **40** and the rear passenger area wall **42**. The front safety rail **40**, according to an embodiment, is embodied as a bent bar having a U-shape that is mounted to the main frame **12** at its two extremities. According to alternative embodiments, the front safety rail **40** is embodied as a front wall or a netted panel mounted to the main frame **12**. The front safety rail **40** and its alternatives are intended to prevent passenger legs to extend over the front end **20** of the modular vehicle **10**.

[0051] The main frame **12**, according to an embodiment, comprises anti-slip components (not shown) on the passenger area floor member **44**. The anti-slip components are aligned with and in front of each seat **22**. The anti-slip components, according to an embodiment, extend towards the sides of the main frame **12** such as to provide an anti-slip surface for passengers to step on when boarding the modular vehicle **10**. According to an embodiment, the whole passenger area floor member **44** is covered with anti-slip components.

[0052] According to an embodiment, the seat assembly **32** further comprises one or more handle elements (i.e., central hand rails **26**, Fig. 7) extending from the horizontal surface

located between two seats **22** of the same row. According to an embodiment, the handle elements are embodied as side hand rails located on exterior sides of the seat assembly **32** instead of or additionally to the central hand rails **26**. The side hand rails act as aids for passengers boarding the modular vehicle **10** and as a security feature to keep passenger for falling off the modular vehicle **10** once they have boarded the modular vehicle **10**. Further, the side hand rails provide structure for securing additional components such as seatbelt drums. According to an embodiment, the seat assembly **32** further comprises additional handle elements such as a front handle **28** (see Figs. 7 and 8), wherein the front handle **28** is part of the front safety rail **40** or extending from the exterior edge and/or top edge of the front wall **41**, and/or a back rail **48** extending from the rear passenger area wall **42** for safety and convenience purposes. According to embodiments, alternative or additional railings are mounted to the modular vehicle **10** for passengers to handle during boarding, during course and/or when stepping out of the modular vehicle **10**.

[0053] Still referring to Figs. 1-6, the modular vehicle **10** features a front row **222** of seats **22** mounted on the main frame **12** above the front wheels **142**. The front row **222** of seats **22** is located above the front wheels **142**, with a shield **24** isolating the passenger area **46** from the front wheels **142**. The front row **222** is mounted on a front row mount **232** having an inverted U-shape comprising two vertical members **234** mounted on the main frame **12** and a horizontal member **236** mounted at one extremity to one of the two vertical members **234** and at the other extremity to the other one of the two vertical members **234**. The front row mount **232** extends above the shield **24** and provides the necessary elevation for the seats **22** of the front row **222** to be mounted on the main frame **12** through the front row mount **232**. The central row **224** is mounted on a central row mount **242** having a T-shaped shape comprising a vertical member **244** mounted on the main frame **12** according to a first extremity, and a horizontal member **246** mounted through its centre on the second extremity of the vertical member **244**. The seats **22** of the central row **224** are mounted to the horizontal member **246**. Accordingly, free space under the seats **22** of the central row **224** is available for passengers to place, for instance, pieces of baggage.

[0054] It is to be noted that the passenger area **46** is limited at its front by the front safety rail **40** and at its rear by the rear passenger area wall **42**. The passenger area **46** is not limited by a panel, rail or any other component on any of its sides, allowing passengers to board from both open sides.

[0055] According to alternative embodiments, access to the modular vehicle **10** by its sides is partially restricted by side walls (not shown) covering portions of the sides near the seats **22**. According to an embodiment, hinged doors (not shown) are mounted to the side walls to temporarily close the sides when the modular vehicle **10** is moving.

[0056] It has to be noted that the front wheels **142** are mounted on the main frame **12** in such a manner that the front wheels **142** extends above a plane defined substantially by the passenger area floor member **44**, allowing the passenger area floor member **44** to be relatively low with respect to the ground. The low position eases the boarding of the passengers stepping onto the passenger area floor member **44** as their exit from the modular vehicle **10**, particularly for passengers having walking difficulties. Since the front wheels **142** extend above the general level of the passenger area floor member **44**, a protection member such as the shield **24** is necessary to isolate the front wheels **142** from the passenger area **46** and thereby ensuring security of the passengers.

[0057] It is to be noted that the modular vehicle **10**, according to an embodiment shown on Figs. 1 to 6, comprises a single central row **224** of seats **22**. According to an embodiment shown on Figs. 11 and 12, the modular vehicle **10** comprises no central row **224**, with the length of the main frame **12**, and accordingly the size of the passenger area **46** shortened accordingly. The outcome is a lighter modular vehicle **10** while maintaining similar leg space for the passengers in the passenger area **46**. According to another embodiment (not shown), the length of the main frame **12** and the size of the passenger area **46** are kept substantially the same thereby providing more leg space and baggage space to passengers. According to the latter embodiment, a dedicated baggage space (not shown) is defined in one embodiment at the front, in one embodiment at the center and in one embodiment at the rear portion of the passenger area **46**. According to alternative embodiments, the modular vehicle **10** feature two or three central rows **224** of seats **22** to welcome more passengers, with the size of the passenger area **46** and thus the length of the central portion of the main frame **12** being increased accordingly.

[0058] According to embodiments (not shown), baggage areas comprises panels, anchoring components and/or nets to define partially closed baggage compartments or fully-closed compartments accessible via a door or a netted elastic curtain for example. Such baggage compartments ensure safe storage of the baggage, preventing slipping of baggage within or out of the baggage compartment.

[0059] According to an embodiment, each seat **22** of the seat assembly **32** further comprises seatbelts (i.e., such as full lap style seatbelts, or three anchoring-point seatbelts, both types not shown) for allowing passengers to be safely attached in the modular vehicle **10**. Presence and type of seatbelts may depend on regulations with respect to the location where the modular vehicle **10** is operated.

[0060] According to an embodiment, the main frame **12** is at least partially made of metal or metal alloy, such as steel. According to an embodiment, the main frame **12** is at least partially made of another material such as, without limitation, a polymeric material, a composite material, and the like, as a combination of the materials thereof. According to an embodiment, the main frame **12** is made of a material that fulfills strength parameters and resistant parameters for the modular vehicle **10** to be able to carry its own weight and the weight of the passengers to be transported by the modular vehicle **10**. According to an embodiment, the material is selected based on cost and weight considerations.

[0061] According to an embodiment, the seats **22** are made of a fibreglass material, of an ultra-violet (UV) resistant material, or of another suitable material that provides the required strength to resist to the weight of the passengers. According to an embodiment, the seats **22** are made of a material that is wear resistant, and that can easily be washed. According to an embodiment, alternative parameters are used to select the material(s) and/or design parameters involved in the design of the seats **22**.

[0062] According to an embodiment, the fibreglass material further comprises an anti-microbial composition for allowing quick cleaning and maintenance.

[0063] Referring to the operation of the modular vehicle **10** by the driver, the modular vehicle **10** as described above comprises a driving area **30** providing a rear operational driver position. The passengers are seated in front of the driver. The driver is typically in a semi-standing or a standing position in the driving area **30**. The modular vehicle **10**, according to embodiments, provides at least a four to one (4/1) passenger/driver ratio based a two side-by-side passenger seats or seat positions per row. According to alternative embodiment, a higher ratio is provided when an increased number of rows and/or an increase of the number of passengers per row is used, thus optimizing operating costs.

[0064] As better shown on Figs. 1, 4 and 6, the driving area **30** comprises a driving area floor member **50** and an adjustable driver seat **52** for the driver to be in a selected one of a semi-standing position (or perching position) or a standing position. For each of these positions, the adjustable driver seat **52** allows the driver to adjust the height of the adjustable driver seat

52 in a comfortable ergonomic position. The adjustable driver seat **52** comprises a driver backrest **54** and a driver seat surface **56**. It is to be noted that the driver seat surface **56**, according to embodiments, can be provided with any suitable shape and/or configuration such as to allow the driver to adopt any one of the semi-standing position, and the standing position. As stated, the driver seat surface **56** is adjustable between a plurality of seat positions to adapt to the height of the driver.

[0065] According to an embodiment, the adjustable driver seat **52** comprises a plurality of rods **94** disposed perpendicularly to internal opposite longitudinal rails **92** of the driver backrest **54**. The driver can slide the driver seat surface **56** upward or downward along the internal opposite longitudinal rails **92** and lock driver seat surface **56** in a seat locked position with one of the plurality of rods **94**.

[0066] According to an embodiment, the driver backrest **54** and/or the driver seat surface **56** are adjustable vertically and/or horizontally such as to provide the driver of the modular vehicle **10** with the option to adjust the adjustable driver seat **52** according to their specific requirements. Thus, adjustment to different shapes, weights and lengths is available.

[0067] According to an embodiment, the driving area floor member **50** is substantially higher relative to the ground than the passenger area floor member **44**. This configuration provides a good visibility to the driver, namely the environment in front of the front end **20**, the environment close to the sides the modular vehicle **10**, the passenger area **46** and the environment close to the rear end **18** of the modular vehicle **10**.

[0068] Now referring more specifically to Fig. 2, the modular vehicle **10** further comprises an attachment member **90** for attaching either a trailer cart or a luggage carrier. The attachment member **90** allows to releasably attach any additional self-standing wheeled component (such as the trailer cart) or an add-on wheeled component (such as the luggage carrier), and to detach any of them at any time. It further allows switching between use of either one of these pieces of equipment depending on circumstances. The attachment member **90** can further be used to attach releasably conventional objects such as, without limitation, a wheel chair, a dog cage supported by wheels, a two-wheel trailer for transporting equipment and/or sport garments and the like.

[0069] Referring additionally to Figs. 7 to 12, according to an embodiment, the driving area **30** further comprises a driving console comprising a handheld controller **62** (e.g., a joystick) operatively connected to the drive components (see Fig. 13) for operating, namely controlling the speed and steering of the modular vehicle **10**. The handheld controller **62** combines in a

single component a plurality of switches, knobs, buttons, handles and/or levers allowing the driver to manage different aspects of the operation of the modular vehicle **10**.

[0070] According to an embodiment, by changing the angle of the handheld controller **62** relatively to a vertical axial plane (a.k.a. tilting the handheld controller **62**), the driver steers the modular vehicle **10**. The steering of the modular vehicle **10** is performed by controlling the orientation of the front wheels **142**, towards the left or the right based on the handheld controller **62** being tilted left or right relatively to the vertical axial plane. Furthermore, by changing the angle of the handheld controller **62** relatively to a vertical side plane, the driver controls the speed and direction of propelling of the modular vehicle **10** to move forward or backward, as well as to control the speed at which operates the modular vehicle **10**. Thereby, by handling the handheld controller **62** simultaneously relatively to the vertical axial plane and vertical side plane, the driver is able to control movements of the modular vehicle **10** relative to a wide range of parameters.

[0071] According to an embodiment, the modular vehicle **10** comprises an electric motor **302** (see Fig. 13), one or more electrical batteries **306** (see Fig. 13) located under the back row **226** of seats **22** and driving components (see Fig. 13) involved in the steering and driving of the modular vehicle **10**. With solely electric components, and particularly these electric components, the driver is able to operate the modular vehicle **10**, including steering the modular vehicle **10**, controlling the speed and direction of the modular vehicle **10**, as slowing and braking the modular vehicle **10**. All of these commands can be operated using solely the handheld controller **62**.

[0072] According to an embodiment, the set of wheels **14** supporting the main frame **12** of the modular vehicle **10** are configured to allow the modular vehicle **10** to perform a 360-degree turn in almost no more than its own length. The relatively central location of the front wheels **142** close to each other relatively to the width of the main frame **12**, the location of the rear wheels **144** spread over the width of the main frame **12**, and the location of the electric batteries **306** relatively to the longitudinal axis **16** between the front wheels **142** and the rear wheels **144** with their weight of the batteries spread over the width of the modular vehicle **10** allows the modular vehicle **10** to be able to perform aggressive turns without affecting the stability of the modular vehicle **10** or the comfort of the passengers.

[0073] According to an embodiment, electric brakes (not shown) are mounted to at least one of the sets of wheels **142**, **144**. The electric brakes are for stopping the modular vehicle **10** upon command from the driver. According to an embodiment, a specific brake command (e.g.

a button) electrically connected to the electric brakes is mounted on the handheld controller **62**. According to an embodiment, the electric brakes are further commanded through forward and rearward tilting of the handheld controller **62**. For example, tilting the handheld controller **62** in a rearward direction relatively to the vertical side plane when moving forward results in a command signal being transmitted to the electric brakes to operate.

[0074] According to an embodiment, a battery recharge system (not show) electrically connects the electric brakes to the batteries **306**. The electric brakes transform kinetic energy retrieved from the modular vehicle **10** by the electric brakes into electric current, which is relayed by the battery recharge module and used to recharge the batteries **306**.

[0075] According to an embodiment, a security system (not shown) checks the state of the modular vehicle **10** before any use of the modular vehicle **10** and is adapted to lock the electric brakes in a locked position if any electric defect is detected on the modular vehicle **10**.

[0076] According to an embodiment, the handheld controller **62** comprises additional commands, embodied for instance as a locking switch (key switch **316**, Fig. 13), for locking/unlocking the modular vehicle **10** and thereby preventing anyone who may operate the handheld controller **62** when the locking switch is in the locked position to operate the modular vehicle **10**. According to an embodiment, controls comprise in a light switch (not shown) use to turn on or off headlights **66** (Figs. 7 and 8) and the taillights (not shown). According to an embodiment, controls comprise a horn button (not shown) which is embodiments is part of the media system **320** (Fig. 13) that is electrically connected to a car horn (not shown). Accordingly, the car horn is activated upon the driver pressing the horn button. According to an embodiment, one or more of the above controls not involved in steering or driving the modular vehicle **10** are located on a dashboard (not shown) located in front of the driver, on the wall located between the passenger area **46** and the driving area **30**, or aside the handheld controller **62**.

[0077] According to an embodiment, the modular vehicle **10** further comprises a light system **322** (Fig. 13). The light system **322** controls the headlights **66** (see Figs. 7 and 8) and taillights (not shown) (that may be embodied as dot-style front and rear lights). The light system **322** further controls brake light indicators (not shown) and turn light indicators (not shown) according to a standard color scheme. The light system **322**, according to an embodiment, comprises a light pole (not shown) that is releasably mounted on the main frame **12**.

[0078] According to an embodiment, the modular vehicle **10** further comprises a safe and audible reverse motion alarm (part of the media system **320**, Fig. 13). A flashing high-level

warning light (not shown) is also provided on the modular vehicle **10** according to an embodiment for informing individuals circulating in the pedestrian environment of potential hazards.

[0079] According to an embodiment, the modular vehicle **10** further comprises a microphone connected to one or more speaker(s) (both part of the media system **320**, Fig. 13) so that the driver can directly communicate with the passengers of the modular vehicle **10** or with pedestrians around the modular vehicle **10**. Alternatively, the driver can communicate with the passengers of the modular vehicle **10** or with pedestrians around the modular vehicle **10** using pre-recorded safety messages (i.e., using an audio button (not shown) available within the driving area **30** associated with a message unit (not shown, part of the media system **320**, see Fig. 13).

[0080] According to an embodiment, the speed of the modular vehicle **10** is controlled (i.e., limited) to restrict the operation of the modular vehicle **10** between a maximum forward operating speed and a maximum backward operating speed to better suit the operator's requirements, safety parameters and passengers comfort. According to an embodiment, limitations to the forward and backward speeds are electrically implemented.

[0081] Back to Figs. 1-6, the modular vehicle **10** comprises a set of electric batteries **306** (Fig. 13) powering the modular vehicle **10** that are located in a battery compartment located under the back row **226** and extending substantially throughout the full width of the modular vehicle **10**. The configuration of the electric batteries **306** in a substantially evenly-distributed weight relative to the width of the modular vehicle **10** offers an optimal stability to the modular vehicle **10**. Maintenance of the electric batteries **306** and of the electric motor **302** can be performed by simply swinging over the seats **22** part of the back row **226** in a forward manner relatively to a hinge assembly (not shown) so as to provide free access to the battery compartment (not shown) from their top; the poles of the electrical batteries **306** being located on their top for easy maintenance.

[0082] According to an embodiment, the modular vehicle **10** comprises hinged side panels (not shown) providing access to the battery compartment (under the back row **226**) where the electric batteries **306** are located. According to an embodiment, the side panels are lockable. For maintenance and recharge of the electric batteries **306**, one would unlock one of the hinged side panels, swing over the unlocked hinged side panel to free access the charging plug of a charger **308** (Fig. 13) and electrically connect the electric batteries **306** to a power source (the grid) to recharge the electrical batteries **306**.

[0083] According to an embodiment, the driving area **30** further comprises a monitoring system (part of media system **320**, Fig. 13) (i.e., a closed-circuit television monitor or closed-circuit television (CCTV) monitor and cameras) for allowing the driver to view hazardous areas around the modular vehicle **10** through a monitor and thereby be aware of the presence of kids, pedestrians, animals, luggage, other objects and the like that may be in the hazardous areas around the modular vehicle **10** (i.e., in front of the modular vehicle **10**, behind the modular vehicle **10**, and aside the modular vehicle **10** with risks of collisions). The monitoring system, according to an embodiment, also comprises a camera (not shown) for filming the passengers in the modular vehicle **10** during the trip and digital storage means (for example a hard drive or a Solid State Drive (SSD)) for storing the images recorded for administration purposes.

[0084] Now referring to Fig. 13, a schematic illustrates the electric component and connections of an embodiment of the modular vehicle **10**. It must be noted that the schematic of the electric components and connections is voluntarily simplified to illustrate relationship between the components. Accordingly, connections comprising fuse boxes and fuses, dual connections to relay signals between components, and other components intended for transforming or stabilizing the current to be exchanged between components have been sometimes omitted and sometimes illustrated through a single line to highlight the components and the relationship between these components.

[0085] Back to the schematic of Fig. 13, the modular vehicle **10** comprises an electric motor **302**, an alternative current motor or AC motor, electrically powered by a set of electric batteries **306** (such as a set of four (4) twelve (12) volts lead acid batteries or Absorbent Glass Mat (AGM) batteries) and controlled by a controller **304**. The controller **304** is preferably a PLC (Programmable Logic Controller). The controller **304**, according to embodiments, comprises a single PLC or is distributed over a plurality of PLCs. Of course, other types of controllers may be used, such as a connecting switch board for interconnecting relays. The controller **304** comprises input components for receiving signals from connected command components (e.g. handheld controller **310**) and output components for transmitting command signals such as the signals responsible for the behavior of the electric motor **302**.

[0086] Connected to the batteries **306** is a charger **308** for electrically connecting the batteries **306** to a power source (the grid) and thereby recharging the batteries **306**.

[0087] To steer and to operate the modular vehicle **10**, a handheld controller **310** (illustrated on Figs. 5 to 12 as a handheld controller **62**) that, according to driver manipulations (tilting of

the handheld controller **62** according to the vertical plans as discussed before), generates and transmits electric signals to the controller interface **312**, which relays the signals to a steering servo **314**. The steering servo **314** transmits signals to the controller **304**, which interprets the signal in light of the controller programming; the controller being responsible for the operation of the electric motor **302**. According to an embodiment, the controller interface **312**, the steering servo **314** and the controller **304** are all responsible to process received signal in light of embedded programming, and to generate signals to be transmitted accordingly. One or more of the controller **304**, the steering servo **314**, the controller interface **312** and the handheld controller **310** may further generate, receive and/or process feedback signals for finer operation of the modular vehicle **10** by the driver.

[0088] According to an embodiment, the modular vehicle **10** further comprises a key switch **316**, connected to the controller **304**. The key switch **316** allows to lock/unlock the modular vehicle **10**, preventing operation of the modular vehicle **10** when the key switch is in a locked position. According to an embodiment, the key switch **316** is operated using a physical key for power to be relayed to components of the modular vehicle **10**. According to another component, the key switch **316** turns on/off a relay powering some operating components while another relay operating independently from the key switch **316** powers some non-operating components (e.g., lights).

[0089] According to an embodiment, the modular vehicle **10** also comprises driver seat controls **318**, comprising commands and motors, for adjusting the driver seat.

[0090] According to an embodiment, the modular vehicle **10** comprises a media system **320**. According to embodiments, the media system **320** comprises a sound system that comprise at least one of a horn, speaker(s), a microphone, alarm speaker(s), and other components. Some components (such as the horn) are connected directly to the handheld controller **310**. Some of the components of the sound system are partially or fully automated, having their own controller and/or exchanging signals with the controller **304**. Example of such a partially automated system is an alarm triggered when receiving a signal from the controller **304**; the generation of a signal potentially depending on a signal received by the controller **304** from a detector (e.g. a close field detector, not shown). According to an embodiment, the media system **320** comprises a camera (e.g., closed-circuit TV or CCTV) recording images captures inside the modular vehicle **10** and/or in the environment of the modular vehicle **10**.

[0091] According to an embodiment, the modular vehicle **10** comprises a light system **322**. The light system **322** comprises, according to embodiments, manual lights and/or

operational lights. Operational lights comprise stop lights, back-driving lights, direction lights, “on-operation” lights, etc. operating automatically or semi-automatically with respect to the operation of the modular vehicle **10**. Manual lights comprise for example head lights and tail lights requiring the driver to turn them on.

[0092] The modular vehicle **10**, according to an embodiment, comprises a monitor **324**. The monitor **324**, according to embodiments, display driving and operational information (e.g. battery charge level, speed, distance driven, operation time since last charge, etc.) and/or information related to other components (e.g. the camera). According to an embodiment, the monitor **324** comprises touch screen controls for the driver to input commands therethrough.

[0093] According to embodiments, the modular vehicle **10** is subject to many configurations. Each of these configurations embodies one or more of the features described above in relation with the different embodiments. Selection of one or more of the characteristics of a modular vehicle **10** of an embodiment are potentially determined by the environment in which the modular vehicle **10** is intended to operate. Accordingly, the environment may lead and/or dictate the inclusion and/or exclusion of one or more of the described features.

[0094] While preferred embodiments have been described above and illustrated in the accompanying drawings, it will be evident to those skilled in the art that modifications may be made without departing from this disclosure. Such modifications are considered as possible variants comprised in the scope of the disclosure.

CLAIMS:

1. A vehicle for transporting passengers, the vehicle comprising:
 - a main frame comprising a rear end and a front end opposite the rear end, the main frame defining a longitudinal axis;
 - a passenger area comprising more than one row of at least two seats mounted side-by-side, the more than one row being substantially perpendicular to the longitudinal axis whereby the at least two seats in each of the more than one row face the front end, each of the at least two seats adapted for seating a single passenger; and
 - a driving area behind the passenger area at the rear end of the main frame.
2. The vehicle of claim 1, wherein each of the at least two seats comprises:
 - a seat surface; and
 - a backrest facing substantially toward the front end.
3. The vehicle of claim 1, wherein the driving area further comprises a driving console comprising a handheld controller operable by to operate the vehicle, wherein the handheld controller is operable by a driver in a standing or semi-standing position.
4. The vehicle of claim 3, wherein the handheld controller is able to be tilted about a first plane and a second plane, wherein tilting the handheld controller about the first plane controls forward and backward displacement of the vehicle and tilting the handheld controller about the second plane controls direction of the vehicle.
5. The vehicle of claim 4, wherein the handheld controller further controls at least one of speed of the vehicle and braking of the vehicle.
6. The vehicle of claim 3, wherein the driving area comprise a side wall, wherein the driving console is mounted to the side wall thereby enabling one-hand operation of the handheld controller, and hence the vehicle, by the driver.
7. The vehicle of claim 1, wherein the driving area comprises a side wall, a front wall and a back wall thereby closing off the driving area on three sides.
8. The vehicle of claim 1, wherein the passenger area comprises a passenger area floor and the driving area comprises a driving area floor, wherein the driving area floor is higher than the passenger area floor.
9. The vehicle of claim 1, further comprising two axles which are mounted to the main frame, wherein one of the two axles is for steering the vehicle, and wherein the driving area is located rearward of the two axles.

10. The vehicle of claim 1, further comprising a left side and right side, wherein the left side and the right side are at least partially opened allowing individuals to board on the vehicle and to leave the vehicle from the left side and the right side of the vehicle.
11. A vehicle for transporting passengers, the vehicle comprising:
a main frame comprising a front end and a rear end opposite to the front end, the main frame defining a longitudinal axis;
- a passenger area comprising a row substantially perpendicular to the longitudinal axis, the row having at least two seats mounted side-by-side with each seat being for seating a single passenger and wherein the at least two seats face the front end; and
- a driving area located behind the passenger area.
12. The vehicle of claim 11, wherein the passenger area further comprises another row also comprising at least two seats which face the front end.
13. The vehicle of claim 11, wherein each of the at least two seats comprises:
- a seat surface; and
- a backrest facing substantially toward the front end.
14. The vehicle of claim 11, wherein the driving area further comprises a driving console comprising a handheld controller operable by a driver to operate the vehicle, wherein the handheld controller is operable by the driver in a standing or semi-standing position.
15. The vehicle of claim 14, wherein the handheld controller is able to be tilted about a first plane and a second plane, wherein tilting the handheld controller about the first plane controls forward and backward displacement of the vehicle and tilting the handheld controller about the second plane controls direction of the vehicle.
16. The vehicle of claim 15, wherein the handheld controller further controls at least one of speed of the vehicle and braking of the vehicle.
17. The vehicle of claim 14, wherein the driving area comprise a side wall, wherein the driving console is mounted to the side wall thereby enabling one-hand operation of the handheld controller, and hence the vehicle, by the driver.
18. The vehicle of claim 11, wherein the passenger area comprises a passenger area floor and the driving area comprises a driving area floor, wherein the driving area floor is higher than the passenger area floor.
19. The vehicle of claim 11, further comprising two axles which are mounted to the main frame, wherein one of the two axles is for steering the vehicle, and wherein the driving area

is located rearward of the two axles.

20. The vehicle of claim 11, further comprising a left side and right side, wherein the left side and the right side are at least partially opened allowing individuals to board on the vehicle and to leave the vehicle from the left side and the right side of the vehicle.

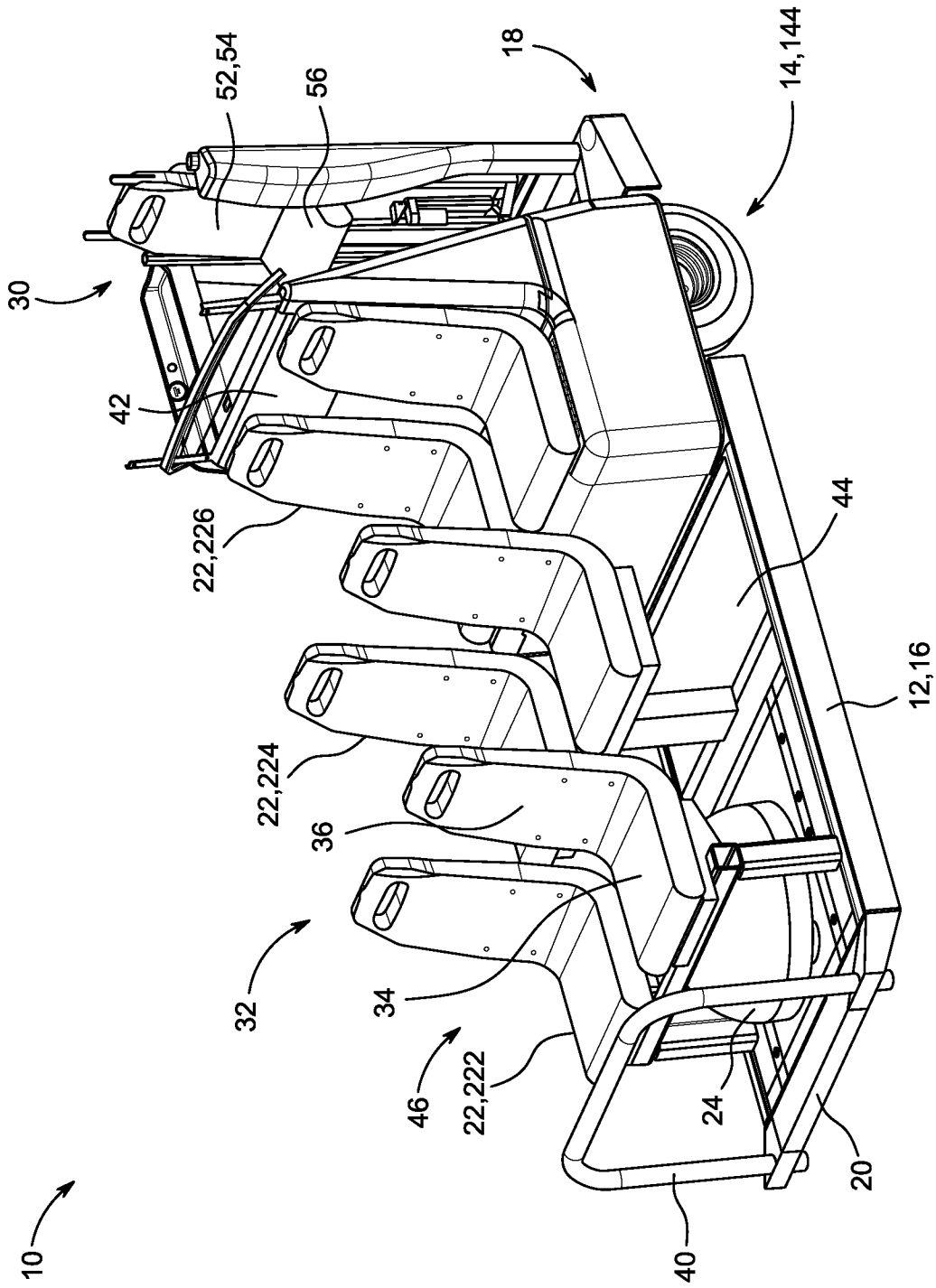


FIG. 1

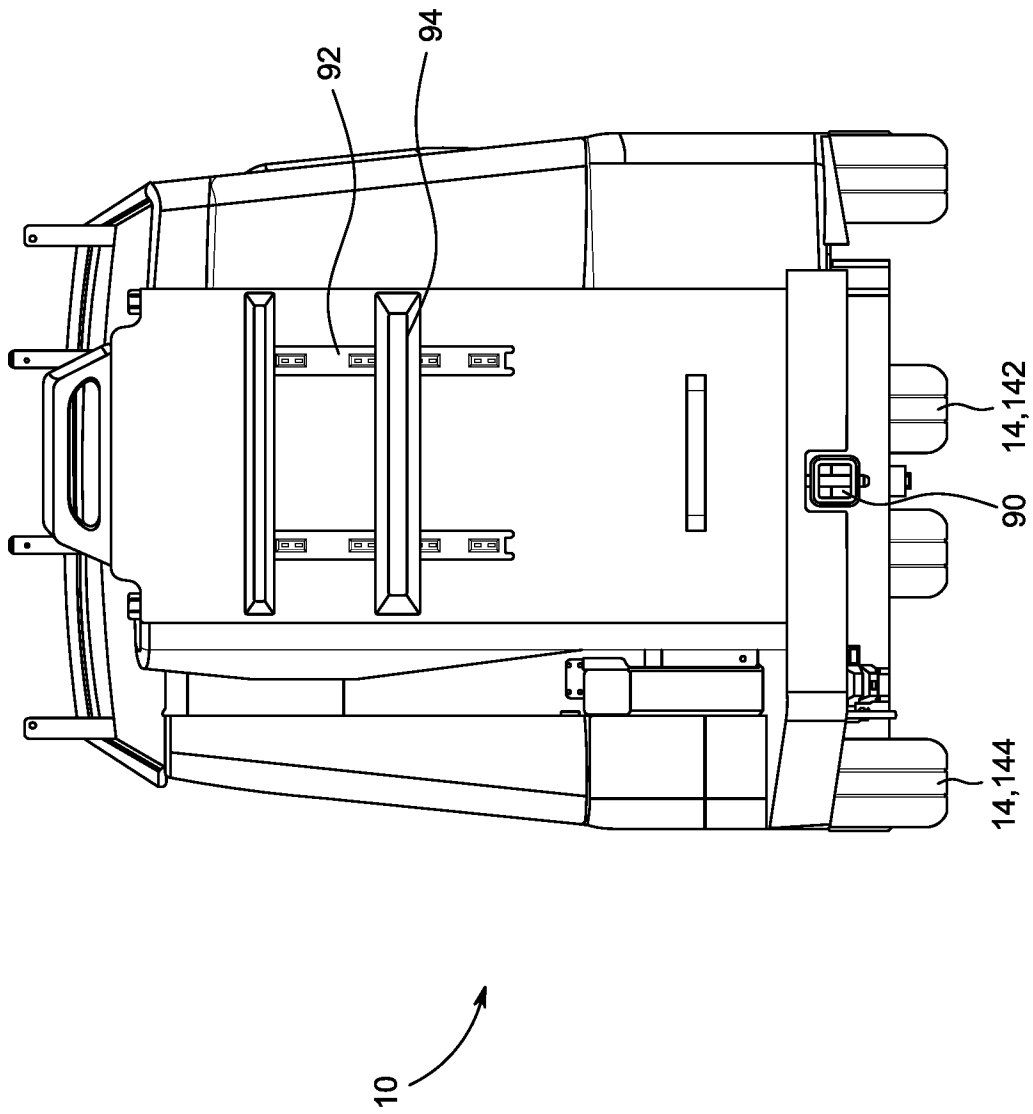


FIG. 2

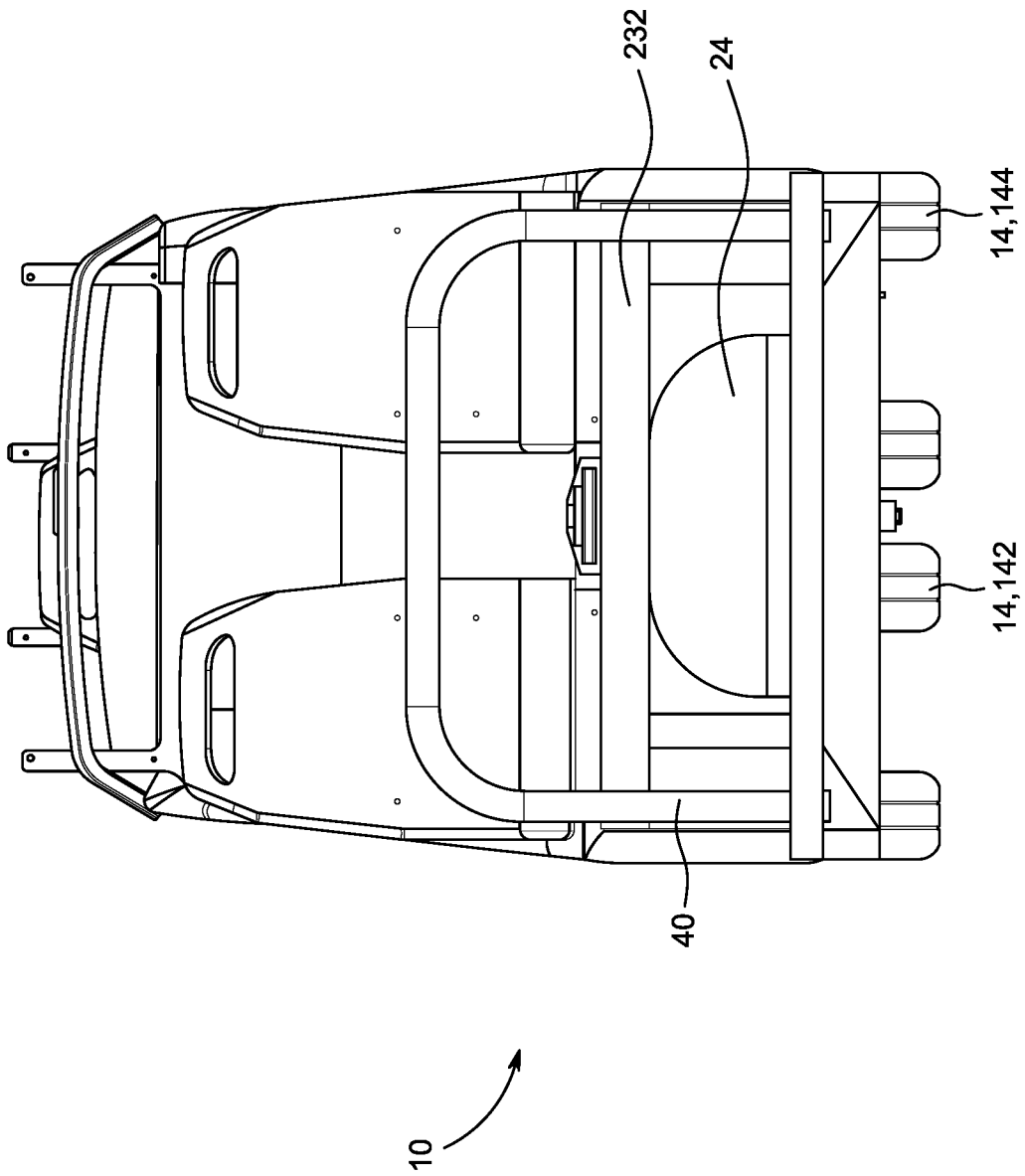


FIG. 3

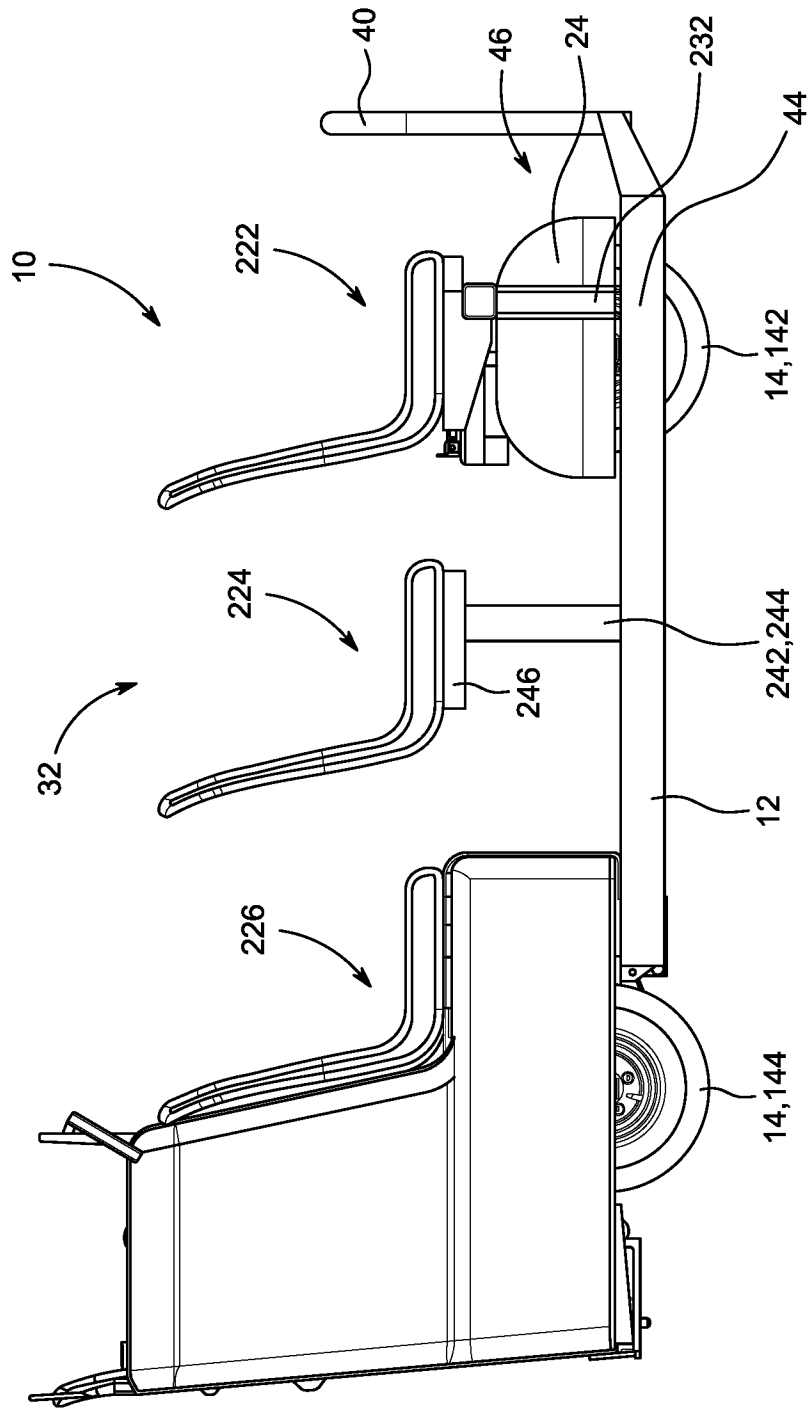


FIG. 5

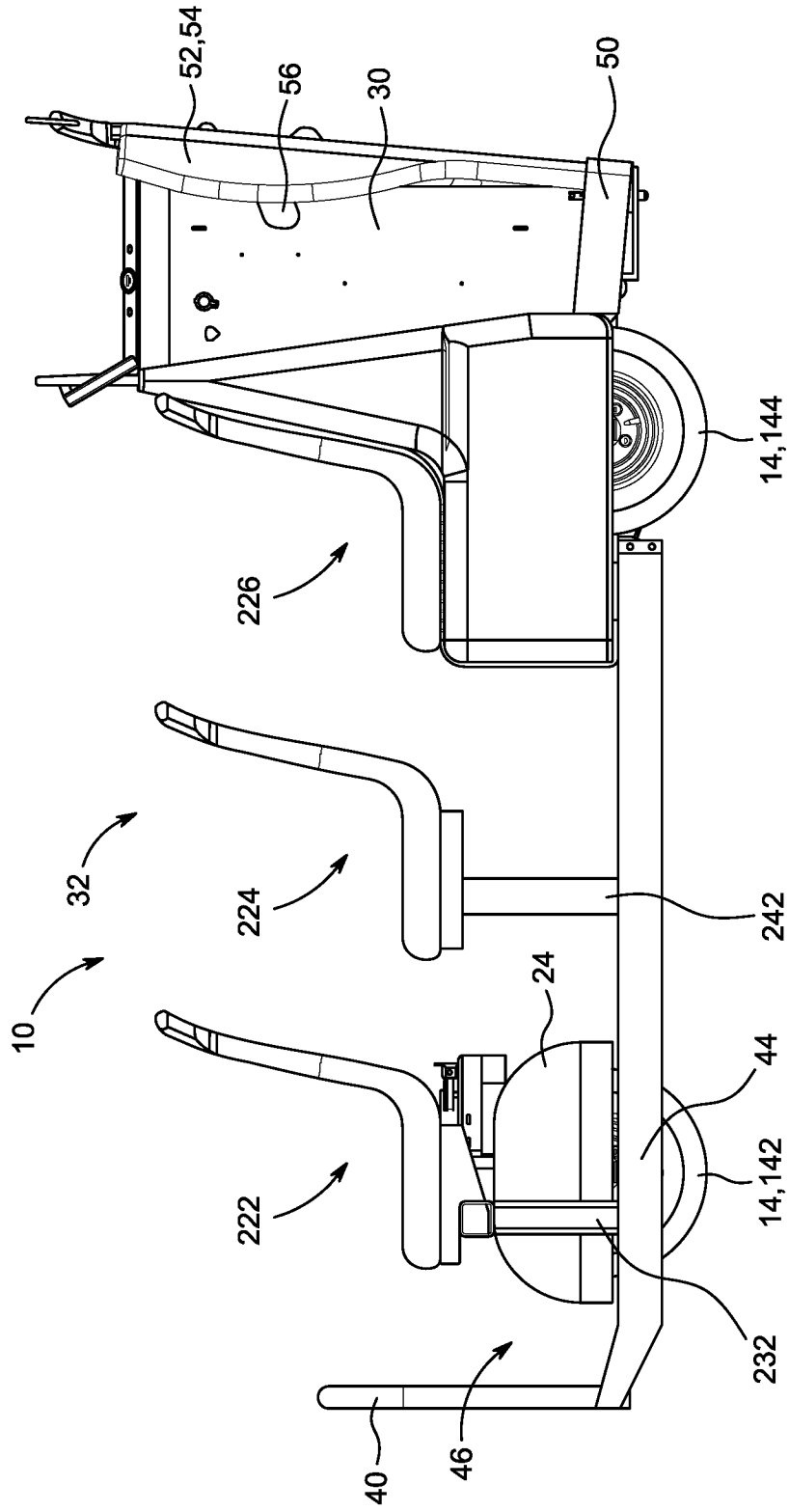


FIG. 6

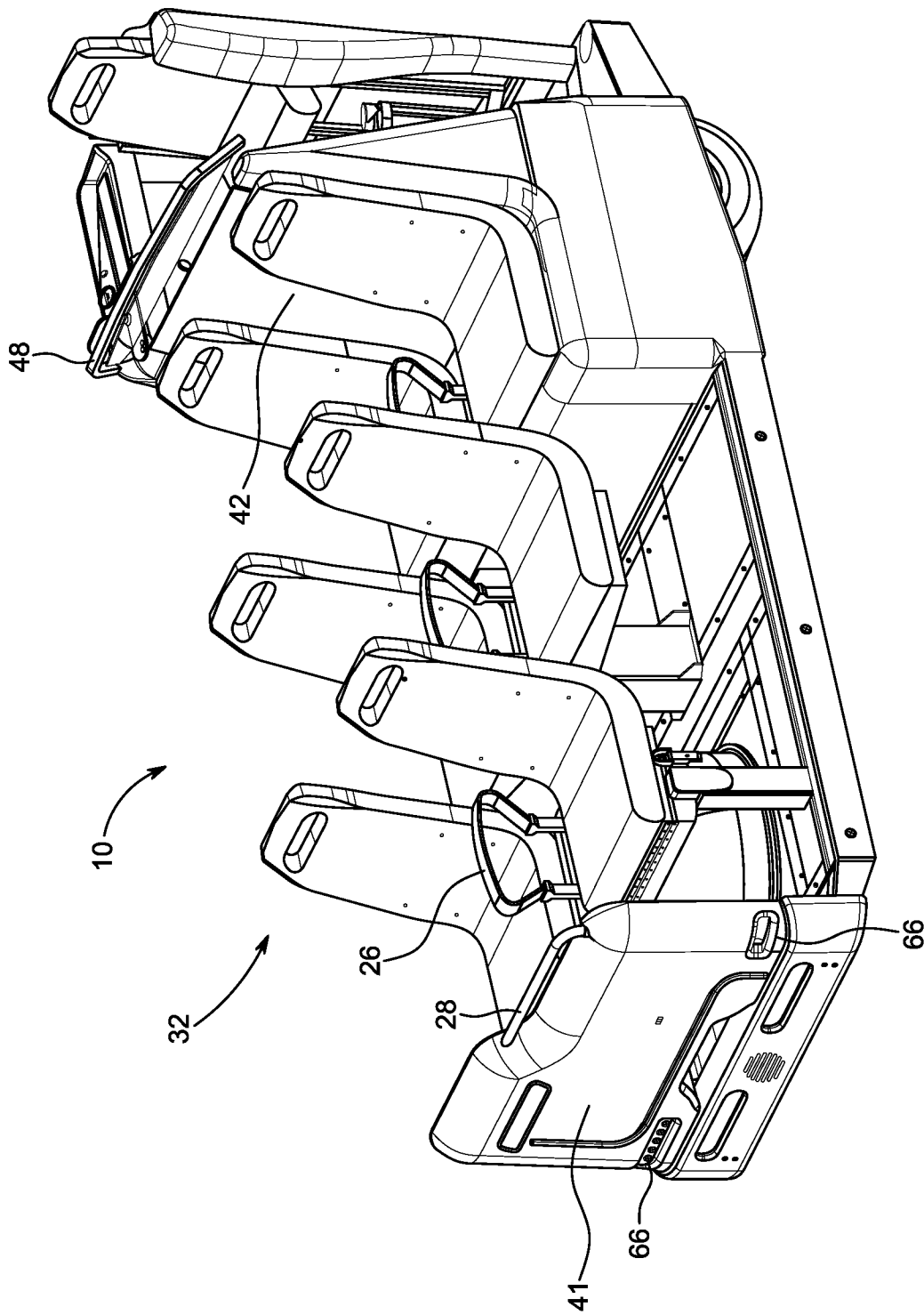


FIG. 7

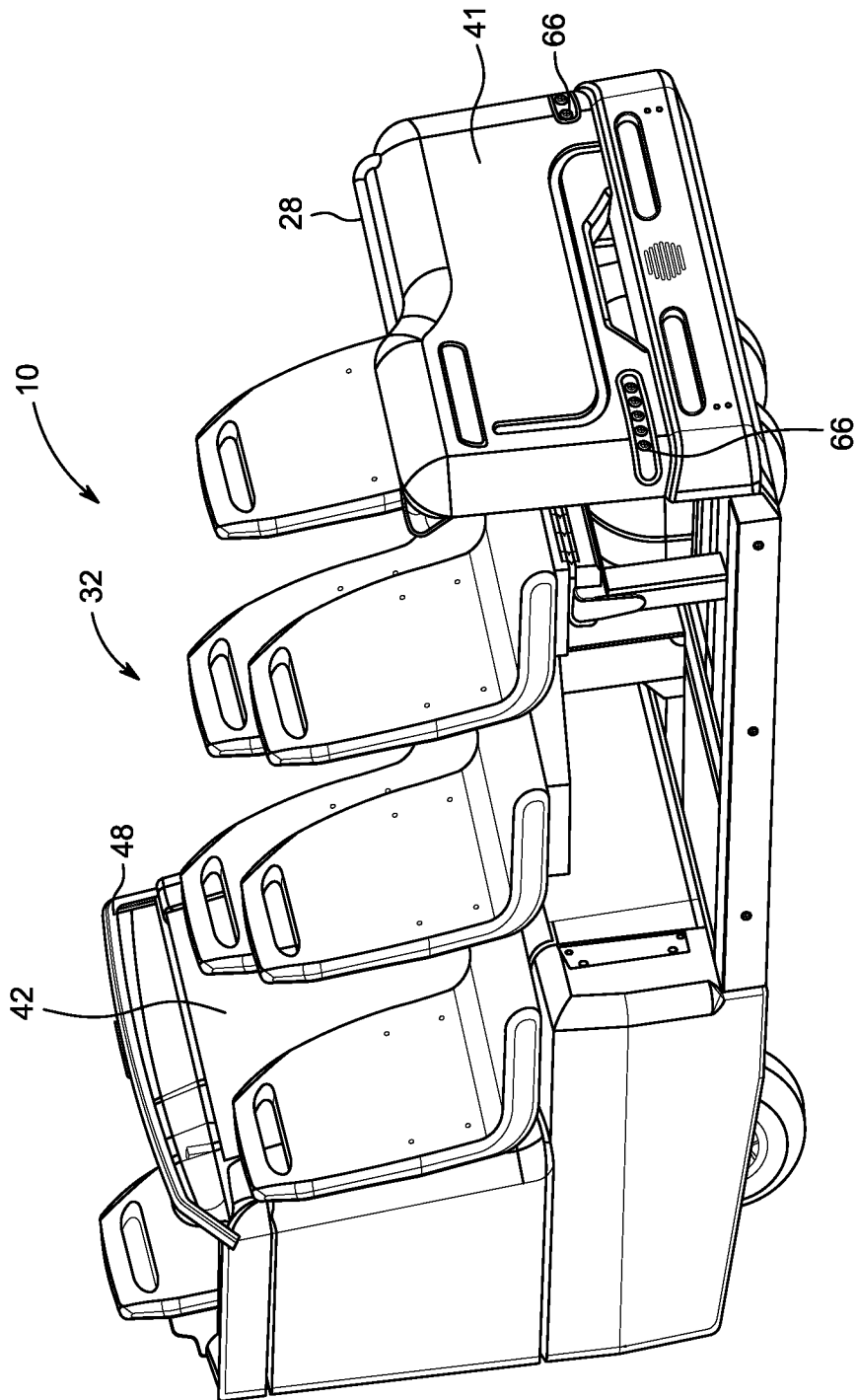


FIG. 8

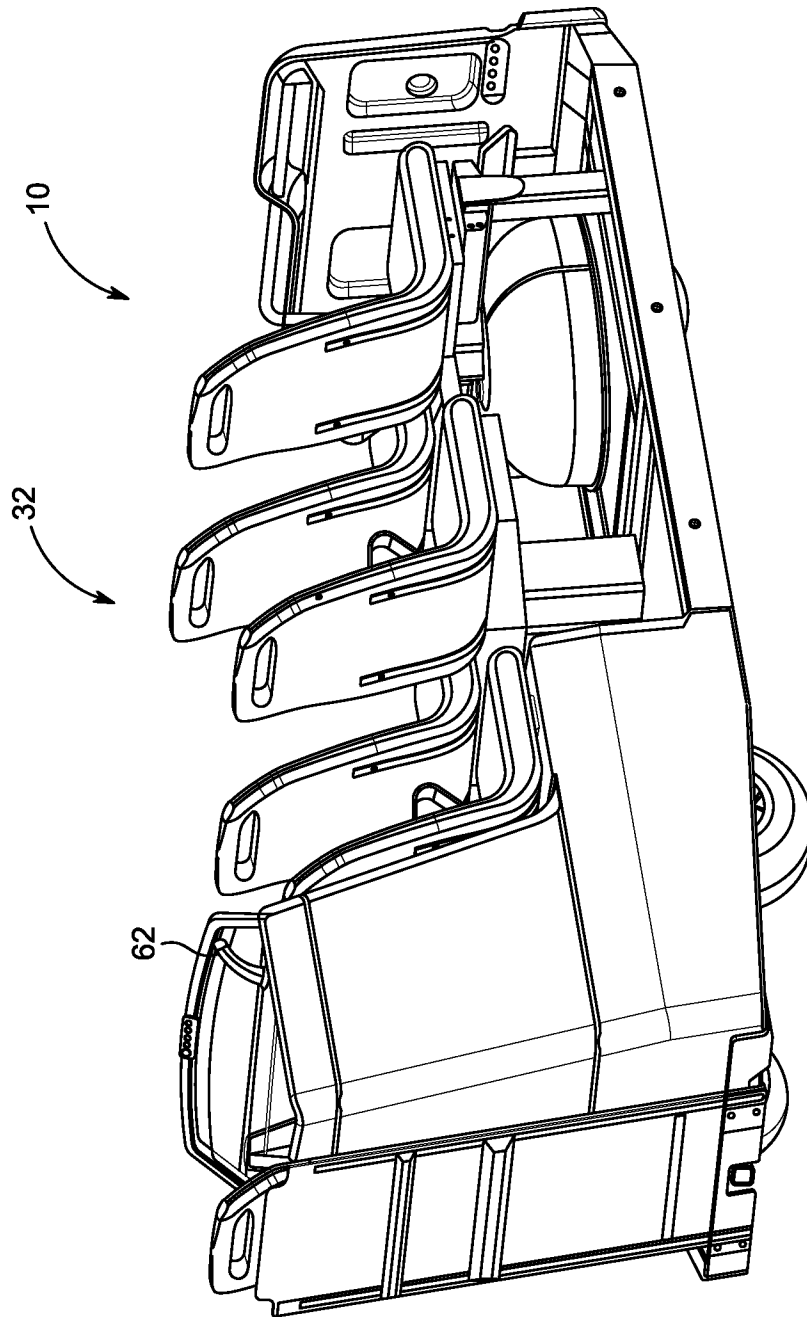


FIG. 9

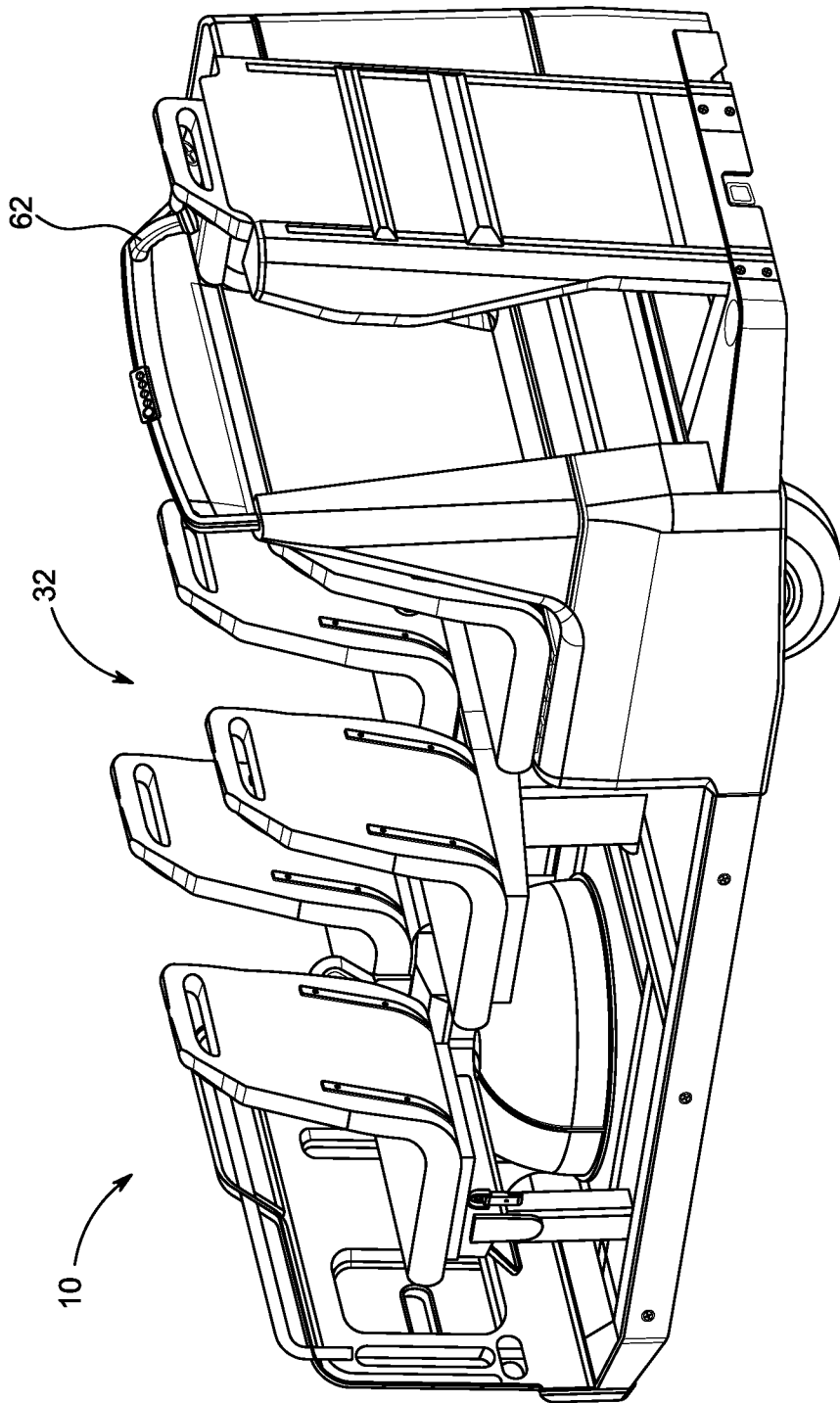


FIG. 10

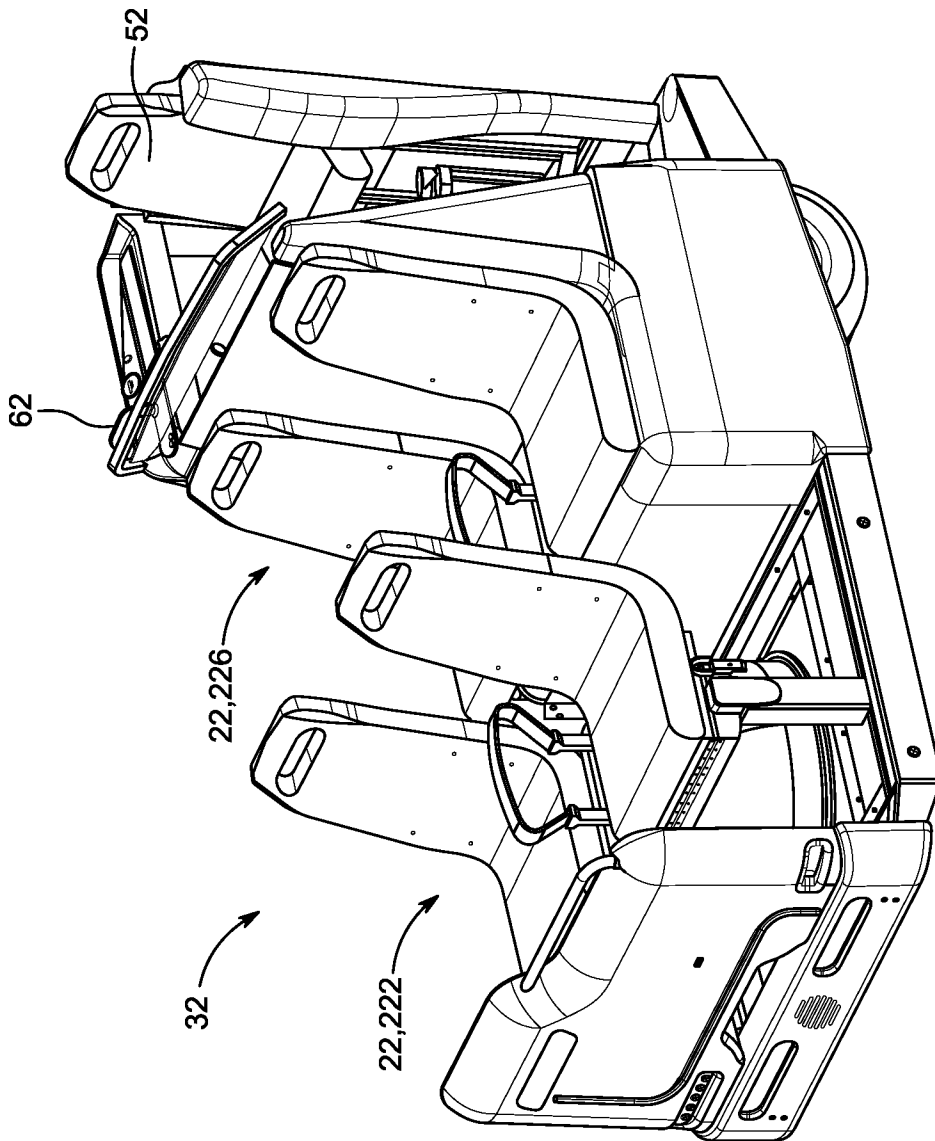


FIG. 11

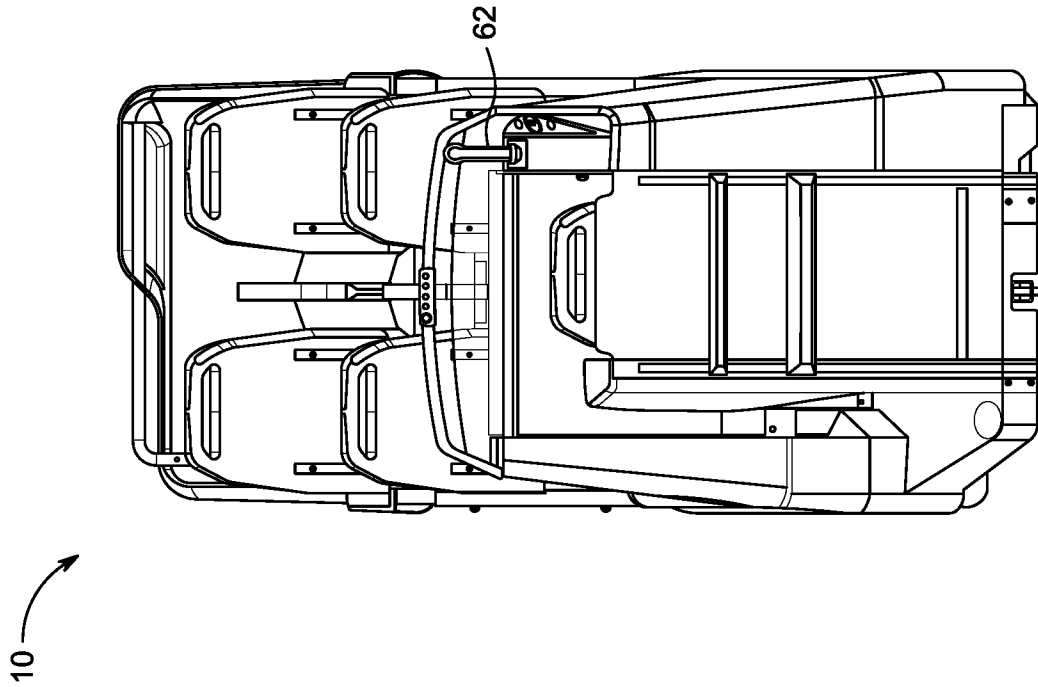


FIG. 12

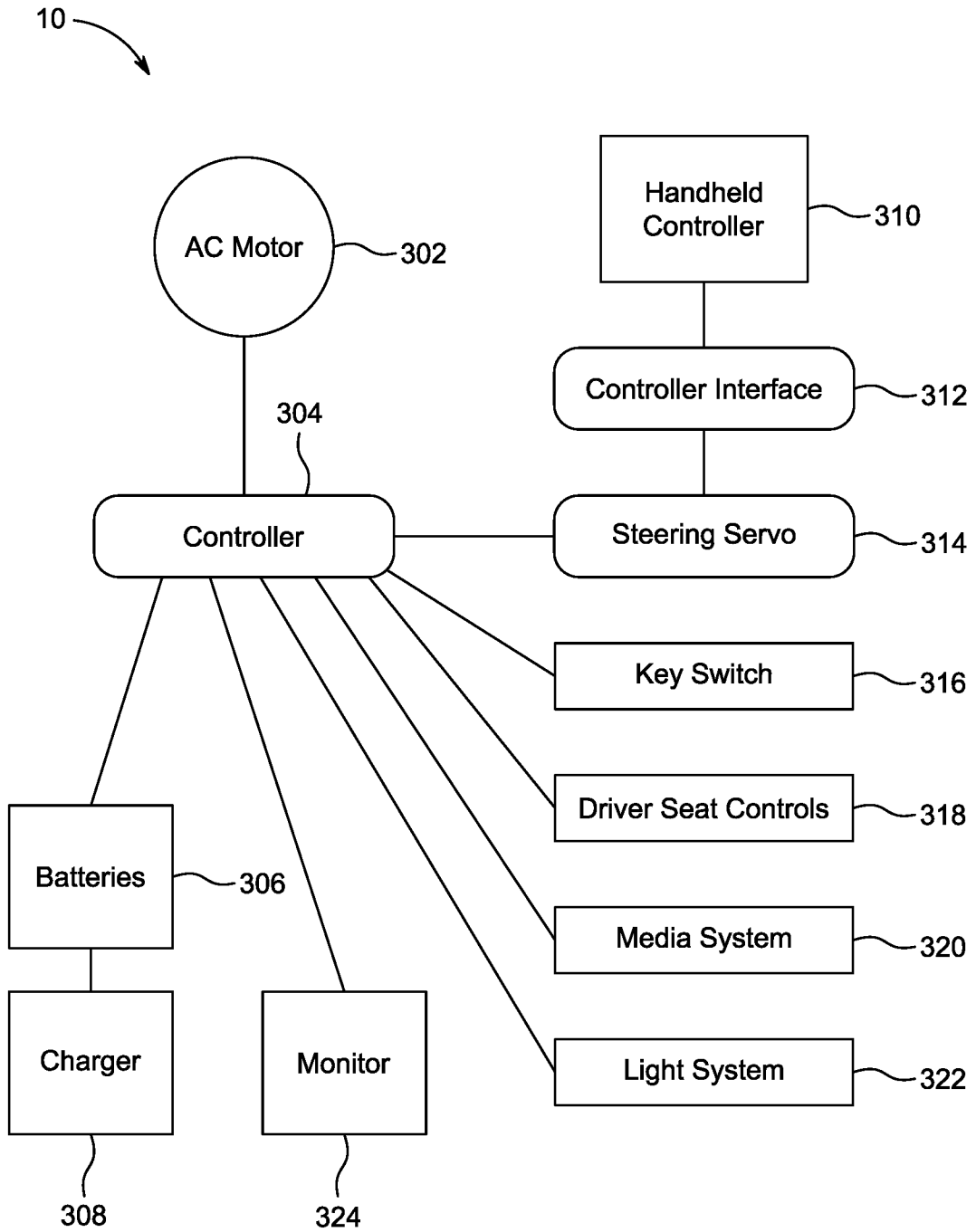


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/051160

A. CLASSIFICATION OF SUBJECT MATTER IPC: B62D 47/02 (2006.01), B60K 26/00 (2006.01), B60N 2/01 (2006.01), B62D 47/00 (2006.01), B62D 51/00 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC: B62D 47/00 (2006.01), B62D 47/02 (2006.01), B62D 51/00 (2006.01), B62D 51/02 (2006.01), B62D 39/00 (2006.01), B62D 63/00 (2006.01), B62D 63/02 (2006.01), B62D 63/04 (2006.01), B60K 26/00 (2006.01), B60N 2/005 (2006.01), B60N 2/01 (2006.01), B60N 99/00 (2006.01) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) QUESTEL ORBIT Keywords: driver, behind, passenger?, stand+, fac+, back, joystick, handheld, etc.		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	CN 101092149 A (AISHI, L.) 26 December 2007 (26-12-2007)	1-8, 10-18, 20 1-20
X	GB 1332025 A (PEDRICK, A.P.) 03 October 1973 (03-10-1973)	1-8, 10-18, 20
X	FR 1272962 A (VAN VINKENROYE, M.G.) 06 October 1961 (06-10-1961)	1-8, 10-18, 20
X	WO 9609201 A1 (WANG, G.) 28 March 1996 (28-03-1996)	1-8, 10-18, 20
Y	WO 2016033689 A1 (LAROUCHE, R. et al.) 10 March 2016 (10-03-2016)	1-20
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* "A" "E" "L" "O" "P"	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 24 November 2017 (24-11-2017)		Date of mailing of the international search report 20 December 2017 (20-12-2017)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 819-953-2476		Authorized officer Jean-Francois Desrosiers (819) 639-7844

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/051160

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7641285 B2 (JACOBS, J.) 05 January 2010 (05-01-2010)	1-20

INTERNATIONAL SEARCH REPORT
Information on patent family members

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PCT/CA2017/051160

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CN101092149A	26 December 2007 (26-12-2007)	None	
GB1332025A	03 October 1973 (03-10-1973)	None	
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WO2016033689A1	10 March 2016 (10-03-2016)	WO2016033689A1 US2017305302A1	10 March 2016 (10-03-2016) 26 October 2017 (26-10-2017)
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