



US010676137B2

(12) **United States Patent**  
**Bollinger**

(10) **Patent No.:** **US 10,676,137 B2**

(45) **Date of Patent:** **Jun. 9, 2020**

(54) **AUTOMOTIVE VEHICLE BODY**

USPC ..... 296/57.1  
See application file for complete search history.

(71) Applicant: **Bollinger Motors LLC**, Hobart, NY  
(US)

(72) Inventor: **Robert Bollinger**, Detroit, MI (US)

(73) Assignee: **Bollinger Motors, LLC**, Ferndale, MI  
(US)

(\* ) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 179 days.

(21) Appl. No.: **15/984,863**

(22) Filed: **May 21, 2018**

(65) **Prior Publication Data**

US 2019/0351950 A1 Nov. 21, 2019

(51) **Int. Cl.**

**B62D 25/20** (2006.01)  
**B60K 1/04** (2019.01)  
**B60R 5/00** (2006.01)  
**B60R 5/04** (2006.01)  
**B62D 33/03** (2006.01)

(52) **U.S. Cl.**

CPC ..... **B62D 25/20** (2013.01); **B60K 1/04**  
(2013.01); **B60R 5/006** (2013.01); **B60R 5/041**  
(2013.01); **B62D 33/03** (2013.01); **B60K**  
**2001/0438** (2013.01)

(58) **Field of Classification Search**

CPC ..... B62D 25/20; B62D 33/03; B60K 1/04;  
B60K 2001/0438; B60R 5/041; B60R  
5/006

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,738,405 A \* 4/1998 Richters ..... B60J 1/085  
296/146.15  
7,240,960 B2 \* 7/2007 Fallis, III ..... B60J 7/0053  
296/107.19  
2008/0100085 A1 \* 5/2008 Ohly ..... B62D 33/0273  
296/57.1

\* cited by examiner

*Primary Examiner* — Joseph D. Pape

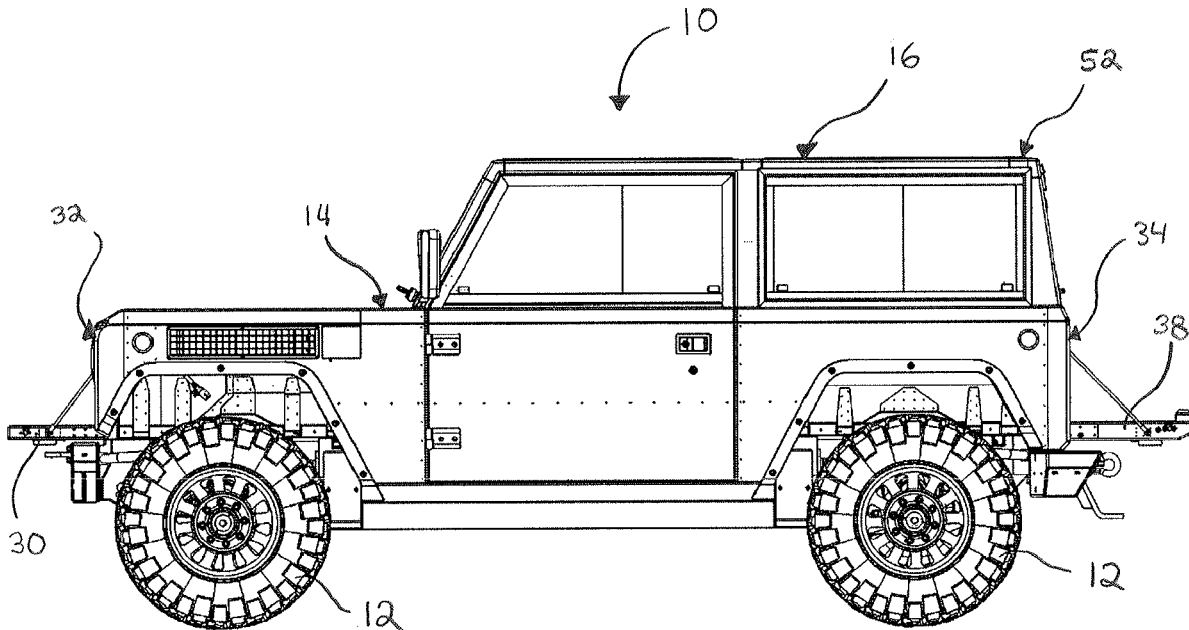
*Assistant Examiner* — Dana D Ivey

(74) *Attorney, Agent, or Firm* — Varnum, Riddering,  
Schmidt & Howlett LLP

(57) **ABSTRACT**

An automotive vehicle includes a body having floorboards positioned along the base of the vehicle body and extending from a front end of the vehicle to a rear end of the vehicle along an uninterrupted path. The path may be accessed by a front opening in the body or a rear opening in the body. A pass through door may provide selective access to a front trunk along the uninterrupted path through the vehicle dash board. In an embodiment the vehicle may include a reconfigurable rear cab comprising a plurality of removably connected components configurable between at least a first and second arrangement.

**20 Claims, 11 Drawing Sheets**



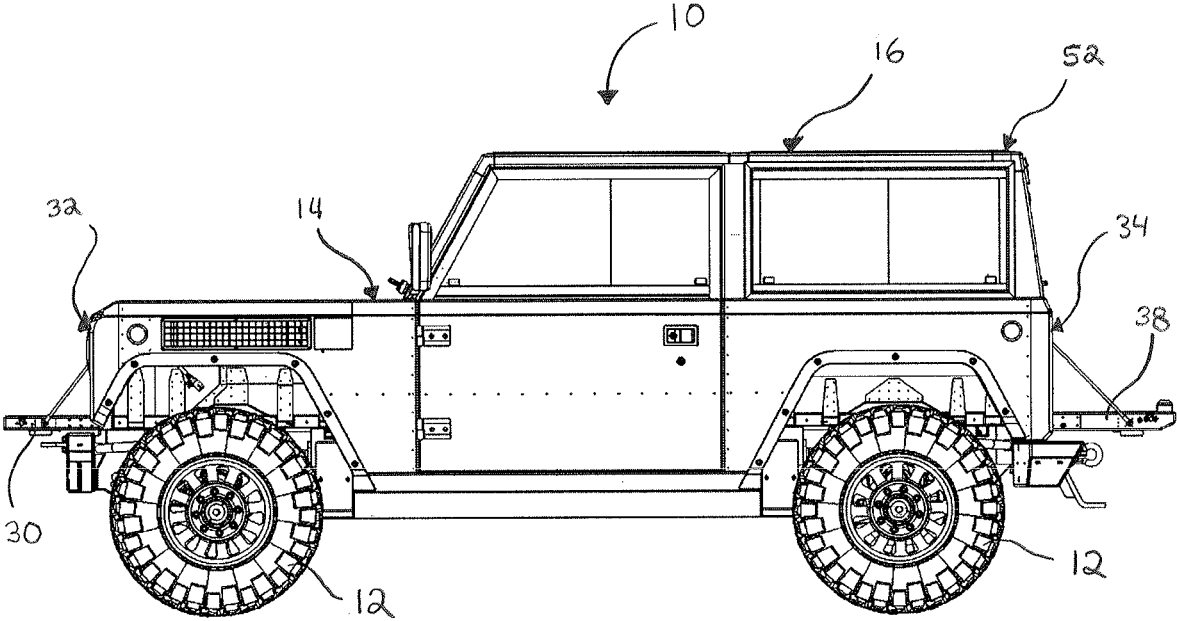


FIG. 1

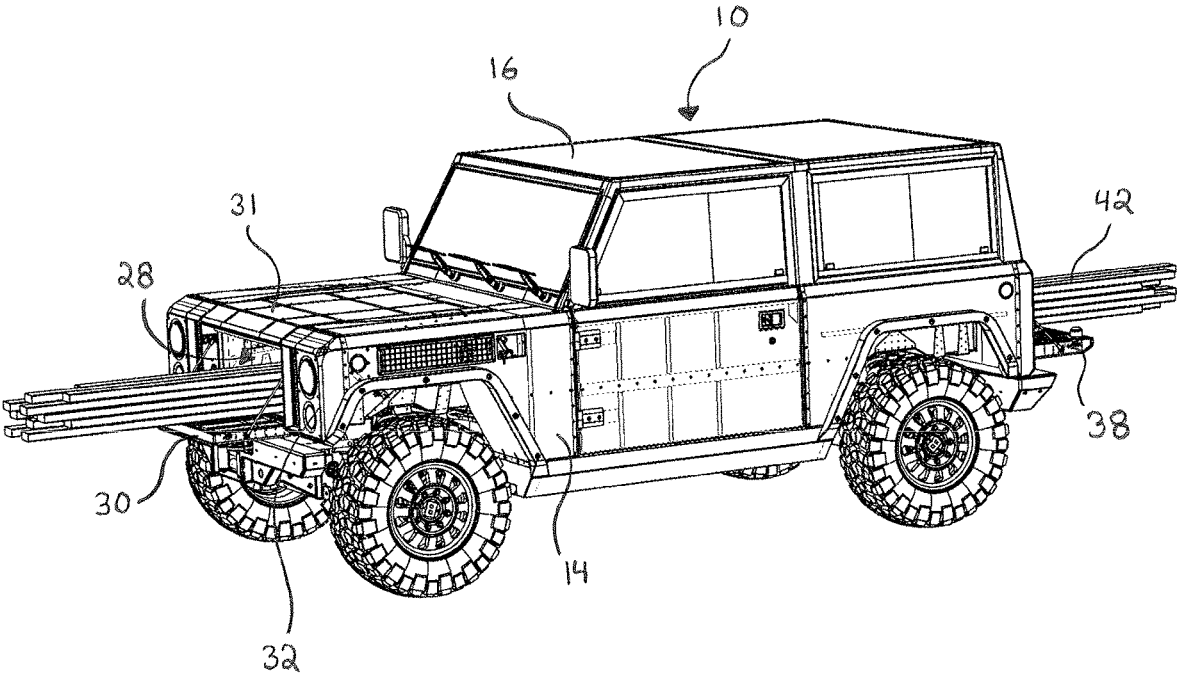


FIG. 2

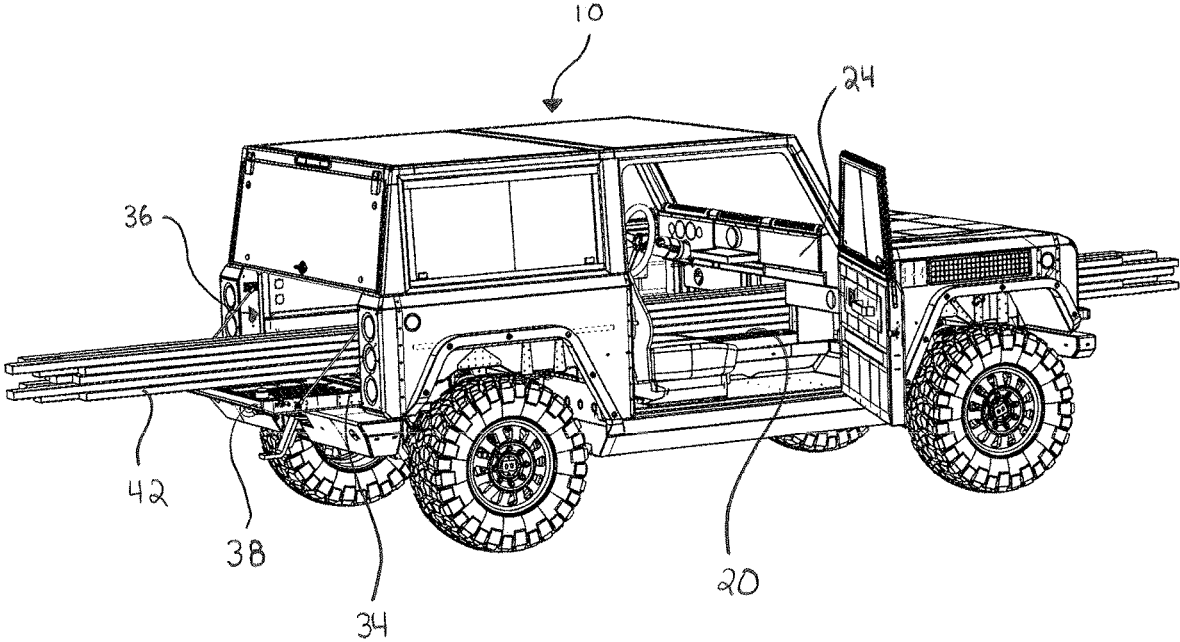


FIG. 3

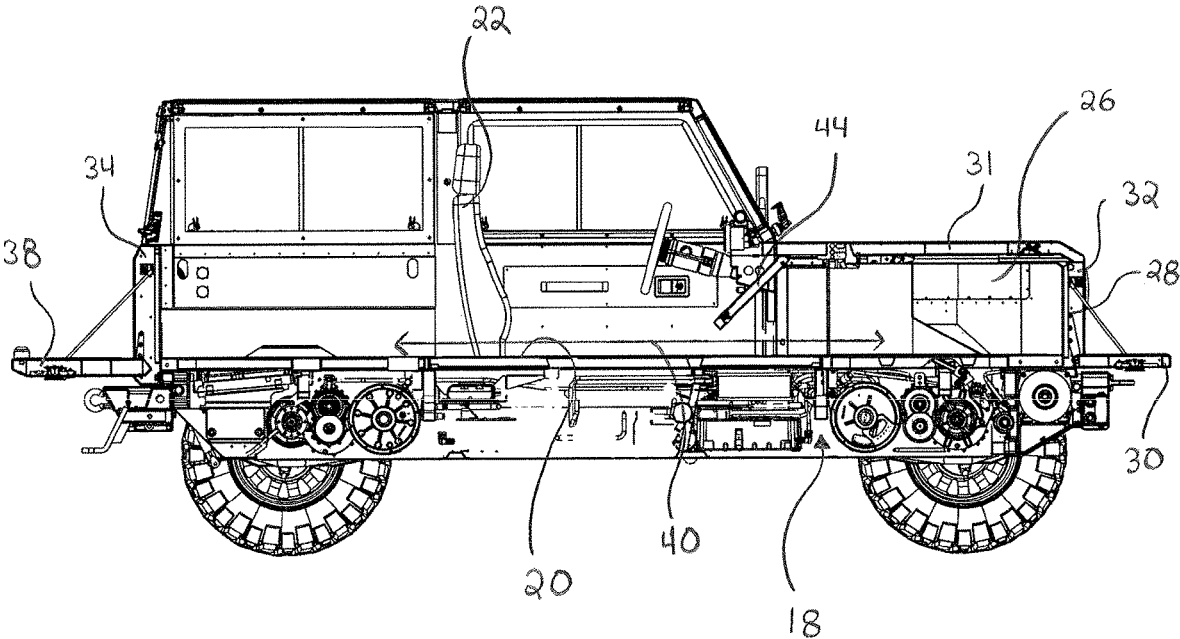


FIG. 4

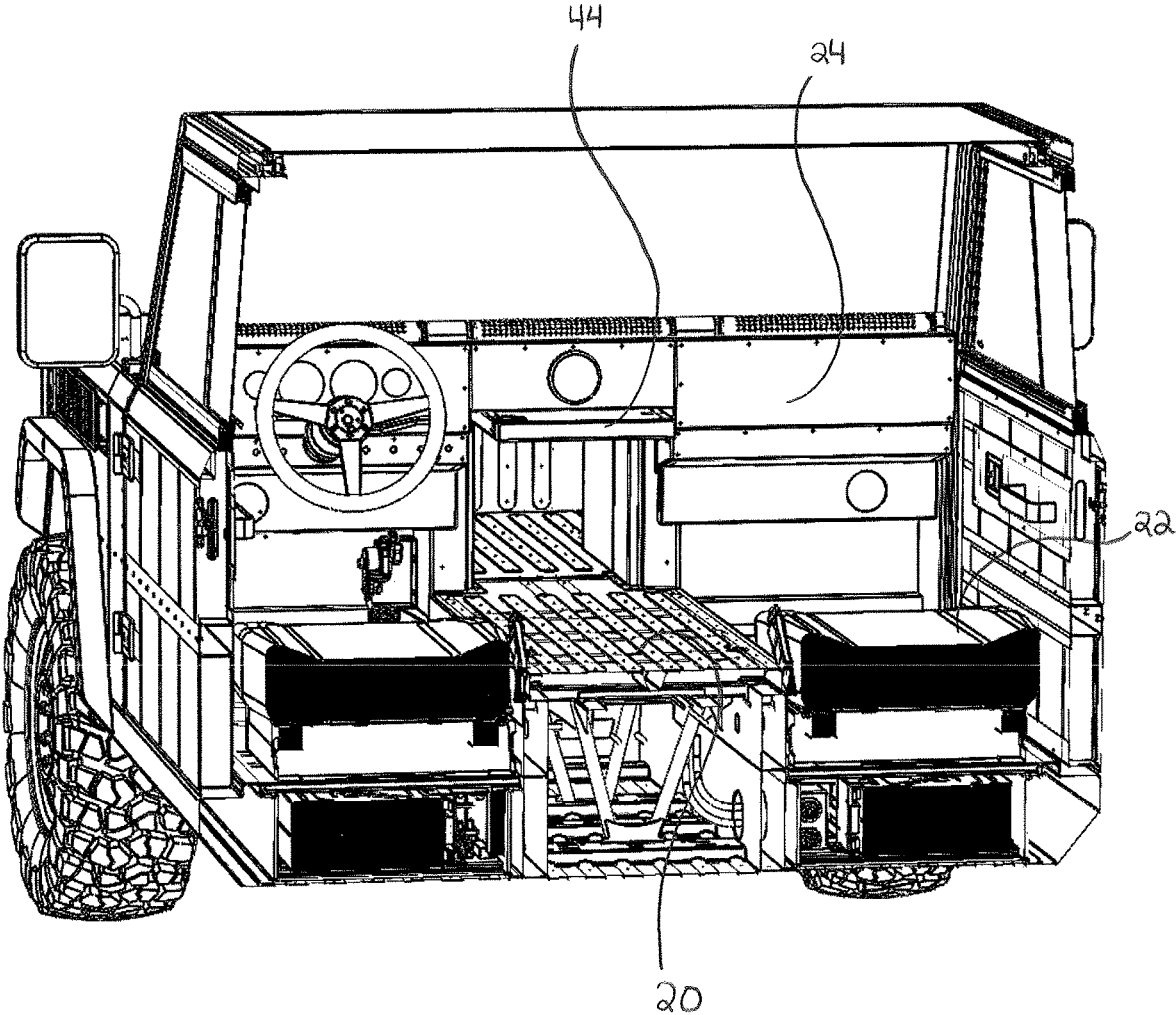


FIG. 5

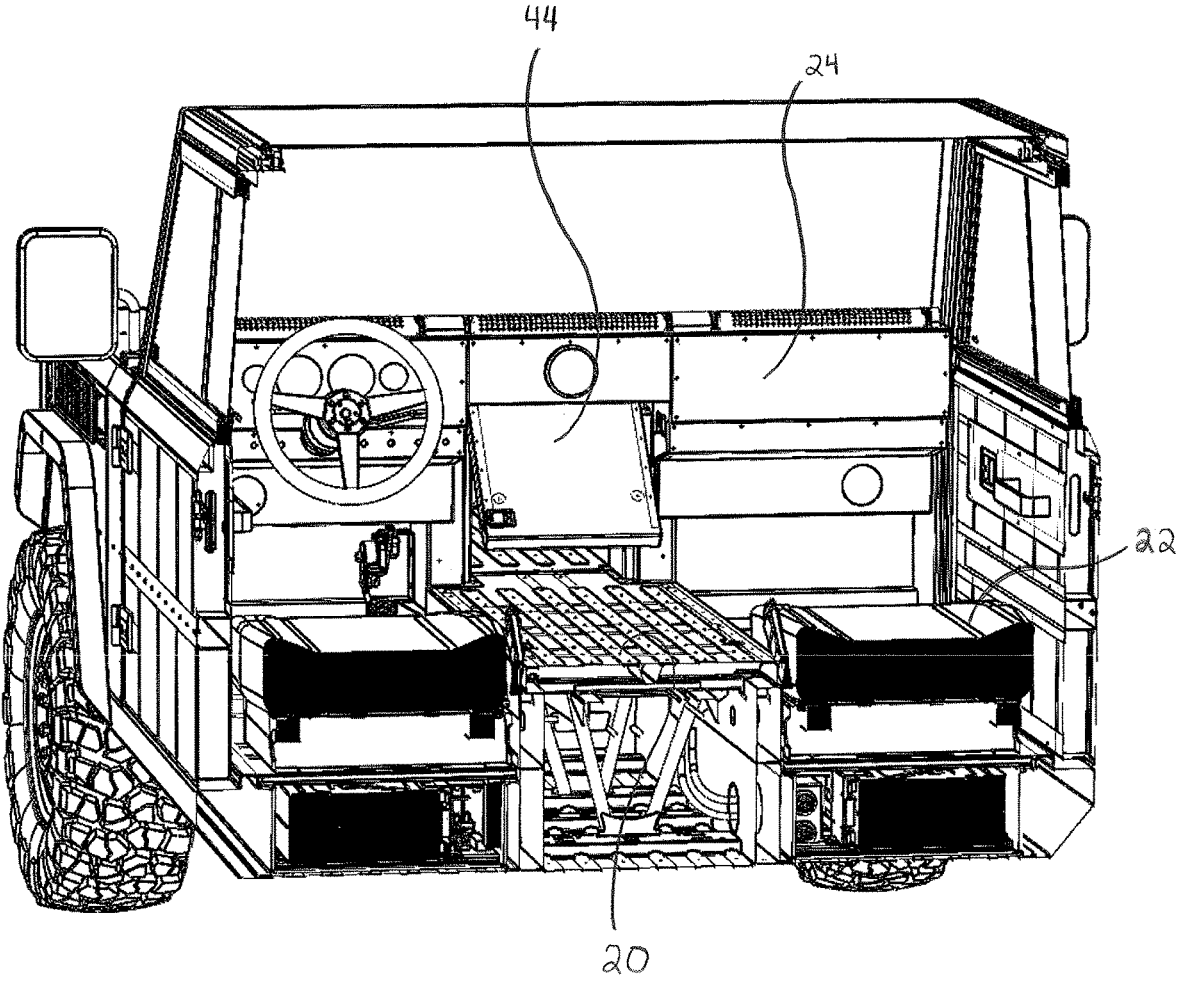


FIG. 6

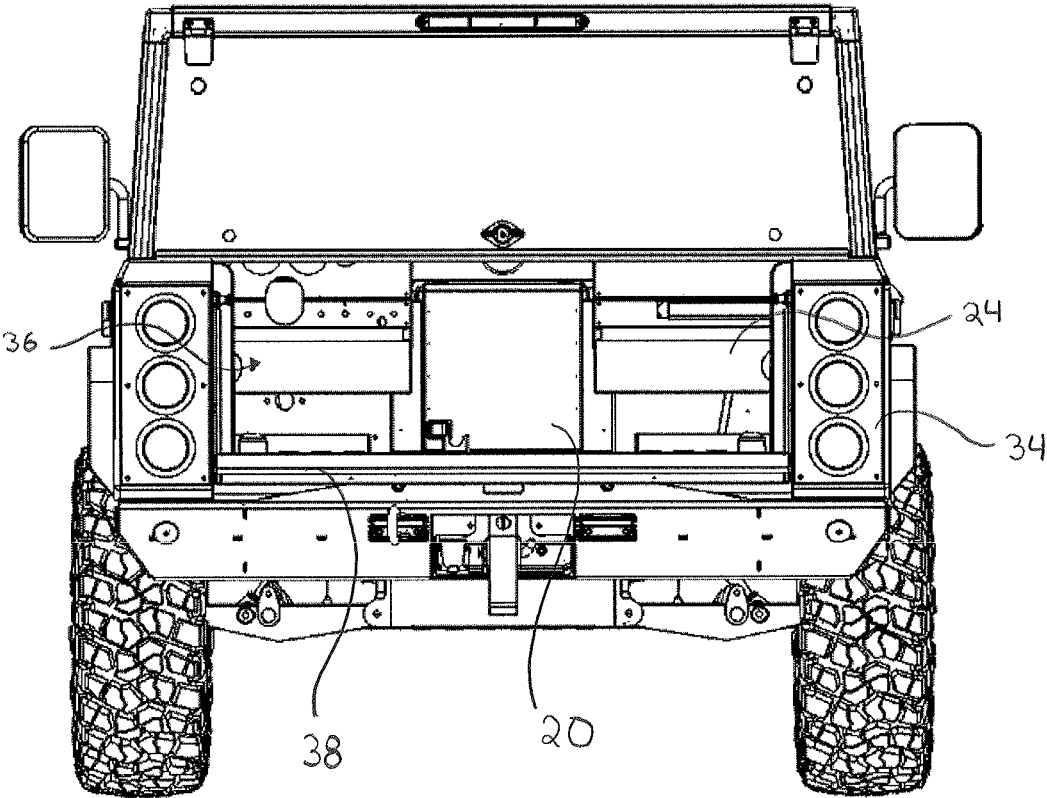


FIG. 7



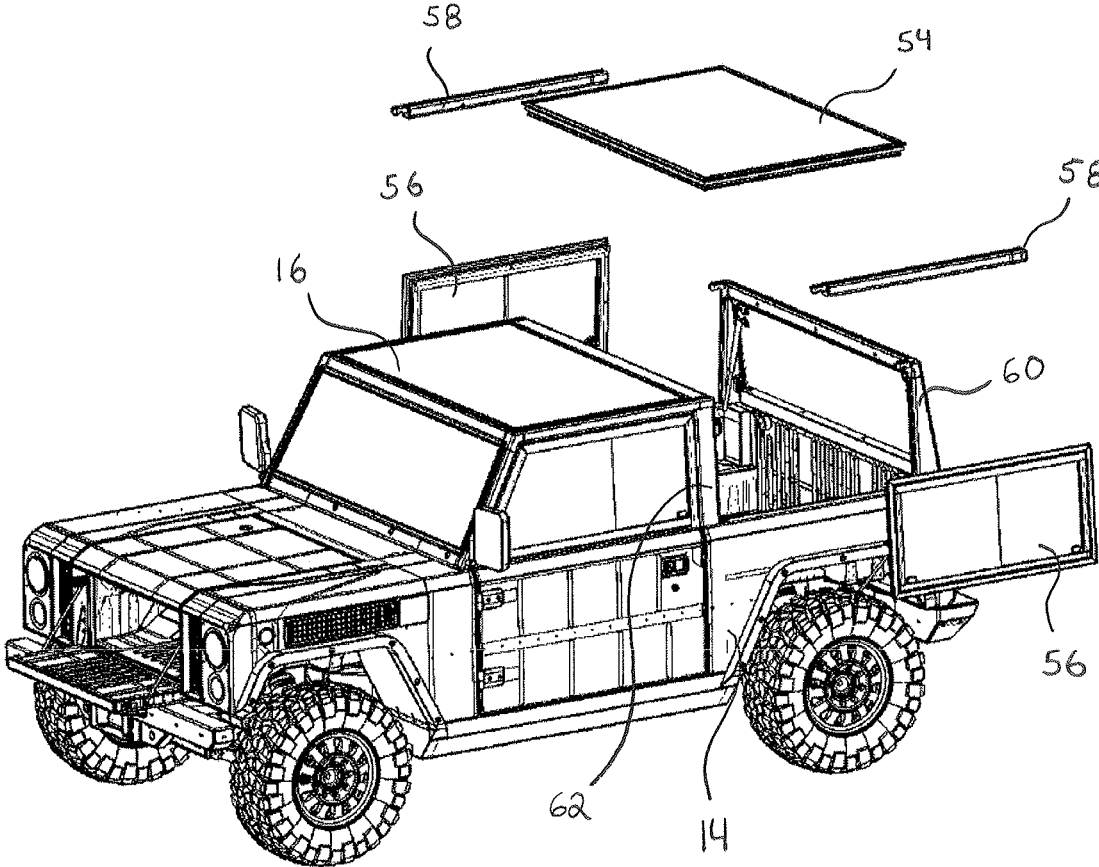


FIG. 8

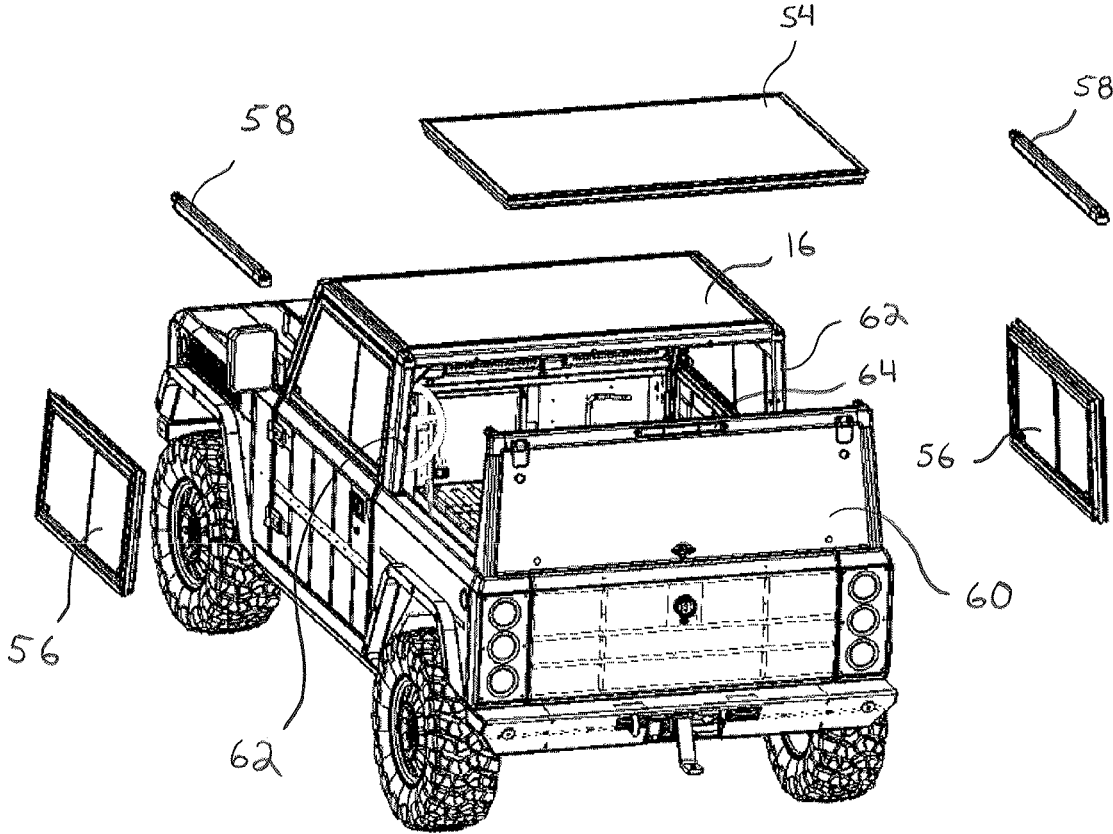


FIG. 9

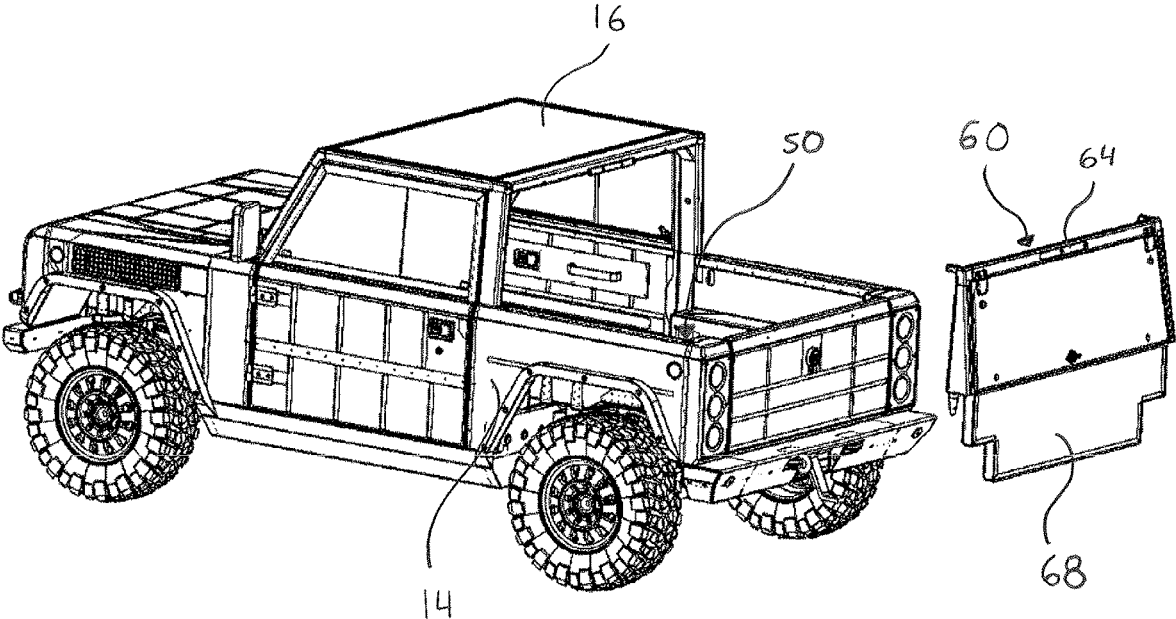


FIG. 10

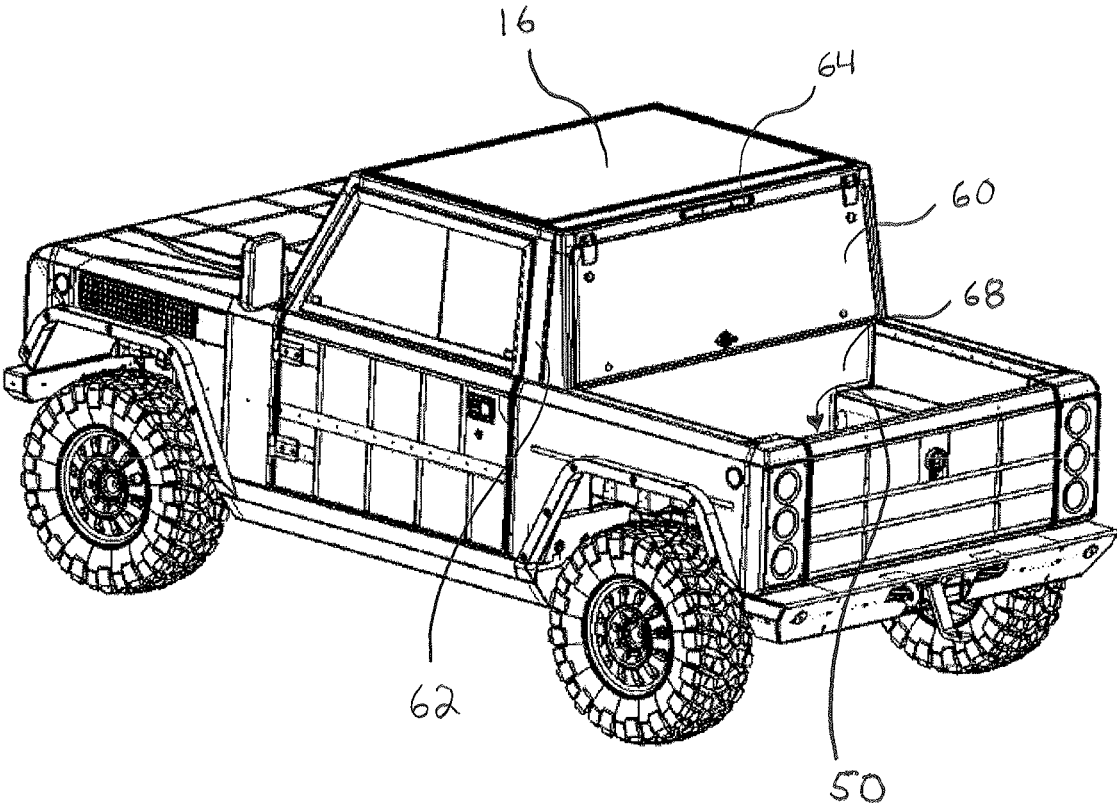


FIG. 11

**AUTOMOTIVE VEHICLE BODY**

## FIELD OF INVENTION

The present invention relates to the field of automotive vehicles and specifically to an automotive vehicle body design.

## BACKGROUND

Automotive vehicles with traditional combustion engines typically are designed with the engine positioned inside the front hood of the vehicle. This positioning is due to weight distribution, space utilization, as well as other reasons design constraints and optimization. In some vehicles, combustion engines are positioned in the rear or trunk to allow for front access or storage. However, in all such designs, the rear or front of the vehicle is occupied with the combustion engine.

Alternative energy powered vehicles, such as electric vehicles, hydrogen powered vehicles, or the like, allow for different configuration options for the vehicle body and cabin. Specifically, the entire powertrain of the vehicle, such as batteries, hydrogen cells, or similar, may be contained in or below the base of the vehicle, thus freeing both the front and rear of the vehicle for storage and other uses. However, current vehicle designs fail to provide full and optimal utilization of the vehicle space by allowing for both the rear and front space to be selectively accessed simultaneously while also providing appropriate safety and containment features to secure cargo in desired areas.

Accordingly, an improved automotive vehicle body is needed in the industry.

## SUMMARY

An automotive vehicle is generally presented. The automotive vehicle includes a plurality of wheels connected to a chassis and a vehicle body connected to the chassis. The body includes a front end and a rear end. One or more floorboards may be positioned along the base of the vehicle body and extend from the front end of the vehicle to the rear end of the vehicle. The vehicle body may include a rear access opening at the rear end of the vehicle and a front access opening in the front end of the vehicle, where both the rear and front access openings are positioned at the floorboards. An uninterrupted path may be formed between the rear access opening and front access opening along the floorboards.

In an embodiment the vehicle includes a front gate connected to the front access opening, such as hinged to the body at the front access opening. The vehicle may also include a tailgate connected to the rear access opening, such as hinged to the body at the rear access opening.

In an embodiment, an automotive vehicle includes a plurality of wheels connected to a chassis and a vehicle body connected to the chassis. The body includes a front end and a rear end and a cab having an interior. One or more floorboards may be positioned along the base of the vehicle body and extend from the front end of the vehicle through the interior of the cab. A dashboard may be positioned within the cab interior, the dashboard including a pass through door located therein. The pass through door may be configured to move between an open position and a closed position. An uninterrupted path may be formed along the floorboards

between the interior of the cab and the front end of the vehicle, wherein the pass through door is positioned within the uninterrupted path.

In an embodiment, the pass through door may be hinged and configured to pivot between an open and closed position, and may be storable within the dashboard.

In an embodiment, an automotive vehicle may include a plurality of wheels connected to a chassis and a vehicle body connected to the chassis. The body may include a front end, a rear end, and a cab having an interior. The vehicle may include a plurality of detachable components forming a portion of the cab. The components may include a rear window panel removably connected to the rear end of the body. First and second side window panels may each be removably connected to the rear window panel and removably connected to a portion of the body. First and second top rails may each be removably connected between a top portion of the rear window panel and a side pillar. And one or more roof panels may each be removably connected to the first and second top rails to form the a portion of the roof of the cab.

## BRIEF DESCRIPTION OF THE DRAWINGS

The operation of the invention may be better understood by reference to the detailed description taken in connection with the following illustrations, wherein:

FIG. 1 illustrates a side view of an automotive vehicle with the tailgate and front gate both in an open position;

FIG. 2 illustrates a first side perspective view of an automotive vehicle having cargo extending through the tailgate and front gate and interior vehicle cabin;

FIG. 3 illustrates a second side perspective view of an automotive vehicle with a door ajar having cargo extending through the tailgate and front gate and interior vehicle cabin;

FIG. 4 illustrates a cutaway side view of an automotive vehicle;

FIG. 5 illustrates a perspective view of the interior of an automotive vehicle having a pass through door in fully open position;

FIG. 6 illustrates a perspective view of the interior of an automotive vehicle having a pass through door in partially open position;

FIG. 7 illustrates a rear view of the interior of an automotive vehicle having a pass through door in closed position;

FIG. 8 illustrates a front perspective and exploded view of an automotive vehicle having a reconfigurable rear cab;

FIG. 9 illustrates a rear perspective and exploded view of an automotive vehicle having a reconfigurable rear cab;

FIG. 10 illustrates a rear perspective view of an automotive vehicle having a rear cabin enclosure panel detached from the vehicle; and

FIG. 11 illustrates a rear perspective view of an automotive vehicle having a rear cabin enclosure panel connected to the vehicle.

## DETAILED DESCRIPTION

Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. It is to be understood that other embodiments may be utilized and structural and functional changes may be made without departing from the respective scope of the invention. Moreover, features of the various embodiments may be combined or altered without departing from the scope of the invention.

As such, the following description is presented by way of illustration only and should not limit in any way the various alternatives and modifications that may be made to the illustrated embodiments and still be within the spirit and scope of the invention.

An automotive vehicle **10** is generally presented. The automotive vehicle **10** may include standard structural components of a typical automotive vehicle, including a plurality of wheels **12**, a chassis, and a body **14**. The body of the vehicle may generally include a cab **16**. The design, structure, and configuration of the body **14** and cab **16** may provide numerous unique benefits, as described herein.

The vehicle **10** may be powered by a power source or powertrain **18** other than a standard combustion engine. Typical automotive vehicles include a gasoline powered internal combustion engine customarily positioned in the front portion of the vehicle, or in some cases in the rear of the vehicle. In contrast, the automotive vehicle **10** may be powered by a powertrain **18** that uses a fuel source other than gasoline, such as an electric or battery powered engine. The alternative powertrain configuration may allow for rearranged layout of the powertrain components thus freeing spaces that are traditionally occupied by the powertrain, as set forth in the embodiments described below.

The automotive vehicle may include floorboards **20** extending along the base of the vehicle cab **16**. The floorboards **20** may comprise metal plating or paneling, plastic matting, or other similar materials, or any combination thereof. The floorboards **20** may be positioned above the chassis and may generally form a plane. As best illustrated in FIG. **4**, the powertrain **18** may be positioned primarily below the plane of the floorboards **20**. It will be appreciated, however, that portions of batteries, power sources, or other drivetrain components may extend partially above the plane of the floorboards **20**. Likewise, the seats **22**, dashboard **24**, and other components within the cab **16** may be generally positioned above the floorboards **20**, although it will be appreciated that portions of some components, such as the base of the seats **22**, may extend partially below the plane of the floorboards **20**.

The arrangement of the powertrain **18** below the floorboards **20** creates open and usable spaces in the front and rear of the vehicle **10**. Specifically, as best illustrated in FIGS. **2-7**, the front portion of the vehicle **10** between the dashboard **24** and a front end **32** may be designated as a front trunk **26**. The floorboards **20** may extend into the front trunk **26** as shown in FIGS. **4** and **5**.

The vehicle **10** may include a front opening **28** in the body **14** to provide access to the front trunk **26** from the front end **32**. The bottom of the front opening **28** may be generally level with the floorboards **20**. The front opening **28** may be covered by a front gate **30**. The front gate **30** may be hinged to the body or chassis of the vehicle **10** and may open downwards to provide access to the front opening **28**. The front gate **30** may be operable between an open position and a closed position. In closed position, the front gate **30** may be positioned generally vertically and may be latched into place to prevent access to the front opening **28**. In open position, as shown in FIGS. **1-4**, the front gate **30** may pivot to a generally horizontal position. The open front gate **30** may be generally in line and level with the floorboards **20** in the front trunk **26** to extend the front trunk surface beyond the outer footprint of the vehicle **10**.

The front trunk **26** may further include a hood **31**. The hood **31** may be positioned above the front trunk **26** forming a lid or top cover thereto. The hood **31** may be hinged to the

top body of the vehicle and capable of opening upwards to provide access to the top of the front trunk **26** space.

The floorboards **20** may extend from the front end **32** to the rear end **34** of the vehicle **10**. As best illustrated in FIGS. **3** and **7**, the rear end **34** of the vehicle **10** may comprise a rear opening **36**. The bottom of the rear opening **36** may be generally level with the floorboards **20**. A tailgate **38**, may be connected to the body **14** at the rear opening **36**. The tailgate **38** may be hinged to the body **14** to be pivotable between an open position and a closed position. In closed position, the tailgate **38** may be latched and/or locked in generally vertical position to close and prevent access to the rear opening **36**. In open position the tailgate **38** may pivot to a generally horizontal position and may be generally level with the floorboards **20** to extend the rear floorboards **20** beyond the outer footprint of the vehicle **10**.

In an embodiment, the vehicle **10** may include an uninterrupted path **40** between the rear opening **36** and the front opening **28**. As shown in FIGS. **2** and **3**, the uninterrupted path **40** may allow for cargo **42** that is greater in length than the vehicle **10** to be stored and transported within the vehicle **10**. The cargo **42** may be inserted through the front opening **28** or rear opening **36** and may extend through one or both openings **28**, **36** during transport. The supporting base of the floorboards **20** may be extended beyond the footprint of the vehicle body **14** by opening the front gate **30** and/or tailgate **38**.

In an embodiment, the vehicle **10** may include a pass through door **44**, as shown in FIGS. **5-7**. The pass through door **44** may be located within the cab **16** and may be positioned in or near the dashboard **24**, within the uninterrupted path **40**. For example, the vehicle **10** may include a dashboard **24** that is positioned to partition the cab **16** from the front trunk space between the dash and the front end **32**. The pass through door **44** may be positioned within the dash and selectively opened and closed to provide access between the cab **16** and the front trunk **26**. The pass through door **44** may further provide selective access or restriction to the uninterrupted path **40** between the front opening **28** and the rear opening **36**. For example, the door **44** may be hinged to swing upward to an open position, as shown in FIG. **6**. The door **44** may further be insertable into the dashboard to be stored in an open position, as shown in FIG. **5**. It will be appreciated though, that the pass through door **44** may be moveable in any appropriate manner to open and close and provide selective access to the front trunk **26**.

In an embodiment illustrated in FIGS. **1** and **8-11**, the automotive vehicle may include a body **14** and cab **16** that is reconfigurable between two or more arrangements. In a first arrangement, shown in FIG. **1**, the cab **16** may be configured to provide space for two rows of seating. In a second arrangement, shown in FIG. **11**, the cab **16** may be configured to provide space for only one row of seating and create a truck bed **50** having no surrounding upper sidewalls or roof. While the reconfigurable cab **16** is shown and described herein as altering between one and two rows of seating, it will be appreciated that the embodiments disclosed herein may be applied to other seating arrangements, such as reconfiguring a vehicle between three rows of seating and two rows of seating.

With reference to FIGS. **8-10**, rear vehicle body may be formed of a plurality of structural components. The components may include one or more roof panels **54**, a pair of side window panels **56**, a pair of top beams **58**, and a rear window panel **60**. The components may be removably

5

connected together to form the rear cab **52** and may be disconnected and reconfigured to provide an uncovered bed **50**.

As shown in FIGS. **8** and **9**, the rear window panel **60** may be removably connected to the rear end **34** of the vehicle **10** and may form the rearmost pillars of the vehicle **10**. The side window panels **56** may be removably connected between the rear window panel **60** and the fixed middle pillars **62** of the vehicle **10**. The top beams **58** may be removably connected between the top of the middle pillars **62** and the top of the rear window panel **60**, above the respective side window panels **56**. When assemble, the top beams **58**, top of the rear window panel **60**, and a portion of the body **14** may form a rectangular top frame. The one or more roof panels **54** may be removably connected to the top frame to form the roof of the cab **16**.

It will be appreciated that the removable connections between the components of the rear cab **52** may be any appropriate connection, such as a screw or bolt connection, latch connection, or the like. In addition, the components and portions of the body **14** may be configured with additional features to assist in the fitted assembly of the components, such as retaining slots, clamps, hooks, pins, gaskets, and the like. Each removable connection between components may allow for manual connection of the components and manual disconnection of the components.

The rear window panel **60** may include an electrical connection to connect a rear brake or stop light **64** with the vehicle controller. The electrical connection may include a quick disconnect plug connectable to the rear window panel **60**. The electrical connection may be disconnected prior to disassembly of the rear cab **52**.

In the second arrangement, illustrated in FIGS. **10** and **11**, the rear window panel **60** may be reconfigured to cover the entire cab opening at the middle pillar **62**. Specifically, the rear window panel **60** may receive a lower portion **68** to be connected below the window and be sized and shaped similar to the lower rear opening in the cab **16** to completely close off the cab opening from the bed **50**.

In use, the rear cab **52** may begin in assembled arrangement, as illustrated in FIG. **1**. A method of reconfiguring the rear cab may comprise disconnecting and removing the roof panel **54** from the top beams **58**. The side window panels **56** may be disconnected and removed from the body **14**, top beams **58**, middle pillar **62**, and rear window panel **60**. The top beams **58** may be disconnected from the rear window panel **60** and from the middle pillar **62**. The brake light **64** of the rear window panel **60** may be electrically disconnected from the vehicle **10** and the rear window panel **60** may be disconnected from the rear end **34** of the vehicle **10**. The lower panel **68** may be connected to the bottom of the rear window panel **60** and the full assembly may be moved to and installed at the middle of vehicle **10** alongside the middle pillar **62**. The brake light **64** of the rear window panel **60** may then be electrically connected to the vehicle controller.

A method of reconfiguring the cab from the second arrangement back to the fully assembled cab **16** in the first arrangement may comprise disconnecting the rear brake light **64** and disconnecting the rear window panel **60** from the rear opening of the cab **16**. The lower panel **68** may be removed and stored. The rear window panel **60**, without the lower panel **68**, may be connected to the rear end **34** of the vehicle **10** and the brake light **64** electrically connected. The top beams **58** may be installed and connected between the rear window panel **60** and middle pillars **62**. The side window panels **56** may be connected to the rear window

6

panel **60**, middle pillars **62**, and top beams **58**. The roof panels **54** may be connected to the top beams **58** to form the roof of the cab **16**.

Although the embodiments of the present invention have been illustrated in the accompanying drawings and described in the foregoing detailed description, it is to be understood that the present invention is not to be limited to just the embodiments disclosed, but that the invention described herein is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the claims hereafter. The claims as follows are intended to include all modifications and alterations insofar as they come within the scope of the claims or the equivalent thereof.

Having thus described the invention, I claim:

1. An automotive vehicle comprising:
  - a plurality of wheels connected to a chassis;
  - a vehicle body connected to the chassis, the body including a front end and a rear end;
  - one or more floorboards positioned along the base of the vehicle body, the floorboards extending from the front end of the vehicle to the rear end of the vehicle;
  - a rear access opening in the rear body of the vehicle adjacent to the floorboards;
  - a front access opening in the front body of the vehicle adjacent to the floorboards;
  - wherein an uninterrupted path is formed through the vehicle along the floorboards between the rear access opening and the front access opening.
2. The automotive vehicle of claim 1 further comprising a front gate connected to the vehicle body at the front access opening, wherein the front gate is configured to provide selective access to the front access opening.
3. The automotive vehicle of claim 2, wherein the front gate is hinged to the vehicle body.
4. The automotive vehicle of claim 3, wherein the front gate is pivotable between an open position and a closed position.
5. The automotive vehicle of claim 3, wherein the front gate is generally level with the floorboards when in open position.
6. The automotive vehicle of claim 1 further comprising a tailgate connected to the vehicle body at the rear access opening, wherein the tailgate is configured to provide selective access to the rear access opening.
7. The automotive vehicle of claim 6, wherein the tailgate is pivotable between an open position and a closed position.
8. The automotive vehicle of claim 6, wherein the tailgate is generally level with the floorboards when in open position.
9. The automotive vehicle of claim 1 further comprising a pass through door located within the uninterrupted path, wherein the pass through door is configured to selectively close off access to the uninterrupted path.
10. The automotive vehicle of claim 9, wherein the pass through door is connected to a dashboard within the vehicle and configured to provide access to a space between the dashboard and the front end of the vehicle.
11. The automotive vehicle of claim 1, wherein the floorboards extend linearly between the front opening and the rear opening.
12. The automotive vehicle of claim 1, wherein the floorboards extend linearly between the front opening and the rear opening.
13. An automotive vehicle comprising:
  - a plurality of wheels connected to a chassis;

a vehicle body connected to the chassis, the body including a front end and a rear end and forming a cab having an interior;  
 a dashboard positioned within the cab interior;  
 one or more floorboards positioned along the base of the vehicle body, the floorboards extending from the front end of the vehicle through the interior of the cab;  
 a pass through door located within the dashboard and configured to move between an open position and a closed position; and  
 wherein an uninterrupted path is formed along the floorboards between the interior of the cab and the front end, wherein the pass through door is positioned within the uninterrupted path.

14. The automotive vehicle of claim 13, wherein the dashboard is configured to partition the cab from a space between the dashboard and the front end of the vehicle.

15. The automotive vehicle of claim 13, wherein the pass through door is configured to pivot between an open position and a closed position.

16. The automotive vehicle of claim 13, wherein the pass through door is storable within the dashboard in an open position.

17. The automotive vehicle of claim 13, wherein the front end of the vehicle includes a front opening positioned at the floorboards.

18. An automotive vehicle comprising:  
 a plurality of wheels connected to a chassis;  
 a vehicle body connected to the chassis, the vehicle body including a front end, a rear end, and a cabin positioned between the front end and the rear end;  
 one or more floorboards positioned along the base of the vehicle body within the cabin;  
 a front trunk positioned between the cabin and the front end, the front trunk comprising an at least partially enclosed volume having a floor;  
 a front gate positioned at the front end of the vehicle and pivotable between an upright position and a horizontal position, wherein the front trunk is accessible through an opening when the front gate is pivoted away from upright position.

19. The automotive vehicle of claim 18 further comprising a hood, wherein the hood is pivotable between an open and closed position and wherein the hood is configured to provide access to the front trunk when in open position.

20. The automotive vehicle of claim 18, wherein the front gate includes an interior surface and wherein the interior surface is aligned with the floor of the front trunk when the front gate is in horizontal position.

\* \* \* \* \*