Dec. 31, 1968 W. S. EGGERT, JR., ET AL 3,419,303

LOWER BODY CONSTRUCTION FOR AUTOMOBILES

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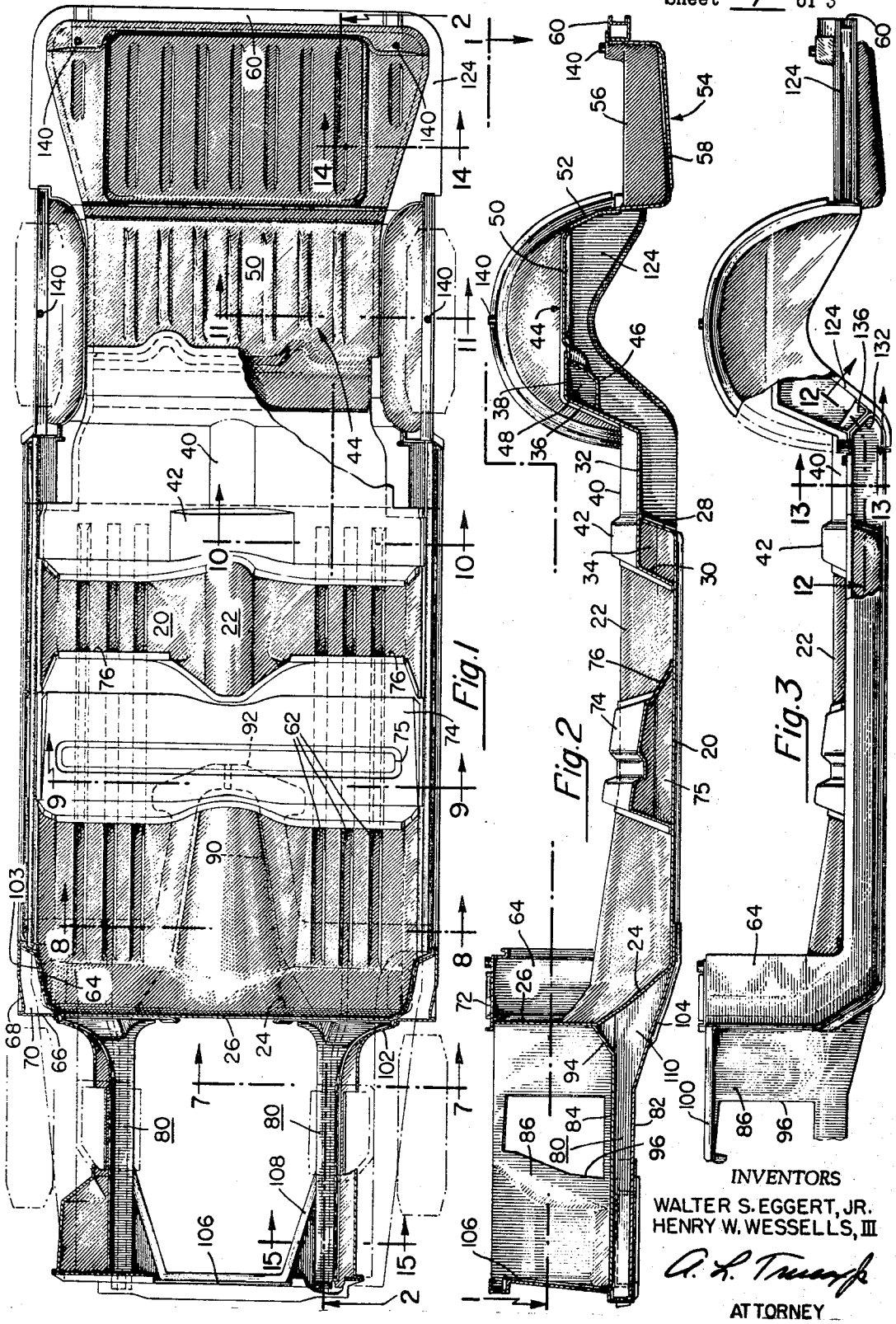


Fig. 1

Fig. 2

Fig. 3

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LOWER BODY CONSTRUCTION FOR AUTOMOBILES

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Fig.4

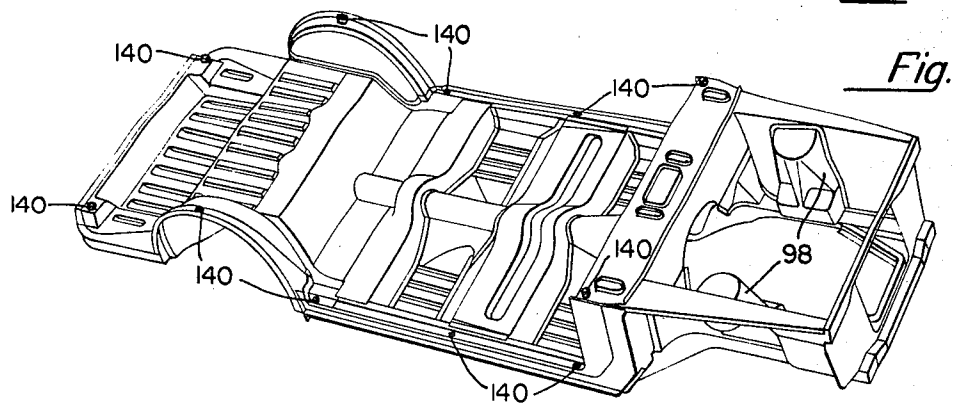


Fig.5

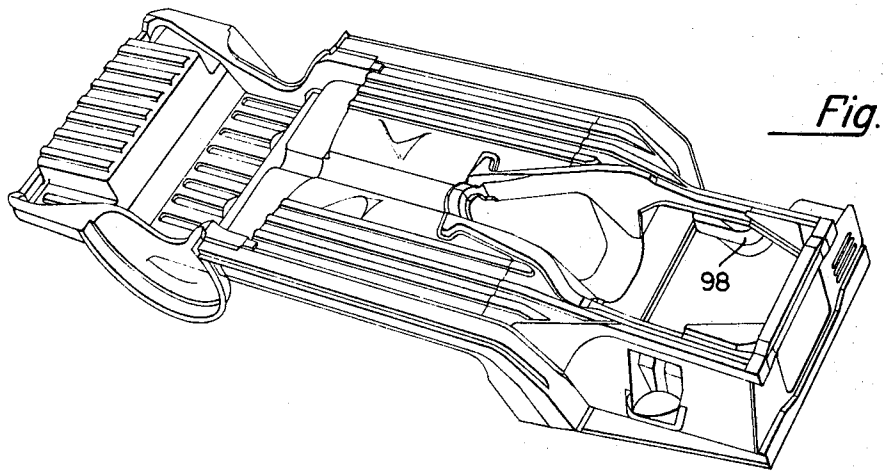


Fig.6

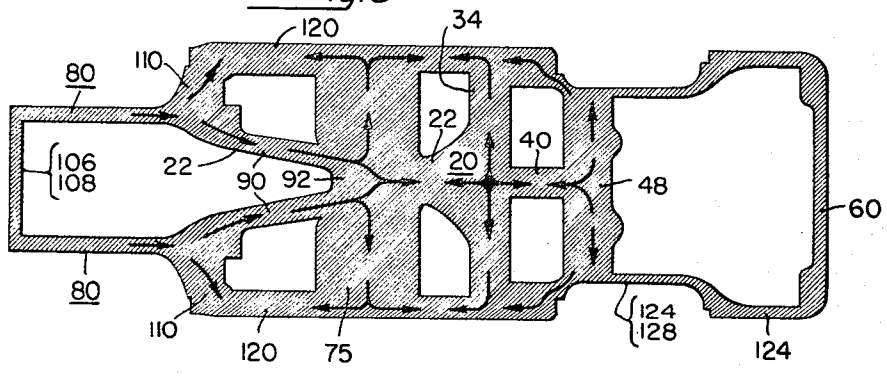


Fig.14

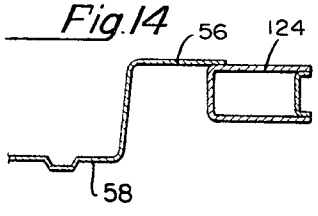
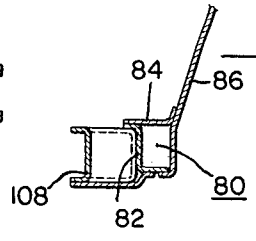


Fig.15



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Fig. 8

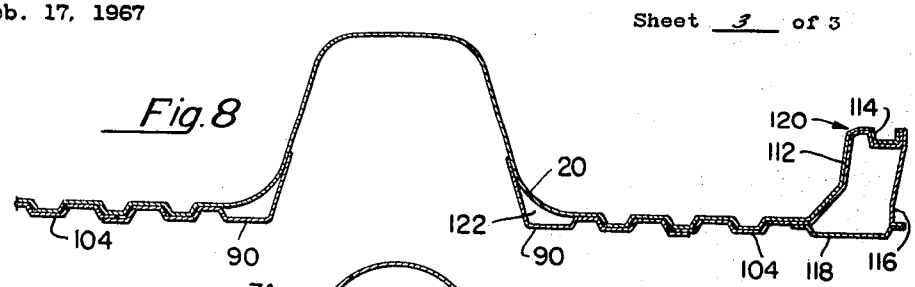
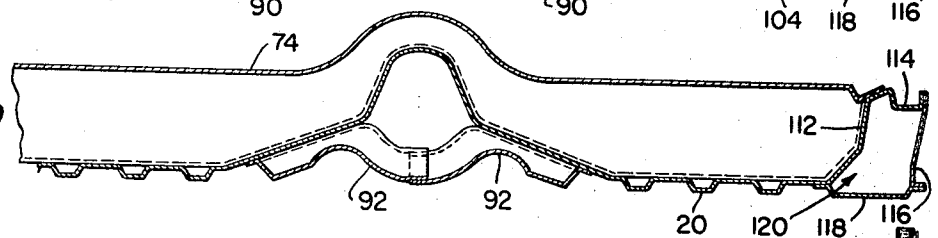


Fig. 9



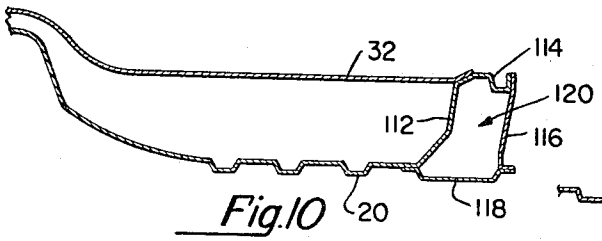


Fig. 10

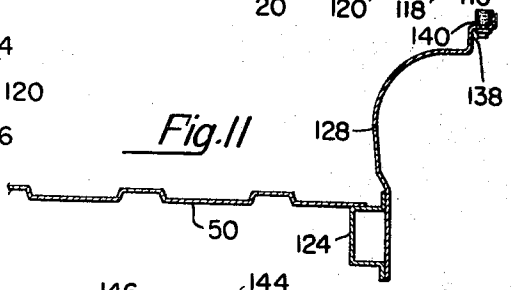
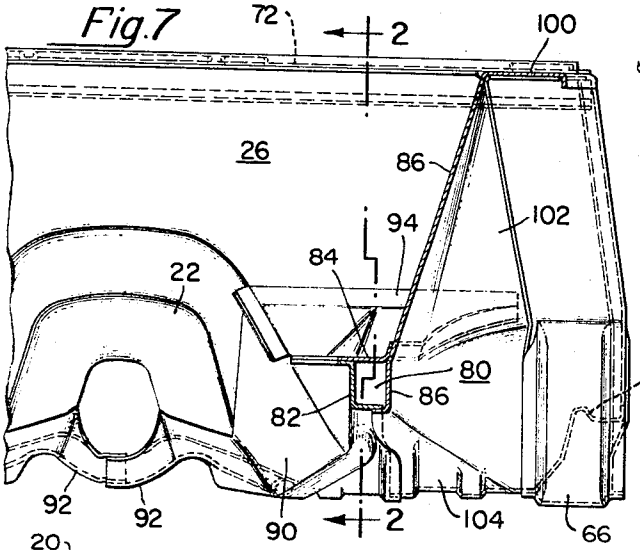


Fig. 11

Fig. 7



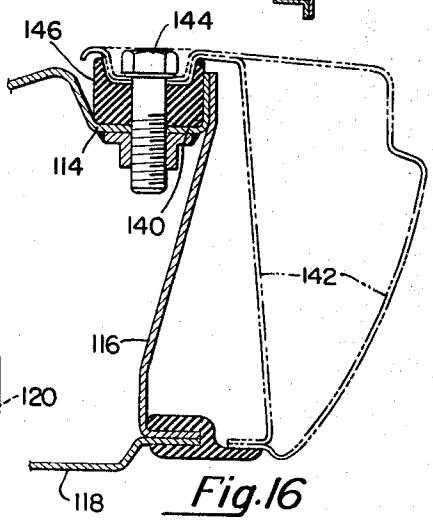


Fig. 16

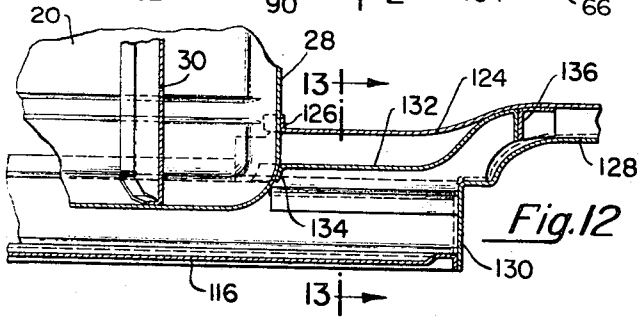


Fig. 12

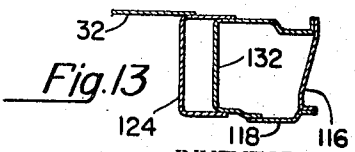


Fig. 13

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LOWER BODY CONSTRUCTION FOR AUTOMOBILES

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9 Claims. (Cl. 296—28)

ABSTRACT OF THE DISCLOSURE

This disclosure pertains to the construction of a lower body construction or platform unit for automobiles, comprising integrated frame, floor and related components which can be operated as a self-contained independent automotive unit adapted to take a completed upper body unit.

This invention relates to a lower body construction for automobiles and has for an object the provision of improvements in this art.

Background of the invention

The present invention constitutes a departure from the two most common types of automotive body construction—the first being characterized by having a skeleton frame on which a body is assembled, and the second being characterized by having a unitized frame and body—by providing a complete unitized lower body construction or unit comprising sills, floor, firewall, and engine and running gear supports, ready to take a finished upper body unit; and, in fact, adapted to take any of a number of types of finished upper body units. There have been some proposals for making a unitized lower body construction but the present invention is believed to provide a lighter, stronger and more versatile type of construction, as will be clear from the following description of an exemplary embodiment of the invention, reference being made to the accompanying drawings, wherein:

Drawings

FIG. 1 is a top plan view and section of a unitized lower body or platform construction, the section being taken on the line **1—1** of FIG. 2;

FIG. 2 is a vertical longitudinal section taken on the line **2—2** of FIG. 1, the section also being designated on FIG. 7;

FIG. 3 is a front side elevation, partly broken away at the forward portion of the rear wheel housing zone;

FIG. 4 is a reduced top-front-side perspective view of the lower body assembly structure shown in FIGS. 1 to 3;

FIG. 5 is a bottom perspective view of the assembly shown in FIG. 4;

FIG. 6 is a load diagram in plan, showing how wheel loads are transferred into the lower body assembly structure;

FIG. 7 is a partial enlarged vertical transverse section taken on the line **7—7** of FIG. 1;

FIG. 8 is a partial enlarged vertical transverse section taken on the line **8—8** of FIG. 1;

FIG. 9 is a partial enlarged vertical transverse section taken on the line **9—9** of FIG. 1;

FIG. 10 is a partial enlarged vertical transverse section taken on the line **10—10** of FIG. 1;

FIG. 11 is a partial enlarged vertical transverse section taken on the line **11—11** of FIG. 1;

FIG. 12 is a partial enlarged horizontal section taken on the line **12—12** of FIG. 3;

FIG. 13 is a partial enlarged vertical transverse section taken on the line **13—13** of FIG. 3, the section also being shown in FIG. 12;

FIG. 14 is a partial enlarged vertical transverse section taken on the line **14—14** of FIG. 1;

FIG. 15 is a partial enlarged vertical transverse section taken on the line **15—15** of FIG. 1;

FIG. 16 is an enlarged view of the right side portion of FIGS. 8, 9 or 10, with parts of the upper body assembly structure shown in phantom as secured thereto.

Summary of invention

Before a detailed description is begun the following comments on the general features and advantages of the present construction may be helpful.

Briefly, the lower body construction hereby provided—and sometimes referred to as an underbody construction—comprises essentially a platform which combines the function of frame, floor, engine and chassis supports, wheelhouse elements, cowl dashboard or firewall elements, and seat supporting means. This platform constitutes the bottom cover for an upper body unit which is separately constructed while open at the bottom for access and later assembled on the lower body unit or platform.

The present platform concept allows normal body-frame construction techniques to be applied in mounting components on the platform, in platform and body handling, and body drop assembly. It is fully compatible with existing plant layouts. It saves repair or "hospitalization" of the bodies subsequent to final assembly. Labor, equipment and management operations are reduced and more advantageously divided.

It also permits the mounting of engine, running gear, seats, and associated equipment to form an operable vehicle which can be moved about without plant transfer equipment, as for example, to be moved to separate assembly areas or plants to receive different upper body units.

The platform concept permits organizational separation of platform and body groups. They can operate almost independently. This provides considerable saving in time and cost by reducing interdependence and interaction of the two groups, and also of the styling group during development and redesign or "facelift" programs. This separation facilitates more effective long range planning by providing components which can be developed and changed according to separate timing schedules.

The present lower body or platform unit can be manufactured in a manner similar to a frame, turned over for assembly of components underneath, and easily accessible for all installation operations. The upper body unit or balloon mounts on the lower body unit at a number of key attachment points, much as on a common frame, these points being on sill elements and providing for resilient isolation to allow flexibility and to provide tuning between platform and body.

In order to provide maximum body space the floor is disposed at a low elevation and is almost flat and provided wtih a tunnel which carries the drive shaft, exhaust line, fuel line, brake lines, wiring and the like.

Box-like through-running transverse seat mount bases are utilized wtih the floor to provide transverse beam structures to add strength and stiffness, i.e., reinforcement.

Front longitudinal members are provided which have rear inner portions which extend inward and rearward along the lower edges of the floor and tunnel to carry front end loads into the floor and tunnel structure and also have outer torque box portions which run into the side sills and dash structure to carry front end loads into the dash and side sill structures.

The load is redistributed between the tunnel and side sills by means of the front and rear box-section cross members which serve as seat bases; also by the transverse beam structure at the fire wall.

The mechanical chassis components, engine, power train, front and rear suspension, steering components, heater system, air conditioning system, liquid cooling system, exhaust, controls, electrical equipment, seats, floor covering and trim, spare tires, bumpers, and the like can be mounted on the lower body unit or platform before the upper body unit is brought into assembly with it.

The cowl and sills are formed with enclosed box portions to provide added strength and rigidity in final assembly and to control openings during manufacture.

Since the floor is carried by the lower body unit, the upper body unit, or body proper, or balloon, will be open at the bottom for access and can be trimmed out and doors and windows installed before the body is dropped on the platform.

The seal can be made between the upper and lower body units by resilient strip means, tape or rubber, and the units secured together at the standard mountain points provided.

After body drop, the car is completed, preferably by making the minimum number of electrical connections required and or the addition of components such as lamps, instruments, linkages and hydraulic lines as may be required or as preferably left for the final assembly.

Small and nonplanar areas are provided to minimize noise. The fact that the platform accepts various body types and designs makes the effects of noise reduction programs much more stable and permanent.

A great gain from interaction of body and platform is the ability to tune to minimize shake. From the point of view of overall body rigidity—a substantial factor in shake—the platform is designed to carry the major part of bending loads. Because of its generally flat sheet-like between-sill construction it will also take a large proportion of the torsional loads encountered in a sedan type car. The body, even though rubber-mounted on the platform, will provide the remaining torsional stiffness required.

For convertible bodies, doublers in the sills of the platform will provide needed additional bending stiffness. Torsional stiffness, due to the ladder type structure of spaced transverse beams between side sills, will be superior to that of present type convertibles.

The platform is designed to provide air ducting through side members and cross members to supply air to the rear seat without depending on through air flow under the front seat. Such an arrangement is particularly well adapted for future climate systems, i.e., those added after the car is sold.

Description of preferred embodiment

Referring now to the specific embodiment shown in the drawings, there is a main floor panel **20** having a medial tunnel portion **22**, the floor panel also having front upturned portions forming an inclined foot panel **24** and a vertical dash or firewall panel **26**.

At its rear end the main floor panel **20** has an upturned portion **28** which, with a forward downturned portion **30** of a rear seat panel **32**, forms a transverse closed-box-section beam structure **34**.

Rearwardly of its rear seat support portion, the rear seat panel **32** has an upwardly extending seat back supporting portion **36** and beyond that an elevated generally horizontal portion **38**. Medially, the rear seat panel **32**, in front of the back-support **36**, has a tunnel portion **40** and a higher tunnel portion **42** in line with the beam **34** thus reinforcing it.

Rearwardly of the rear seat panel **32**, there is a rear bridge deck panel **44**, this panel having at its forward end an angular portion **46** which, with the angular portion **36, 38** of the rear seat panel **32**, forms a through-running transverse closed-box-section rear beam-like structure **48**.

Rearwardly of its elevated bridge portion **50**, the deck panel **44** has a downturned portion **52** and beyond that a rear deck portion **54** which widens toward the rear (from the narrow bridging portion) and is provided with raised portions **56** around an inner depressed portion **58**. A box-section stiffening frame structure **60** extends across the rear end and up along the sides. Side portions widen forwardly to provide additional strength and stiffness and anchorage to the rear side sill and rear wheelhouse structures, as will be described.

Throughout most of its length the main floor panel **20** on the sides is provided with stiffening elements such as the pressed-in longitudinal corrugations or ribs **62**.

In the dash or firewall region the upturned portion of the floor panel **20** is provided with vertical side flange portions **64**, these being reinforced by outer vertical members **66** and **68** to form vertical closed-box-section post or strut structures **70**.

A cowl deck plate **72** is secured to the tops of the struts **70** and to the dash structure to form boxed-in rigid cowl structure.

An inverted channel-shaped front seat base **74** is secured across the front floor panel and forms therewith a closed-box-section transverse beam **75**. At the rear on each side the beam **75** is provided with openings **76** to supply air to the rear passenger space.

Forwardly of the dash structure and connected therewith inboard of its sides, there are provided front longitudinal sill structures **80**.

The sill structure **80** on each side comprises a lower panel component **82**, an upper panel component **84**, and a side panel component **86**, these parts in the front sill region proper (FIG. 7) being suitably shaped and connected to form the closed-box-section front sills **80**.

The lower front sill component **82** extends downwardly and widens toward its rear end to form a rearwardly extending portion **90** which follows along the inside of the front end of the floor tunnel **22**; and from that an inwardly extending transverse portion **92** which, at the end, overlaps a similar extension from the other side beneath the front transverse seat base beam **75**.

The upper front sill component **84** widens and rises toward its rear end, as at **94**, and is secured to the front of the dash panel **26**.

The side front sill components **86** is very wide vertically and forms a part of the front wheelhouse, having an opening **96** for wheel supports and on the inner side of which a shock support anchorage **98** is secured. At the upper edge it is provided with a wide outturned flange **100**.

Toward the rear end the side component **86** of the front sill spreads laterally at **102** and is secured to the front of the dash structure. The part **102** continues rearwardly in a portion **103** which overlies the side flange **64** of the floor panel and with the panels **66** and **68** completes the post or strut structure. At the bottom it widens and extends downwardly into a corrugated protion **104** which is secured to the bottom of the floor panel **20**.

A front vertical transverse panel **106** and an edge-stiffened interior support structure **108** are connected between the front ends of the front sill structures **80**.

It will be noted that the front sill structures at the rear end form large almost-closed transverse beam structures **110** which provide open box spaces which communicate with the open spaces of the front sill structures already described.

Forwardly of the front seat base beam **75**, as shown in FIG. 8, the main floor panel **20** has an upwardly extending side flange portion **112** on each side, this being turned out horizontally and channeled at the top in a lateral portion **114**. The doubler extension **104** of the front sill structure which extends back this far is shaped to conform to the floor panel configuration. A side plate **116** and a bottom plate **118** are so formed and secured to these side flange parts as to form a fully closed-box-section sill **120** of considerable size. The interior space of the side sill communicates with the space of the strut post **70** and rearwardly with the space within the seat base

beam 75 to convey air for heating, ventilating, or cooling the passenger space.

The side sills are protected on the inside, where most subject to blows and corrosion, by the depressed portions of the floor, more specifically by the side flanges 112. It can be seen in FIG. 8 that the portion 90 has a corrugated outer portion doubling with the corrugated floor panel as well as the inner doubler portion running back along the inside of the tunnel 22. It forms a closed-box-section beam structure 122 along the lower edge of the tunnel 22.

As shown in FIG. 9, the same side sill formation is maintained except that the doubler 104 is no longer present and that the seat base beam panel 74 is secured to the floor panel and side sills. It can also be seen that the rear transverse portions 92 of the front sill structure are overlapped and secured to add substantial reinforcement to the seat base beam 75.

As shown in FIG. 10, the same side sill formation is maintained and the sides of the rear seat panel 32 are secured thereto.

As shown in FIGS. 1, 2, 3, 12 and 13, rear side sill structures 124 are provided on each side, each mainly comprising an outwardly open channel section member. At the forward end, FIG. 12, it is flanged at 126 and attached to the rear upturned portion 28 of the main floor panel 20. It is closed on the outer side by a rear wheelhouse panel 128 which at the front end has an outturned flange portion 130 which is attached to the flanged end of the main side sill plates 116 and 118.

The rear side sill is offset inwardly from the main side sill, a reinforcing transition member 132 being interposed in the offset zone. This is secured to the floor panel portion 28, as by a flange 134, to the side sill panels 116, 118, and to the rear wheelhouse panel. The structure is reinforced at the rear by a cupped member 136 secured to the flanged end of the transition reinforcing member 132.

The rear side sills 124 follow and at the top support the panel portions 36, 38, 50 and 52. At the rear they have the frame stiffening members 60 secured to them. The lower edge follows and stiffens the lower edge of the rear wheelhouse. At its upper edge the wheelhouse is stiffened by an angularly bent formation 138 (FIG. 14) or, if desired, by added stiffening elements.

The lower body unit or platform is provided with a plurality (twelve shown, FIG. 4) of body supporting seats 140 where, as shown in FIG. 16, the body parts 142 are sealed and secured, as by bolts 144 with resilient elements 146 and sealing means therebetween.

FIG. 6 shows, in load diagram form, how loads are distributed throughout the platform by the structure which has been described. The front longitudinal sills 80 transfer loads at the front end through the front end structures 106 and 108. At the rear they transfer loads through elements 90, 92 and the tunnel structure into the front transverse beam 75; and through the fire-wall and transverse beams 110 they transfer loads into the side sills 120. The transverse beams 75, 34 and 48 transfer loads between the tunnel 22, 40 and the side sills 120, 124 and the wheelhouse panels 128. The frame 60 carries loads around at the rear. The wide horizontal panels 20, 32, 36, 38, 50, 54, 56 and 58, with their bent and corrugated elements, serve well to transfer shear loads between the more rigid sill, tunnel and beam elements. The bridge beam 48 takes strut loads from the rear wheel supports.

It is thus seen that the invention provides a unitary lower body unit or platform of relatively light weight and of relatively simple parts but of great strength and capable of being finished out to operate as an independent unit; and which permits the bottom-open upper body unit to be constructed and completely finished and trimmed and dropped on the lower body unit. The manner in which the platform unit hereby provided satisfies the objects and provides the desired advantages will be obvious from the above description.

We claim:

1. A unitized lower body unit or platform adapted to function as an independent motive entity if desired and to take a finished open-bottom upper body unit, comprising in combination:
transverse panel structure comprising main floor, rear seat and back, bridge deck and rear deck;
said transverse panel structure having a rigidifying medial tunnel structure extending through said main floor to said rear seat back;
side sill structures combined with said transverse panel structures;
rear wheelhouse panel structures combined with said transverse panel structures and said side sill structures;
a firewall structure comprising a transverse panel structure, hollow post or strut structures on the sides, and low transverse hollow beam structures at the bottom on the sides of the medial tunnel structure zone;
front longitudinal sill structures secured to the firewall structure, transverse panel structure, and side sill structures;
a front end structure connected between said front longitudinal sill structures and including rearwardly projecting portions secured to the sides of the tunnel structure of the main floor panel structure;
means combined with said main floor panel structure to form a through-running closed-box-section transverse beam at the front seat location;
and formations in said transverse panel structures forming through-running closed-box-section transverse beam structures at the bottom front and top back of the rear seat location.

2. A unitized lower body unit as set forth in claim 1: wherein said main floor panel structure has upwardly and outwardly flanged sides forming the inner sides and top of main side sill structures;
and panel structure forming with the flanged sides of said main floor panel structure closed-box-section side sill structures.

3. A unitized lower body unit as set forth in claim 1: wherein said main floor panel structure at the front end has an upwardly extending portion forming an inclined floor foot panel and a vertical firewall panel.

4. A unitized lower body unit as set forth in claim 1: wherein said front sill structures include portions at the rear end which form portions of said hollow strut structures and part of said lower horizontal firewall beam structures.

5. A unitized lower body unit as set forth in claim 1: wherein said rearwardly projecting portions of the front sill structures form, with floor panel parts, closed-box-section beam structures which provide added reinforcement along the sides of the tunnel structure.

6. A unitized lower body unit as set forth in claim 1: wherein said rearwardly projecting portions of the front sill structures extend to the front seat beam and include transversely extending portions secured across and below the tunnel structure to reinforce the front seat beam.

7. A unitized lower body unit as set forth in claim 1: wherein said front sill structures include outer vertical components which form wheelhouses and rearwardly projecting portions which form part of said firewall struts.

8. A unitized lower body unit as set forth in claim 1: wherein said side sill structures are hollow from said firewall structure to said front seat beam, and have the interior space connected with that of the front

seat beam and with the spaces of said firewall struts and beams to form air ducts.

9. A unitized lower body unit as set forth in claim 1: wherein said transverse panel structure at the rear end has a deep dished portion with raised sides;

and a reinforcing rail structure extending around the rear end and sides of the transverse panel structure and secured at the front ends to said rear wheelhouse panel structures.

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