

US00RE49859E

(19) **United States**  
(12) **Reissued Patent**  
**Takahashi**

(10) **Patent Number:** **US RE49,859 E**  
(45) **Date of Reissued Patent:** **Mar. 5, 2024**

(54) **VEHICLE FRAMEWORK STRUCTURE**

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(21) Appl. No.: **17/459,470**

(22) Filed: **Aug. 27, 2021**

**Related U.S. Patent Documents**

Reissue of:

(64) Patent No.: **10,392,052**  
Issued: **Aug. 27, 2019**  
Appl. No.: **15/787,326**  
Filed: **Oct. 18, 2017**

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(30) **Foreign Application Priority Data**

Dec. 9, 2016 (JP) ..... 2016-239805

(51) **Int. Cl.**  
**B62D 21/07** (2006.01)  
**B62D 21/11** (2006.01)  
**B62D 25/20** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **B62D 21/07** (2013.01); **B62D 21/11**  
(2013.01); **B62D 25/20** (2013.01)

(58) **Field of Classification Search**  
CPC ..... **B62D 21/02**; **B62D 21/07**; **B62D 21/11**;  
**B62D 21/12**; **B62D 21/15**; **B62D 21/18**;  
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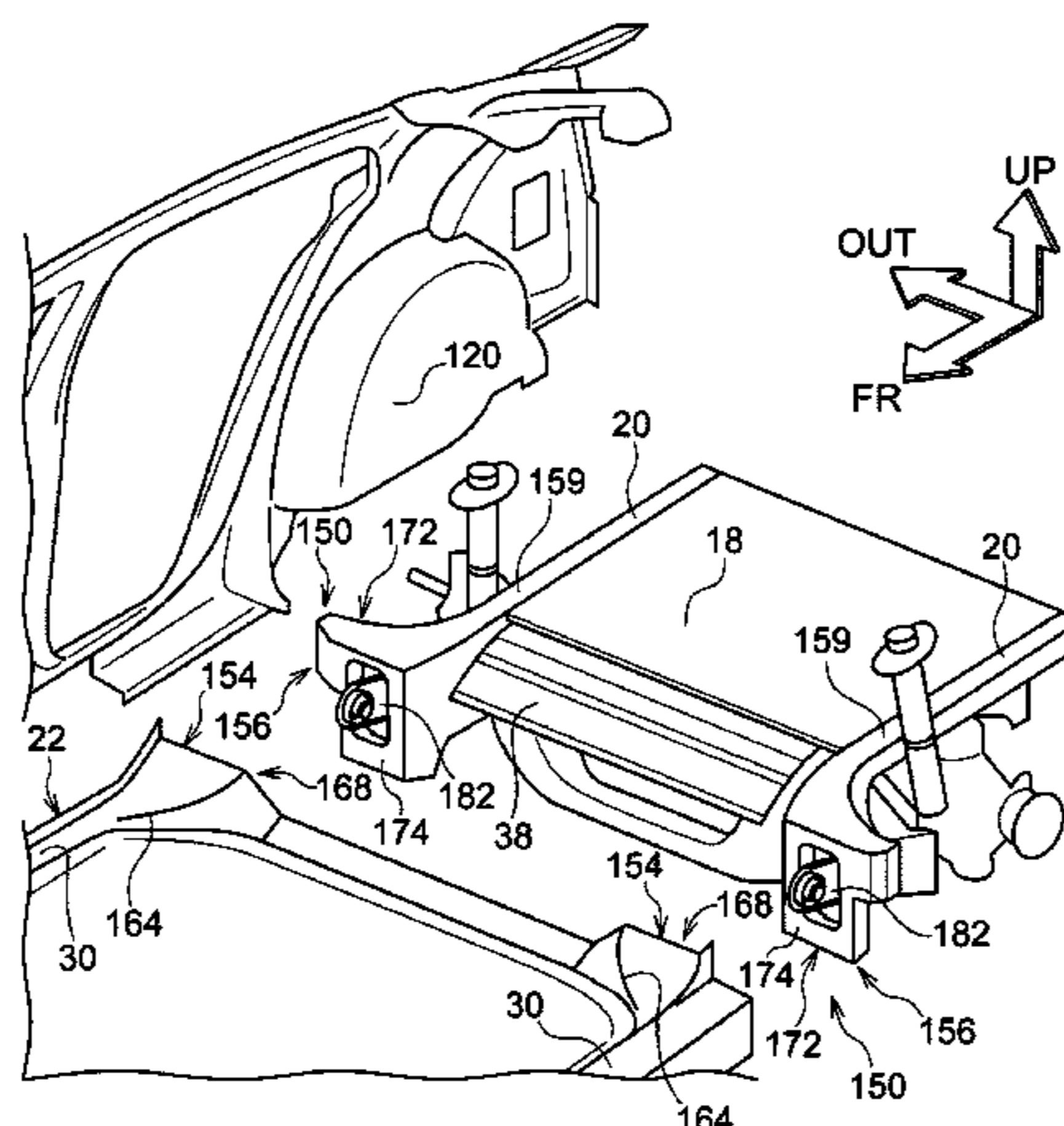
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(57) **ABSTRACT**

[The present disclosure presents a] *A* vehicle framework [structure, which] *structure* comprises: a front frame *member* that [configures] *forms* a part of a *vehicle* framework [of] *at* a vehicle front section *of a vehicle*; a rear frame *member* that [configures] *forms* a part of [a] *the* framework [of] *at* a vehicle rear section *of the vehicle*; an intermediate frame *member* that [configures] *forms* a part of [a] *the* framework [of] *at* a vehicle intermediate section *of the vehicle*, [and that includes a framework member] *the intermediate frame member* is disposed between the front frame *member* and the rear frame *member*, and [having] *has* a length direction in a vehicle front-rear direction; and a coupling section that includes a first [configuration] *coupling* member attached to [the framework member of] *the intermediate frame member* so as to [be continuous with the framework member] *extend* in the vehicle front-rear direction, and a second [configuration] *coupling* member attached to the first [configuration] *coupling* member so as to [be continuous with the first configuration member] *extend* in the vehicle front-rear direction.

**7 Claims, 10 Drawing Sheets**

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(58) **Field of Classification Search**

CPC ..... B62D 25/025; B62D 25/08; B62D 25/20;  
 B62D 25/2009; B62D 25/2018; B62D  
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See application file for complete search history.

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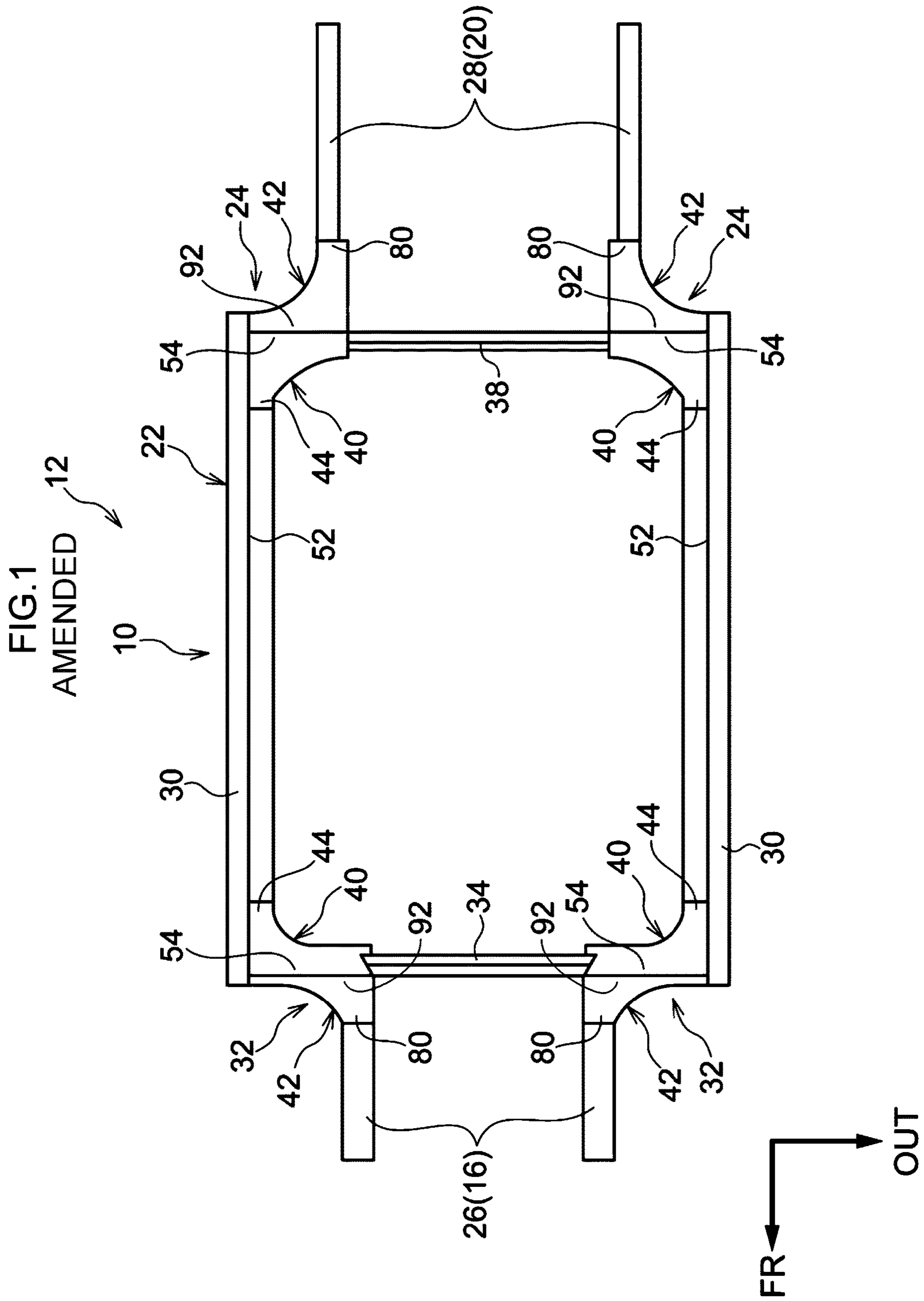




FIG.2  
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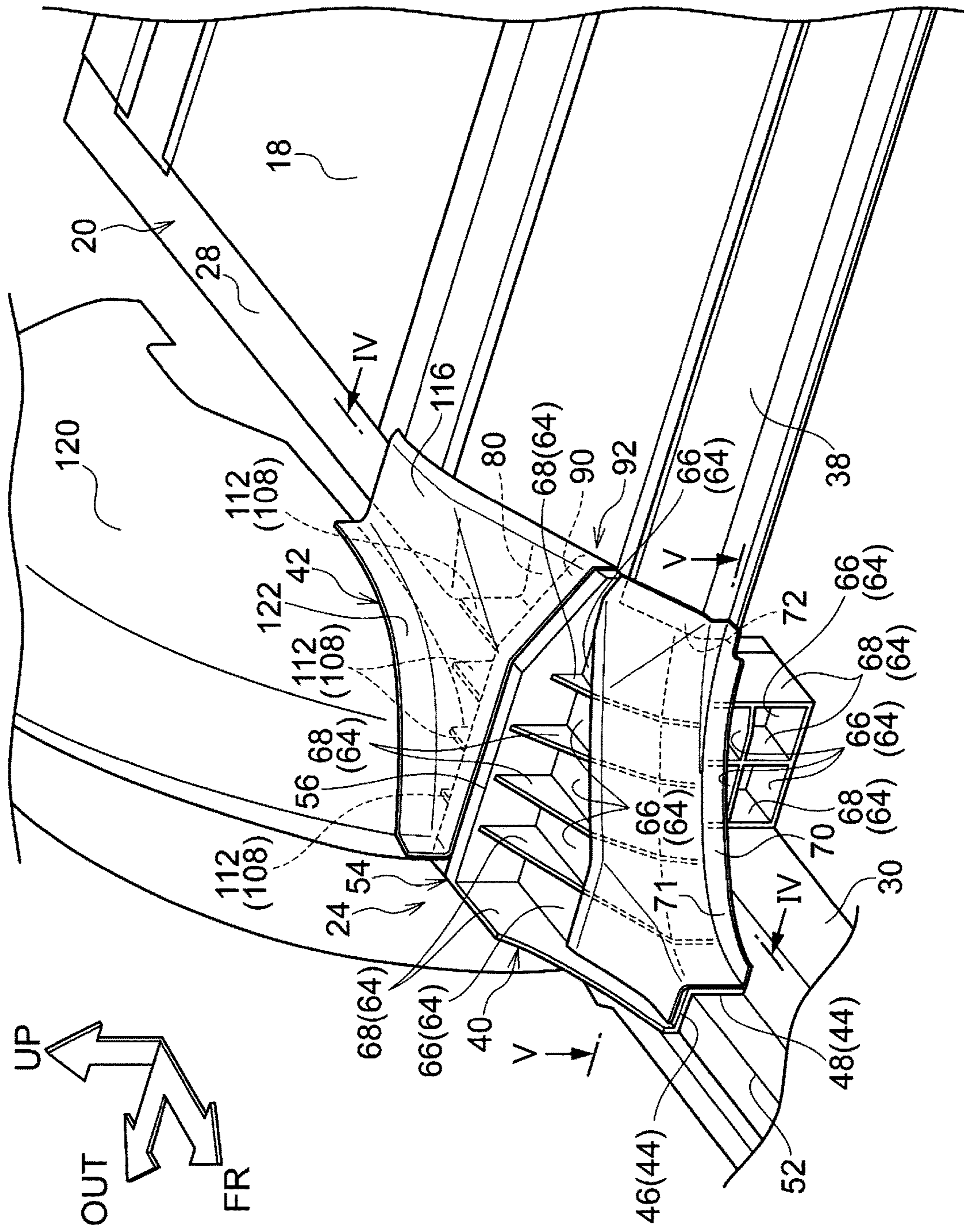


FIG. 3

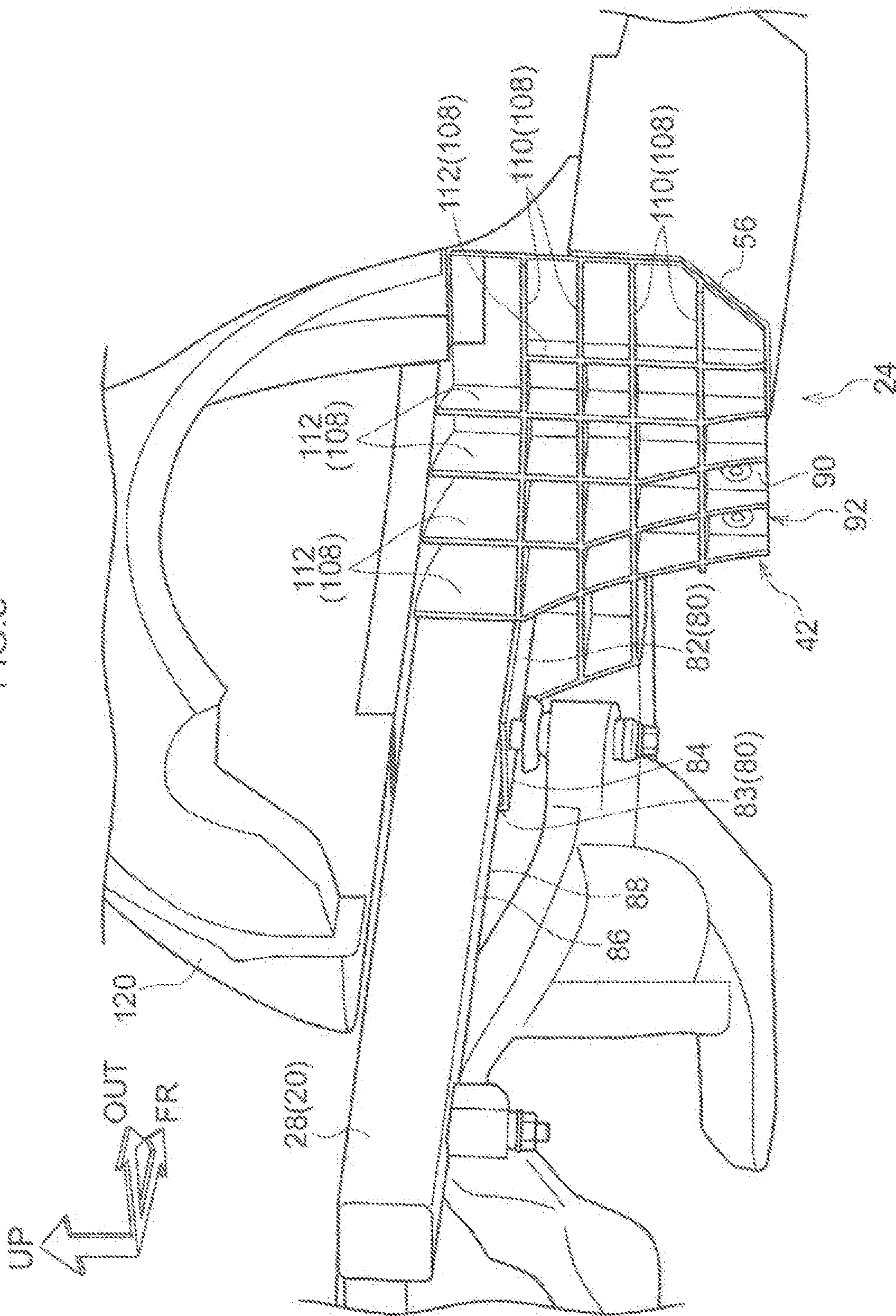




FIG.4  
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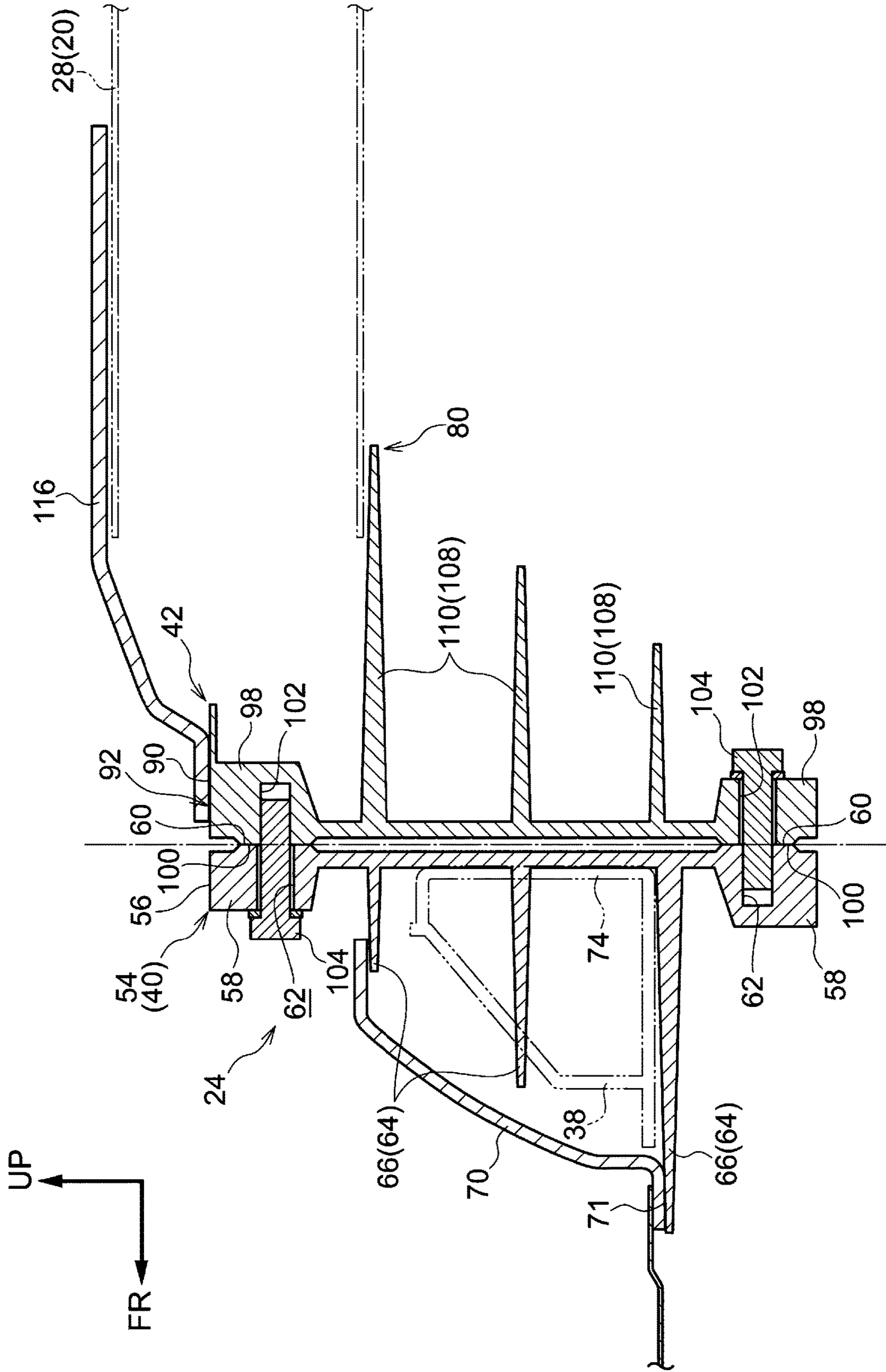


FIG. 5  
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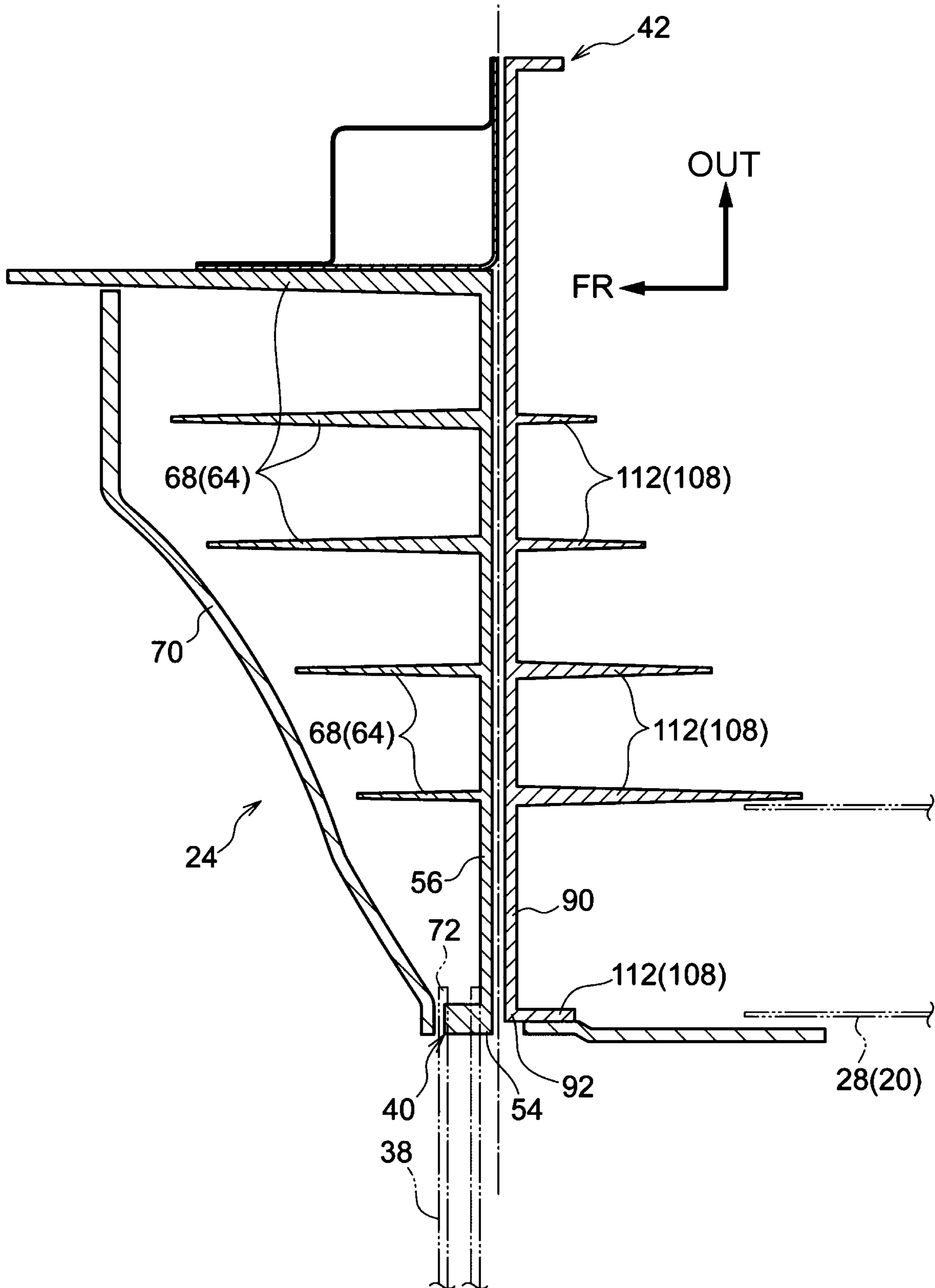


FIG.6  
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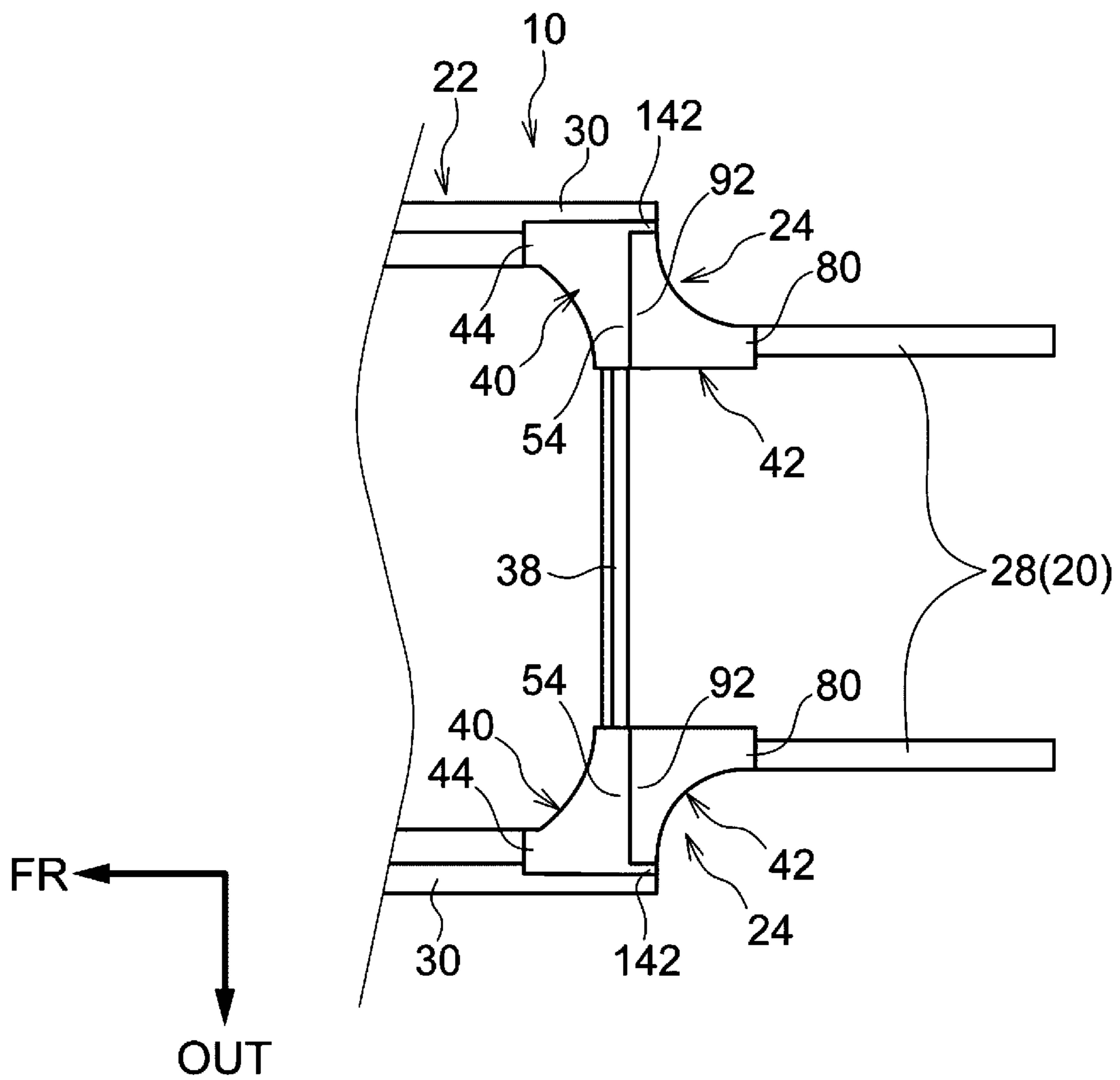
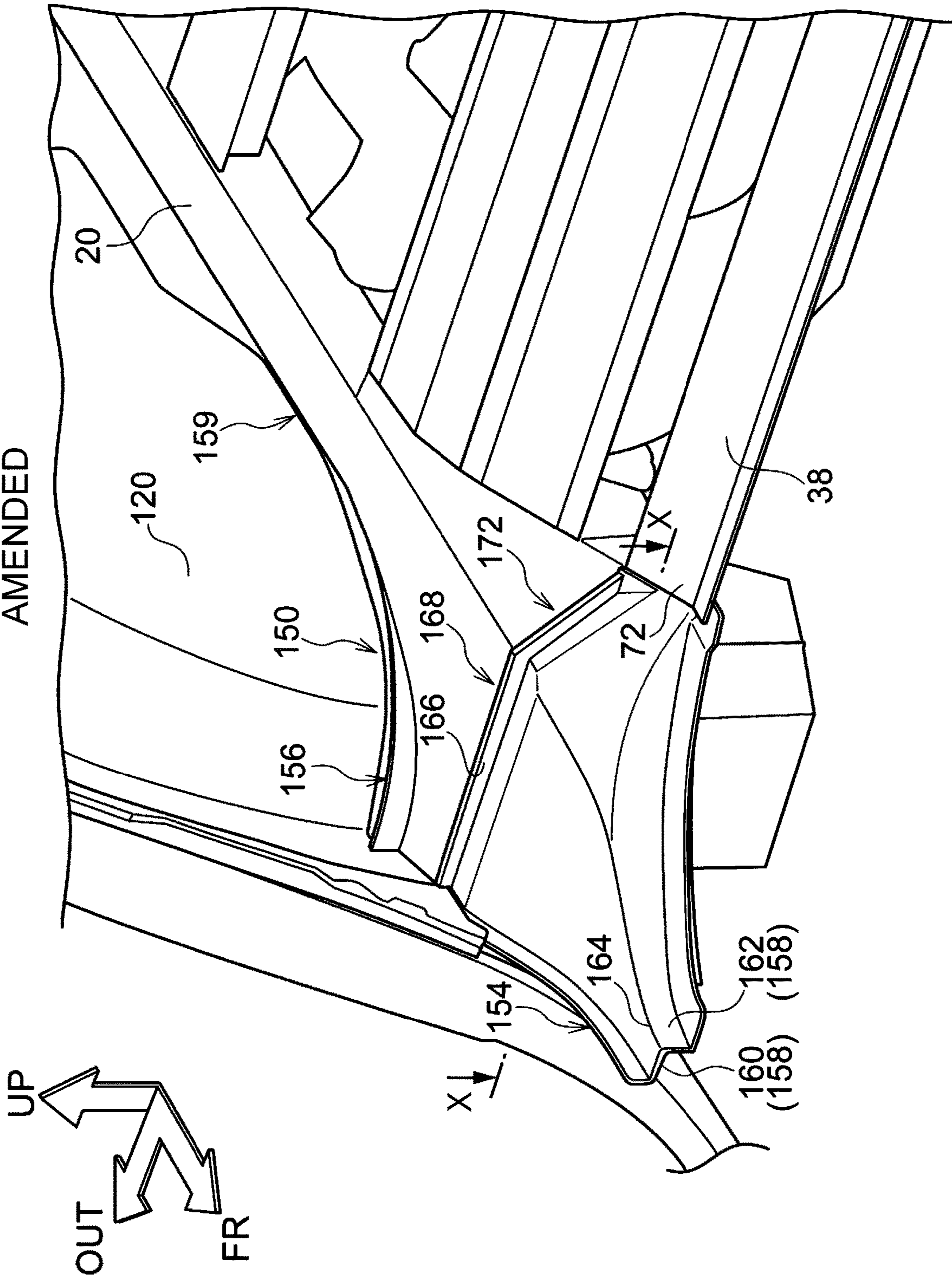




FIG.7  
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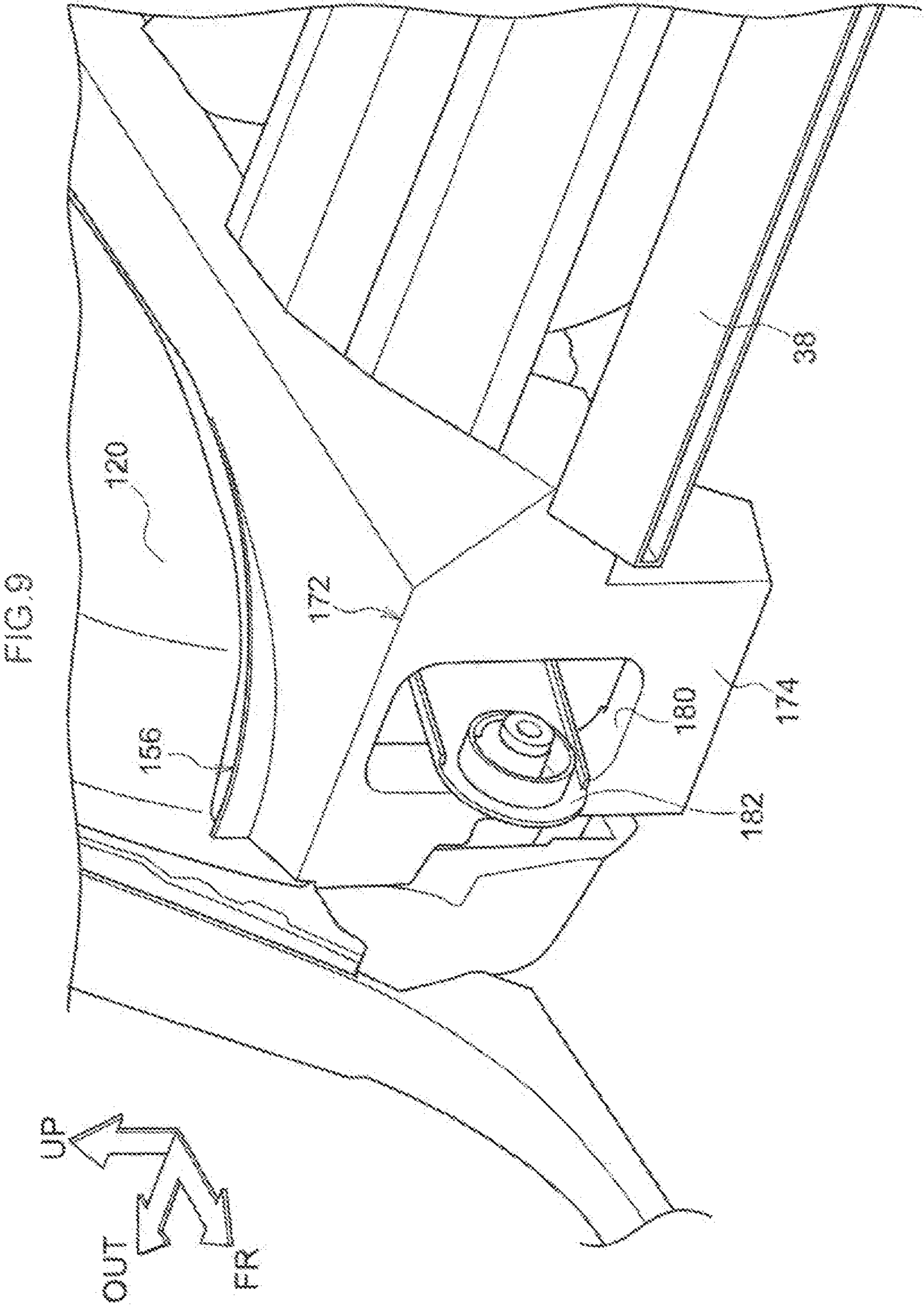
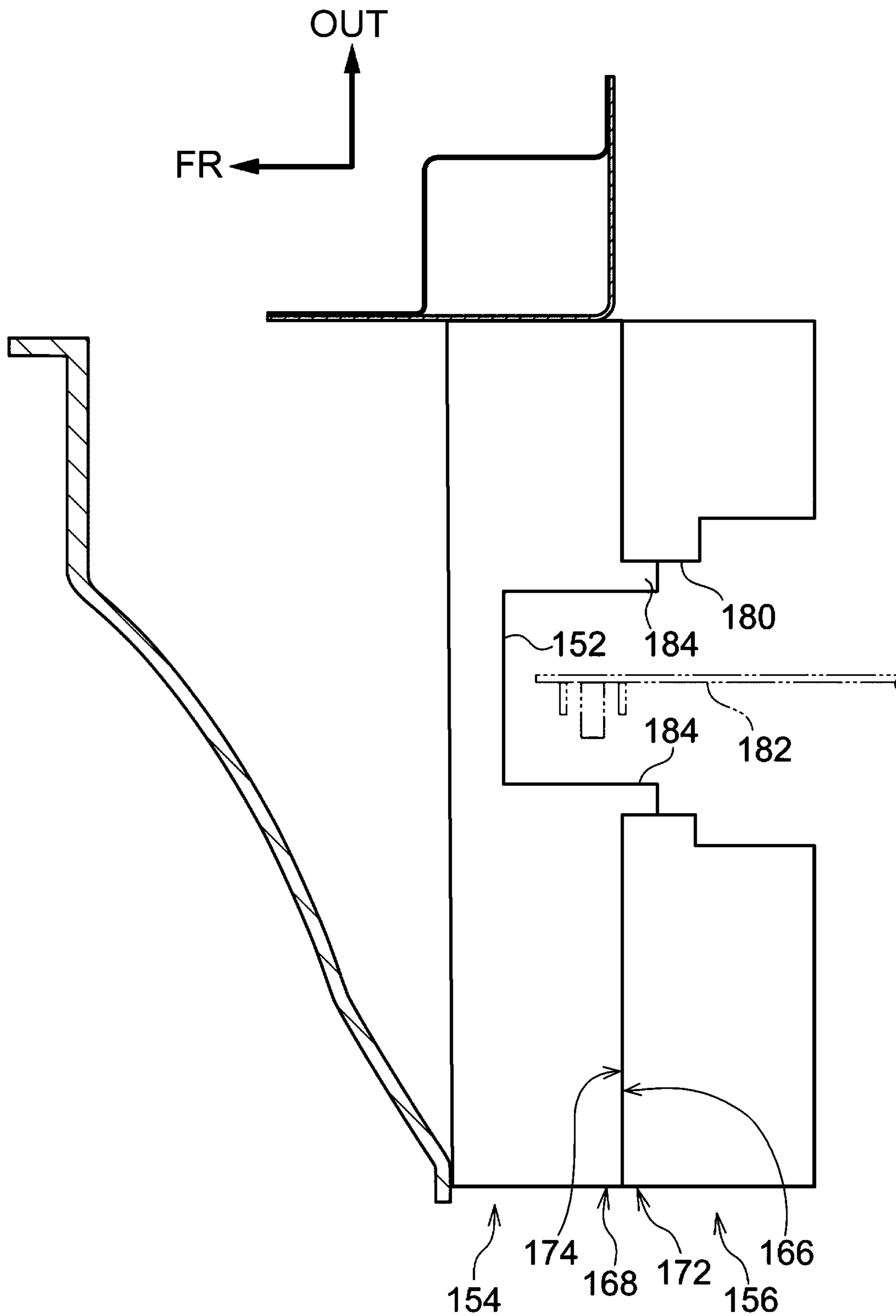




FIG.10  
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## VEHICLE FRAMEWORK STRUCTURE

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

## CROSS-REFERENCE TO RELATED APPLICATION

This application is based on and claims priority under 35 USC 119 from Japanese Patent Application No. 2016-239805 filed on Dec. 9, 2016, the disclosure of which is incorporated by reference herein.

## BACKGROUND

## Technical Field

The present invention relates to a vehicle framework structure.

## Related Art

Japanese Patent Application Laid-Open (JP-A) No. 2007-106320 describes a vehicle frame structure. The frame structure includes a front frame [configuring] *member forming a part of a vehicle* framework at a vehicle front section, a rear frame [configuring] *member forming a part of a vehicle* framework at a vehicle rear section, and an intermediate frame [configuring] *member forming a part of a vehicle* framework between the front frame *member* and the rear frame *member*. A uniform portion capable of selectively changing *the length of the frame structure* in a vehicle front-rear direction can be attached to one vehicle front-rear direction end portion of the front frame *member* and the rear frame *member*.

The vehicle framework can accordingly be easily lengthened or shortened in the vehicle front-rear direction, thereby enabling common framework to be employed in vehicles using different power units or vehicles of different sizes.

## SUMMARY

However, in the case of electric vehicles employing a motor as a power unit, the configuration does not require a muffler, transmission, or propeller shaft, and there is therefore no need to provide a floor panel with a floor tunnel in which to dispose such elements. In cases in which no floor tunnel is present, the bending rigidity of the floor panel is reduced, and so collision load concentrates in the vehicle framework in a vehicle collision. Accordingly, in the configuration described in JP-A No. 2007-106320, there is a possibility that collision load might concentrate between the uniform portion and the intermediate frame *member* in a vehicle collision, hindering the smooth transmission of load to elsewhere in the framework. The related art described above therefore leaves room for improvement regarding this point.

In consideration of the above circumstances, an object of the present invention is to obtain a vehicle framework structure capable of improving load transmission efficiency in a vehicle body structure not provided with a floor tunnel.

A vehicle framework structure of a first aspect includes a front frame *member*, a rear frame *member*, an intermediate frame *member*, and a coupling section. The front frame [configures] *member forms* part of a *vehicle* framework [of] at a vehicle front section of a *vehicle*. The rear frame [configures] *member forms* part of [a] *the vehicle* framework [of] at a vehicle rear section of *the vehicle*. The intermediate frame [configures] *member forms* part of [a] *the vehicle* framework [of] at a vehicle intermediate section of *the vehicle*, and [includes a framework member] *is* disposed between the front frame *member* and the rear frame *member* and [having] *has* a length direction in a vehicle front-rear direction. The coupling section includes a first [configuration] *coupling* member attached to [the framework member of] the intermediate frame *member* so as to [be continuous with the framework member] *extend* in the vehicle front-rear direction, and a second [configuration] *coupling* member attached to the first [configuration] *coupling* member so as to [be continuous with the first configuration member] *extend* in the vehicle front-rear direction. The coupling section couples [at least] one of the front frame [or] *member* and the rear frame *member* to the intermediate frame *member* in the vehicle front-rear direction by joining a [leading] *larger* end portion of the first [configuration] *coupling* member to a [leading] *larger* end portion of the second [configuration] *coupling* member opposing the [leading] *larger* end portion of the first [configuration] *coupling* member. Both the first [configuration] *coupling* member and the second [configuration] *coupling* member are formed so as to gradually increase in size in at least one of a vehicle width direction [or] *and* a vehicle vertical direction on progression from respective base end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member toward the respective [leading] *larger* end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member.

According to the first aspect, the coupling section is capable of coupling the front frame [configuring] *member forming* part of the *vehicle* framework [of] at the vehicle front section of *the vehicle* and the intermediate frame [configuring] *member forming* part of the *vehicle* framework [of] at the vehicle intermediate section of *the vehicle* together in the vehicle front-rear direction. Similarly, the coupling section is capable of coupling the rear frame [configuring] *member forming* part of the *vehicle* framework [of] at the vehicle rear section of *the vehicle* and the intermediate frame *member* together in the vehicle front-rear direction. The coupling section includes the first [configuration] *coupling* member that is attached so as to [be continuous with the framework member of the intermediate frame] *extend* in the vehicle front-rear direction, and the second [configuration] *coupling* member that is attached [so as to be continuous with] *to* the first [configuration] *coupling* member *to extend* in the vehicle front-rear direction. This thereby enables stress to be suppressed from concentrating between the intermediate frame *member* and the first [configuration] *coupling* member and between the front frame *member* or the rear frame *member* and the second [configuration] *coupling* member. Moreover, the [leading] *larger* end portion of the first [configuration] *coupling* member and the [leading] *larger* end portion of the second [configuration] *coupling* member opposing the [leading] *larger* end portion of the of the first [configuration] *coupling* member are joined together, thus respectively coupling [at least] one of the front frame [or] *member* and the rear frame *member* to the intermediate frame *member* in the vehicle front-rear direction.



Note that the first [configuration] *coupling* member and the second [configuration] *coupling* member are each formed so as to gradually increase in size in at least one of the vehicle width direction and the vehicle vertical direction on progression from the respective base end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member toward the respective [leading] *larger* end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member. Namely, the location (the respective [leading] *larger* end portions) where the first [configuration] *coupling* member and the second [configuration] *coupling* member are joined together is [configured] *formed* with larger dimensions in at least one of the vehicle width direction and the vehicle vertical direction than other locations, thereby improving the ability to withstand input load. This thereby enables input load to be transmitted smoothly to elsewhere in the framework.

A vehicle framework structure of a second aspect [is] *includes the features of* the first aspect, wherein the *vehicle intermediate [frame] section* includes a pair of left and right rockers extending along the vehicle front-rear direction, and a cross member [coupling] *coupled between* the pair of left and right rockers [together] in the vehicle width direction, *one of the pair of left and right rockers constituting the intermediate frame member and being coupled to the cross member via the first [configuration] coupling member of the coupling section.*

According to the second aspect, the *vehicle intermediate [frame] section* includes the rockers extending along the vehicle front-rear direction and the cross member [coupling] *coupled between* the rockers [together] in the vehicle width direction, *one of the pair of left and right rockers constituting the intermediate frame member and being coupled to the cross member via the first [configuration] coupling member of the coupling section.* Accordingly, load input to the intermediate frame member from the coupling section can be transmitted smoothly to [both the rockers and the cross member] *the intermediate frame member* by the first [configuration] *coupling member.*

Note that here, “via the first [configuration] *coupling member*” includes not only a configuration in which the rockers and the cross member are separated from one another due to the first [configuration] *coupling member* being present between the rocker and the cross member, but also configurations in which a rocker and the cross member are in a directly joined together state, with the [join] *joint* being covered by the first [configuration] *coupling member.*

A vehicle framework structure according to a third aspect [is] *includes the features of* the second aspect, wherein a [location where] *portion of* the first [configuration] *coupling member of the coupling section that is joined to the one of the pair of left and right rockers[,] and a [location where] portion of the first [configuration] coupling member of the coupling section that is joined to the cross member[,] are configured as a single body.*

According to the third aspect, in the coupling section, [the location where] *a portion of* the first [configuration] *coupling member that is joined to the [rocker] one of the pair of left and right rockers and [the location where] a portion of the first [configuration] coupling member that is joined to the cross member are configured as a single body, so as not to form a [join] joint where stress is liable to concentrate between the rocker and the cross member. This thereby enables stress to be suppressed from concentrating in the first [configuration] coupling member.*

[A vehicle framework structure according to a fourth aspect is any one of the first aspect to the third aspect of the present invention, wherein in the coupling section, at least one ridge line, of plural ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the first configuration member, is disposed so as to be continuous with at least one ridge line of plural ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the second configuration member.]

[According to the fourth aspect, at least one ridge line of the plural ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the first configuration member of the coupling section is disposed so as to be continuous with at least one ridge line of the plural ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the second configuration member. Accordingly, when load is input to the coupling section along the vehicle front-rear direction, the load can be transmitted smoothly from the first configuration member to the second configuration member or from the second configuration member to the first configuration member, along the ridge lines that have high bending rigidity.]

[Note that here, “continuously” includes both configurations in which there is no gap present between the ridge line of the first configuration member and the ridge line of the second configuration member, and configurations in which a gap is present between the ridge line of the first configuration member and the ridge line of the second configuration member.]

[A vehicle framework structure according to a fifth aspect is any one of the first aspect to the fourth aspect of the present invention, wherein, in a vehicle front view of the coupling section, at least one ridge line, of plural ridge lines within a face of the leading end portion of the first configuration member that is a face opposing the second configuration member, is disposed so as to be substantially superimposed on at least one ridge line of plural ridge lines within a face of the leading end portion of the second configuration member that is a face opposing the first configuration member.]

[According to the fifth aspect, in a vehicle front view of the coupling section, at least one ridge line of the plural ridge lines within the face of the leading end portion of the first configuration member that is a face opposing the second configuration member is disposed so as to be substantially superimposed on at least one ridge line of the plural ridge lines within the face of the leading end portion of the second configuration member that is a face opposing the first configuration member. Accordingly, when load is input to the coupling section along the vehicle front-rear direction, the load can be transmitted smoothly from the first configuration member to the second configuration member or from the second configuration member to the first configuration member, along the ridge lines that have high bending rigidity.]

A vehicle framework structure according to a sixth aspect [is] *includes the features of* any one of the first aspect to the fifth aspect of the present invention, wherein the first [configuration] *coupling member* and the second [configuration] *coupling member of the coupling section are each formed with a rib extending along the vehicle front-rear direction, and the rib of the first [configuration] coupling member and the rib of the second [configuration] coupling member are disposed so as to be substantially superimposed on each other in a vehicle front view.*



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According to the sixth aspect, the first [configuration] *coupling* member and the second [configuration] *coupling* member of the coupling section are each formed with a rib extending along the vehicle front-rear direction. The respective ribs are disposed so as to be substantially superimposed on each other in vehicle front view. Accordingly, when load is input to the coupling section along the vehicle front-rear direction, load input from one of the ribs is borne by the other of the ribs, thereby enabling the load to be more reliably transmitted.

A vehicle framework structure according to a seventh aspect [is] *includes the features* of any one of the first aspect to the sixth aspect of the present invention, wherein [at least] one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section is provided with a projection that projects out toward the other [out] of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member, and that overlaps the other [out] of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member in the vehicle width direction.

According to the seventh aspect, the projection is provided to [at least] one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section. The projection projects out toward the other [out] of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section, and overlaps the other [out] of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member in the vehicle width direction. Accordingly, when load is input into either the first [configuration] *coupling* member or the second [configuration] *coupling* member substantially along the vehicle width direction, the load can be transmitted to the other [out] of the first [configuration] *coupling* member or the second [configuration] *coupling* member.

A vehicle framework structure according to an eighth aspect [is] *includes the features* of any one of the first aspect to the seventh aspect of the present invention, wherein the coupling section is formed with at least one of a hollow portion [or] *and* an opening.

According to the eighth aspect, the coupling section is formed with at least one of a hollow portion [or] *and* an opening, thereby enabling a reduction in weight of the coupling section.

A vehicle framework structure according to a ninth aspect [is] *includes the features* of the eighth aspect, wherein a portion of a suspension arm is inserted into the at least one of [a] *the* hollow portion [or *an*] *and the* opening.

According to the ninth aspect, a portion of the suspension arm is inserted into the at least one of [a] *the* hollow portion [or *an*] *and the* opening in the coupling section, thereby enabling space to be saved in the vehicle.

A vehicle framework structure according to a tenth aspect [is] *includes the features* of any one of the first aspect to the ninth aspect of the present invention, wherein a fitting portion is formed at one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section, and a fitted-to portion is formed at the other of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member, with the fitting portion being [fitted] *coupled* to the fitted-to portion by being inserted into the fitted-to portion in the vehicle front-rear direction.

According to the tenth aspect, in the coupling section, the fitting portion is formed at one of the first [configuration] *coupling* member [or] *and* the second [configuration] *cou-*

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*pling* member, and the fitted-to portion is formed at the other of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member. The fitting portion is [fitted] *coupled* to the fitted-to portion by being inserted into the fitted-to portion in the vehicle front-rear direction. Accordingly, when connecting the first [configuration] *coupling* member and the second [configuration] *coupling* member together, positioning of the first [configuration] *coupling* member and the second [configuration] *coupling* member can be performed easily by inserting the fitting portion into the fitted-to portion. Moreover, since it is possible for load to be transmitted either from the fitting portion to the fitted-to portion or from the fitted-to portion to the fitting portion, when load is input to one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member substantially along the vehicle vertical direction or substantially along the vehicle width direction, the load can be better transmitted to the other [out] of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member.

A vehicle framework structure according to an eleventh aspect [is] *includes the features* of any one of the first aspect to the tenth aspect of the present invention, wherein at least one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section is formed as a single body with at least one of the front frame [or] *member and* the rear frame *member*.

According to the eleventh aspect, at least one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section is formed as a single body with at least one of the front frame [or] *member and* the rear frame *member*, thus rendering an operation to attach the second [configuration] *coupling* member to the at least one of the front frame [or] *member and* the rear frame *member* unnecessary. A reduction in the number of assembly processes can accordingly be achieved.

A vehicle framework structure according to a twelfth aspect [is] *includes the features* of any one of the first aspect to the eleventh aspect of the present invention, wherein at least one ridge line of plural ridge lines provided at the coupling section is [configured so as to be continuous with] *located adjacent to* at least one ridge line of plural ridge lines provided at either the front frame *member* or the rear frame *member*.

According to the twelfth aspect, at least one ridge line of the plural ridge lines provided at the coupling section is [configured so as to be continuous with] *located adjacent to* at least one ridge line of the plural ridge lines provided to either the front frame *member* or the rear frame *member*. This thereby enables load to be transmitted between the front frame *member* or the rear frame *member* and the intermediate frame *member* along the ridge lines that have high bending rigidity.

A vehicle framework structure according to a thirteenth aspect [is] *includes the features* of any one of the first aspect to the twelfth aspect of the present invention, wherein the first [configuration] *coupling* member and the second [configuration] *coupling* member of the coupling section are fastened together using a fastener.

According to the thirteenth aspect, the first [configuration] *coupling* member and the second [configuration] *coupling* member of the coupling section are fastened together using a fastener. Accordingly, joining the first [configuration] *coupling* member and the second [configuration] *coupling* member together is easier than in cases in which welding is employed.



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The vehicle framework structure according to the first aspect exhibits the excellent advantageous effect of enabling load transmission efficiency to be improved in a vehicle body structure not provided with a floor tunnel.

The vehicle framework structure according to the second aspect exhibits the excellent advantageous effect of enabling input load to be dispersed such that the load is borne by the overall framework.

The vehicle framework structure according to the third aspect to the sixth aspect and the twelfth aspect exhibits the excellent advantageous effect of enabling load transmission efficiency to be improved in a vehicle body structure not provided with a floor tunnel.

The vehicle framework structure according to the seventh aspect exhibits the excellent advantageous effect of enabling shear deformation to be suppressed in the coupling section.

The vehicle framework structure according to the eighth aspect exhibits the excellent advantageous effect of enabling a reduction in weight to be achieved.

The vehicle framework structure according to the ninth aspect exhibits the excellent advantageous effect of enabling efficient utilization of space in the vehicle.

The vehicle framework structure according to the tenth aspect exhibits the excellent advantageous effect of enabling load transmission efficiency to be improved with respect to load input in any direction in a vehicle body structure not provided with a floor tunnel.

The vehicle framework structure according to the eleventh aspect and the thirteenth aspect exhibits the excellent advantageous effect of enabling an improvement in productivity.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described in detail based on the following figures, wherein:

FIG. 1 is a schematic plan view illustrating a vehicle framework structure according to a first exemplary embodiment.

FIG. 2 is a perspective view illustrating relevant portions of a vehicle framework structure according to the first exemplary embodiment, in a state viewing from the vehicle front toward the vehicle rear.

FIG. 3 is a perspective view illustrating relevant portions of a vehicle framework structure according to the first exemplary embodiment, in a state viewing from the vehicle rear toward the vehicle front.

FIG. 4 is an enlarged cross-section illustrating a state sectioned along line [A-A] IV-IV in FIG. 2.

FIG. 5 is an enlarged cross-section illustrating a state sectioned along line [B-B] V-V in FIG. 2.

FIG. 6 is a schematic plan view illustrating a coupling section of a vehicle framework structure according to a modified example of the first exemplary embodiment.

FIG. 7 is a perspective view illustrating relevant portions of a vehicle framework structure according to a second exemplary embodiment, in a state viewing from the vehicle front toward the vehicle rear.

FIG. 8 is an exploded perspective view illustrating relevant portions of a vehicle framework structure according to the second exemplary embodiment, in a state viewing from the vehicle front toward the vehicle rear.

FIG. 9 is an exploded perspective view illustrating a second configuration member of a vehicle framework structure according to the second exemplary embodiment, in a state viewing from the vehicle front toward the vehicle rear.

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FIG. 10 is an enlarged [cross-section] *conceptual view* illustrating a [state sectioned] *view* along line [C-C] X-X in FIG. 7.

#### DETAILED DESCRIPTION

##### First Exemplary Embodiment

Explanation follows regarding a first exemplary embodiment of a vehicle framework structure according to the present invention, with reference to FIG. 1 to FIG. 6. Note that in the respective drawings, the arrow FR indicates the front in the vehicle front-rear direction, the arrow OUT indicates the vehicle width direction outer side, and the arrow UP indicates upward in the vehicle vertical direction.

As illustrated in FIG. 1, a vehicle 12 provided with a vehicle framework structure 10 includes a front frame section 16, a rear frame section 20, an intermediate frame section 22, and coupling sections 24, 32, each located at a vehicle lower side of a floor panel, not illustrated in the drawings. The front frame section 16 [configures] *forms* part of the framework of a front section of the vehicle 12, and specifically, is configured including a pair of left and right front-side members 26 extending along the vehicle front-rear direction. A power unit and a front suspension member (neither of which are illustrated in the drawings) are attached to the front frame section 16. Note that in the present exemplary embodiment, the floor panel of the vehicle 12 has a configuration that does not include a floor tunnel extending along the vehicle front-rear direction.

The rear frame section 20 [configures] *forms* part of the framework of a rear section of the vehicle 12, and specifically, is configured including a pair of left and right rear-side members 28 extending along the vehicle front-rear direction. A trunk floor panel 18 (see FIG. 2) is attached to the rear frame section 20 from the vehicle upper side.

The intermediate frame section 22 [configures] *forms* part of the framework of an intermediate section of the vehicle 12, and is disposed between the front frame section 16 and the rear frame section 20. Specifically, the intermediate frame section 22 is configured including a pair of left and right rockers 30 serving as framework members extending along the vehicle front-rear direction, a front cross member 34 serving as a cross member extending in the vehicle width direction and coupling vehicle front end portions of the pair of left and right rockers 30 together in the vehicle width direction via the coupling sections 32, and a rear cross member 38 serving as a cross member extending in the vehicle width direction and coupling vehicle rear end portions of the pair of left and right rockers 30 together in the vehicle width direction via the coupling sections 24. Note that in plan view of the vehicle, the pair of left and right rockers 30 are disposed at the vehicle width direction outer sides of the front frame section 16 and the rear frame section 20. Configuration may also be made in which the rockers 30 are joined directly to the front cross member 34 and the rear cross member 38, with the [joins] *joints* being covered by first [configuration] *coupling* members 40.

As illustrated in FIG. 2, each coupling section 24 is configured including a first [configuration] *coupling* member 40 and a second [configuration] *coupling* member 42. The first [configuration] *coupling* member 40 is disposed on the intermediate frame section 22 side and is formed by casting so as to have a substantially L-shaped profile in plan view of the vehicle. A base end portion 44 [configuring] *forming* a vehicle front side of the first [configuration] *coupling* member 40 is formed with a substantially L-shaped



profile in vehicle front view by a horizontal wall portion 46 with a plate thickness direction in the vehicle vertical direction, and a vertical wall portion 48 with a plate thickness direction in the vehicle width direction. The base end portion 44 is connected to the rocker 30 in a state in which a ridge line, not [illustrated] *labeled* in the drawings, formed between the horizontal wall portion 46 and the vertical wall portion 48 of the base end portion 44 is [substantially superimposed on] *located adjacent to* a ridge line 52 on an upper face of the rocker 30. Namely, the first [configuration] *coupling* member 40 is attached to the rocker 30 [so as to be continuous thereto] *along a portion of the rocker 30 that extends in* the vehicle front-rear direction. Note that the coupling sections 24 according to the present exemplary embodiment are configured so as to basically have left-right symmetry to each other (left-right symmetry about a vehicle front-rear direction line passing through an intermediate location in the vehicle width direction). FIG. 2 accordingly illustrates one side in the vehicle width direction (on the right of the vehicle), and the following explanation primarily focuses on the one side in the vehicle width direction. Moreover, the coupling sections 32 (see FIG. 1) according to the present exemplary embodiment are configured so as to basically have front-rear symmetry to the coupling sections 24 (front-rear symmetry about a vehicle width direction line passing through an intermediate location in the vehicle front-rear direction), and so detailed explanation thereof will be omitted.

As illustrated in FIG. 4, a [leading] *larger* end portion 54 on the opposite side of the first [configuration] *coupling* member 40 to the base end portion 44 is [configured] *formed* including a joining wall portion 56 with a plate thickness direction in the vehicle front-rear direction. In vehicle front view, the joining wall portion 56 is set with larger dimensions in the vehicle vertical direction and the vehicle width direction than the base end portion 44 (see FIG. 2). The base end portion 44 and the [leading] *larger* end portion 54 (joining wall portion 56) are integrally formed as a single member, with no [join] *joint* present therebetween.

Moreover, plural fastening portions 58 are respectively formed at a vehicle upper end portion and a vehicle lower end portion of the joining wall portion 56. Each fastening portion 58 has a greater plate thickness than the plate thickness of the joining wall portion 56 at locations other than the fastening portions 58. Accordingly, a vehicle rear face 60 of each fastening portion 58 projects out toward the vehicle rear with respect to the locations of the joining wall portion 56 other than the fastening portions 58.

Each fastening portion 58 of the joining wall portion 56 is formed with a fastening hole 62 with an axial direction along the plate thickness direction. The fastening holes 62 in the fastening portions 58 formed of the vehicle upper end portion of the joining wall portion 56 are, for example, through holes penetrating the fastening portions 58 in the plate thickness direction. The fastening holes 62 of the fastening portions 58 formed at the vehicle lower end portion of the joining wall portion 56 are, for example, non-penetrating holes that are open toward the vehicle rear.

The joining wall portion 56 is formed with ribs 64 running toward the vehicle front. The ribs 64 are configured by plural first ribs 66, each with a plate thickness direction in the vehicle vertical direction, and, as illustrated in FIG. 2, plural second ribs 68, each with a plate thickness direction in the vehicle width direction. Each of the plural first ribs 66 are disposed discretely to one another, and each of the plural second ribs 68 are disposed discretely to one another. Accordingly, in vehicle front view, the first ribs 66 and the

second ribs 68 are disposed in a lattice pattern. Note that leading end portions of the plural first ribs 66 are respectively curved such that in plan view of the vehicle, the leading end portions of the first ribs 66 are positioned further toward the vehicle rear on progression toward the vehicle width direction inner side. Moreover, as illustrated in FIG. 5, leading end portions of the plural second ribs 68 are also positioned further toward the vehicle rear on progression toward the vehicle width direction inner side so as to correspond to the leading end portions of the first ribs 66. Moreover, a first cover member 70 that curves so as to span from the base end portion 44 to the cross member 38 is attached to the first [configuration] *coupling* member 40 so as to partially follow the leading end portions of the plural first ribs 66 and partially follow of the leading end portions of the plural second ribs 68. Due to the above configuration, the first [configuration] *coupling* member 40 is formed so as to gradually increase in size in the vehicle width direction and the vehicle vertical direction on progression from the base end portion 44 toward the [leading] *larger* end portion 54 (joining wall portion 56). Note that a vehicle lower side end portion of the first cover member 70 is integrally formed with a flange 71 extending along a substantially horizontal direction and toward the vehicle front.

Moreover, as illustrated in FIG. 2, a length direction end portion 72 of the rear cross member 38 is connected to a vehicle width direction inner side of the joining wall portion 56. Specifically, a rear vertical wall portion 74 of the rear cross member 38 is connected to a vehicle front face of the joining wall portion 56 (see FIG. 4). Note that the first cover member 70 is connected to the length direction end portion 72 of the rear cross member 38 from the vehicle front and the vehicle upper side.

The second [configuration] *coupling* member 42 is attached to the first [configuration] *coupling* member 40 so as to [be continuous thereto along] *extend therefrom in* the vehicle front-rear direction. Specifically, at each coupling section 24, the second [configuration] *coupling* member 42 is disposed at the vehicle rear of the first [configuration] *coupling* member 40. Moreover, at each coupling section 32, the second [configuration] *coupling* member 42 is disposed at the vehicle front of the first [configuration] *coupling* member 40 (see FIG. 1). The second [configuration] *coupling* member 42 is formed by casting so as to have a substantially L-shaped profile in plan view of the vehicle. As illustrated in FIG. 3, a base end portion 80 [configuring] *forming* a vehicle rear side of the second [configuration] *coupling* member 42 is formed with a substantially L-shaped profile in vehicle front view by a horizontal wall portion 82 with a plate thickness direction in the vehicle vertical direction, and a vertical wall portion 83 with a plate thickness direction in the vehicle width direction. The rear frame section 20 is connected to the base end portion 80 in a state in which a ridge line 84 between the horizontal wall portion 82 and the vertical wall portion 83 of the base end portion 80 is [substantially superimposed on] *located adjacent to* a ridge line 88 at a lower face 86 of the rear frame section 20. Namely, the ridge line 84 of the second [configuration] *coupling* member 42 (the coupling section 24) is configured so as to be [continuous with] *adjacent to* the ridge line 88 of the rear frame section 20 *extending* in the vehicle front-rear direction. Note that in the coupling sections 32, the ridge line 84 of the second [configuration] *coupling* member 42 (the coupling section 32) is configured so as to [be continuous] *extend* in the vehicle front-rear direction *adjacent to* a



non-illustrated ridge line of the front frame *section* 16, so as to be symmetrical to the coupling sections 24 in the vehicle front-rear direction.

Similarly to in the first [configuration] *coupling* member 40, a [leading] *larger* end portion 92 on the opposite side of the second [configuration] *coupling* member 42 to the base end portion 80 is [configured] *formed* including a joining wall portion 90 with a plate thickness direction in the vehicle front-rear direction. The joining wall portion 90 is formed in substantially the same shape as the joining wall portion 56 of the first [configuration] *coupling* member 40 in vehicle front view (see also FIG. 2). Moreover, in vehicle front view, the joining wall portion 90 of the second [configuration] *coupling* member 42 is set with larger dimensions in the vehicle vertical direction and the vehicle width direction than the base end portion 80. Moreover, as illustrated in FIG. 4, plural fastening portions 98 corresponding to the respective fastening portions 58 of the first [configuration] *coupling* member 40 are formed at a vehicle upper end portion and a vehicle lower end portion of the joining wall portion 90. Each of the fastening portions 98 has a greater plate thickness than the plate thickness of the joining wall portion 90 at locations other than the fastening portions 98. Accordingly, a vehicle front face 100 of each fastening portion 98 projects out toward the vehicle front with respect to the locations of the joining wall portion 90 other than the fastening portions 98.

The fastening portions 98 of the joining wall portion 90 are each formed with a fastening hole 102 having an axial direction along the plate thickness direction. The fastening holes 102 of the fastening portions 98 formed at the vehicle upper end portion of the joining wall portion 90 are, for example, non-penetrating holes open toward the vehicle front, and the fastening holes 102 of the fastening portions 98 formed at the vehicle lower end portion of the joining wall portion 90 are, for example, through holes penetrating the fastening portions 98 in the plate thickness direction. Fasteners 104 are inserted into the fastening portions 98 formed at the vehicle lower end portion of the joining wall portion 90 from the vehicle rear, and are screwed together with the fastening portions 58 formed at the vehicle lower end portion of the joining wall portion 56 of the first [configuration] *coupling* member 40. Similarly, fasteners 104 are inserted into the fastening portions 58 formed at the vehicle upper end portion of the joining wall portion 56 of the first [configuration] *coupling* member 40 from the vehicle front, and are screwed together with the fastening portions 98 formed at the vehicle upper end portion of the joining wall portion 90. The first [configuration] *coupling* member 40 and the second [configuration] *coupling* member 42 are thereby fastened together. [Note that some ridge lines of plural ridge lines extending along the vehicle front-rear direction of the joining wall portion 56 of the first configuration member 40 are disposed so as to be continuous with some ridge lines of plural ridge lines extending along the vehicle front-rear direction of the joining wall portion 90 of the opposing second configuration member 42. Moreover, in vehicle front view, some ridge lines of plural ridge lines within the face (vehicle rear face) of the joining wall portion 56 of the first configuration member 40 that is a face opposing the second configuration member 42 are disposed so as to be superimposed on some ridge lines of plural ridge lines within the face (vehicle front face) of the joining wall portion 90 of the second configuration member 42 that is a face opposing the first configuration member 40. In other words, some of the ridge lines within the vehicle rear face of the joining wall portion 56 are disposed so as to oppose

some of the ridge lines within the vehicle front face of the joining wall portion 90 in the vehicle front-rear direction.]

The joining wall portion 90 is formed with ribs 108 running toward the vehicle rear. The ribs 108 are configured by plural first ribs 110 with a plate thickness direction in the vehicle vertical direction and plural second ribs 112 (see FIG. 2 and FIG. 3) with a plate thickness direction in the vehicle width direction. Each of the plural first ribs 110 are disposed discretely to one another, and each of the plural second ribs 112 are disposed discretely to one another. Moreover, the plural first ribs 110 and the plural second ribs 112 are disposed so as to be substantially superimposed on the first ribs 66 and the second ribs 68 of the first [configuration] *coupling* member 40 in vehicle front view (see also FIG. 5). Accordingly, in vehicle front view, the first ribs 110 and the second ribs 112 are disposed in a lattice pattern. Note that as illustrated in FIG. 3, [leading] end portions of the plural first ribs 110 are respectively curved such that in plan view of the vehicle, the [leading] end portions of the plural first ribs 110 are positioned further toward the vehicle front on progression toward the vehicle width direction outer side. Moreover, as illustrated in FIG. 5, [leading] end portions of the plural second ribs 112 are also positioned further toward the vehicle front on progression toward the vehicle width direction outer side so as to correspond to the [leading] end portions of the first ribs 110. Namely, the second [configuration] *coupling* member 42 is formed so as to gradually increase in size in the vehicle width direction and the vehicle vertical direction on progression from the base end portion 80 toward the [leading] *larger* end portion 92 (joining wall portion 90).

A second cover member 116 is provided to the second [configuration] *coupling* member 42 so as to cover the second [configuration] *coupling* member 42 from the vehicle upper side. The second cover member 116 is configured from a plate member with a plate thickness direction in the vehicle vertical direction. As illustrated in FIG. 2, a vehicle width direction inner side end portion of the second cover member 116 is disposed so as to substantially follow the vehicle front-rear direction from a vehicle width direction inner side end portion of the joining wall portion 90. Moreover, vehicle width direction outer side end portions of the respective second [configuration] *coupling* members 42 follow vehicle width direction inner side faces of a pair of left and right wheel houses 120 provided at the vehicle width direction outer sides of the rear frame *section* 20. Note that a vehicle width direction inner side end portion of the second cover member 116 is integrally formed with a flange 122 that follows the vehicle width direction inner side face of the wheel house 120 and stands up toward the vehicle upper side.

#### Operation and Advantageous Effects of the First Exemplary Embodiment

Explanation follows: regarding operation and advantageous effects of the present exemplary embodiment.

As illustrated in FIG. 1, in the present exemplary embodiment, the coupling sections 32 are capable of coupling the front frame *section* 16 [configuring] *forming* part of the vehicle framework [of] at the vehicle front section and the intermediate frame *section* 22 [configuring] *forming* part of the vehicle framework [of] at the vehicle intermediate section together in the vehicle front-rear direction. Similarly, the coupling sections 24 are capable of coupling the rear frame *section* 20 [configuring] *forming* part of the vehicle framework [of] at the vehicle rear section and the interme-



diate frame *section 22* together in the vehicle front-rear direction. The coupling sections **24**, **32** each include the first [configuration] *coupling* member **40** that is attached [so as to be continuous with] *to* the rocker **30** of the intermediate frame *section 22* *so as to extend* in the vehicle front-rear direction, and the second [configuration] *coupling* member **42** that is attached [so as to be continuous with] *to* the first [configuration] *coupling* member **40** *so as to extend* in the vehicle front-rear direction. This thereby enables stress to be suppressed from concentrating between the intermediate frame *section 22* and the first [configuration] *coupling* member **40** and between the front frame *section 16* or the rear frame *section 20* and the second [configuration] *coupling* member **42**. Moreover, the [leading] *larger* end portion **54** of the first [configuration] *coupling* member **40** and the [leading] *larger* end portion **92** of the second [configuration] *coupling* member **42** opposing the [leading] *larger* end portion **54** of the first [configuration] *coupling* member **40** are joined together, thus respectively coupling the front frame *section 16* or the rear frame *section 20* to the intermediate frame *section 22* in the vehicle front-rear direction.

Note that the first [configuration] *coupling* member **40** and the second [configuration] *coupling* member **42** are respectively formed so as to gradually increase in size along at least one of the vehicle width direction and the vehicle vertical direction on progression from the base end portions **44**, **80** toward the [leading] *larger* end portions **54**, **92**. Namely, the location where the first [configuration] *coupling* member **40** and the second [configuration] *coupling* member **42** are joined together is [configured] *formed* with larger dimensions in the vehicle width direction and the vehicle vertical direction than other locations, thereby improving the ability to withstand input load. This thereby enables input load to be transmitted smoothly to elsewhere in the framework. Load transmission efficiency can accordingly be improved in a vehicle body structure not provided with a floor tunnel.

Moreover, the intermediate frame *section 22* includes the rockers **30** extending along the vehicle front-rear direction, and the front cross member **34** and the rear cross member **38** that respectively couple the rockers **30** together in the vehicle width direction via the first [configuration] *coupling* members **40** of the coupling sections **24**, **32**. Accordingly, load input to the intermediate frame *section 22* from the coupling sections **24**, **32** can be transmitted smoothly to both the rockers **30** and the front cross member **34** or the rear cross member **38** by the first [configuration] *coupling* member **40**. This thereby enables input load to be dispersed such that the load is borne by the overall framework.

Moreover, in each of the coupling sections **24**, **32**, the location where the first [configuration] *coupling* member **40** is joined to the rocker **30** and the location where the first [configuration] *coupling* member **40** is joined to the front cross member **34** or to the rear cross member **38** are [configured] *formed* as a single body, so as not to form a [join] *joint* where stress is liable to concentrate between the rocker **30** and the front cross member **34** or the rear cross member **38**. This thereby enables stress to be suppressed from concentrating in the first [configuration] *coupling* members **40**, and therefore in the coupling sections **24**, **32**.

[Furthermore, in each of the coupling sections **24**, **32**, at least one ridge line of the plural ridge lines extending in the vehicle front-rear direction in the vicinity of the leading end portion **54** of the first configuration member **40** is disposed so as to be continuous with at least one ridge line of the plural ridge lines extending in the vehicle front-rear direction in the vicinity of the leading end portion **92** of the

second configuration member **42**. Accordingly, when load is input to the coupling sections **24**, **32** along the vehicle front-rear direction, the load can be transmitted smoothly from the first configuration member **40** to the second configuration member **42** or from the second configuration member **42** to the first configuration member **40**, along the ridge lines that have high bending rigidity.]

[Moreover, in each of the coupling sections **24**, **32**, in vehicle front view, at least one ridge line of the plural ridge lines within the face of the leading end portion **54** of the first configuration member **40** that is a face opposing the second configuration member **42** is disposed so as to be substantially superimposed on at least one ridge line of the plural ridge lines within the face of the leading end portion **92** of the second configuration member **42** that is a face opposing the first configuration member **40**. Accordingly, when load is input to the coupling sections **24**, **32** along the vehicle front-rear direction, the load can be transmitted smoothly from the first configuration member **40** to the second configuration member **42** or from the second configuration member **42** to the first configuration member **40**, along the ridge lines that have high bending rigidity. This thereby enables a further improvement to load transmission efficiency in a vehicle body structure not provided with a floor tunnel.]

Moreover, in each of the coupling sections **24**, **32**, the first [configuration] *coupling* member **40** and the second [configuration] *coupling* member **42** are respectively formed with the ribs **64**, **108** that extend along the vehicle front-rear direction. The respective ribs **64**, **108** are disposed so as to be substantially superimposed on one another in vehicle front view. Accordingly, when load is input to the coupling sections **24**, **32** along the vehicle front-rear direction, load input from one of the ribs **64** or the ribs **108** is borne by the other out of the ribs **64** or the ribs **108**, thereby enabling the load to be more reliably transmitted.

Moreover, at least one ridge line of the plural ridge lines provided at the coupling sections **24**, **32** is configured so as to be [continuous with] *adjacent to* at least one ridge line of the plural ridge lines provided at the front frame *section 16* or the rear frame *section 20* *extending* in the vehicle front-rear direction, such that load can be transmitted from the front frame *section 16* or the rear frame *section 20* to the intermediate frame *section 22*, or from the intermediate frame *section 22* to the front frame *section 16* or the rear frame *section 20*, along the ridge lines that have high bending rigidity. This thereby enables a further improvement in load transmission efficiency in a vehicle body structure not provided with a floor tunnel.

Moreover, in each of the coupling sections **24**, **32**, since the first [configuration] *coupling* member **40** and the second [configuration] *coupling* member **42** are fastened together using the fasteners **104**, joining the first [configuration] *coupling* member **40** and second [configuration] *coupling* member **42** together is easier than in cases in which welding is employed. This thereby enables an improvement in productivity.

Note that in the first exemplary embodiment described above, the ribs **64** and the ribs **108** are disposed so as to be substantially superimposed on each other in vehicle front view. However, there is no limitation thereto, and the ribs **64** and the ribs **108** may be disposed at positions that are not superimposed on each other.

Moreover, the first [configuration] *coupling* member **40** and the second [configuration] *coupling* member **42** are fastened together using the fasteners **104**. However, there is no limitation thereto, and configuration may be made in



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which the first [configuration] *coupling* member 40 and the second [configuration] *coupling* member 42 are joined together using another type of fastening, such as rivets, or are joined together by welding.

Moreover, configuration is made in which the rocker 30 and either the front cross member 34 or the rear cross member 38 are attached to each first [configuration] *coupling* member 40. However, there is no limitation thereto, and configuration may be made in which only the rocker 30 is attached to the first [configuration] *coupling* member 40, or configuration may be made in which only either the front cross member 34 or the rear cross member 38 is attached to the first [configuration] *coupling* member 40. Further, each of the coupling sections 24, 32 is configured such that the joining wall portion 56 of the first [configuration] *coupling* member 40 is joined to the joining wall portion 90 of the second [configuration] *coupling* member 42. However there is no limitation thereto, and configuration may be made in which one length direction end portion of the rocker 30 is joined to one length direction end portion of either the front-side member 26 or the rear-side member 28, with reinforcement members having an outer profile increasing in size on progression toward an end portion being provided at respective outer peripheral faces of the respective one length direction end portions, and these reinforcement members being joined together.

## MODIFIED EXAMPLE

In the present exemplary embodiment, configuration is made in which the first [configuration] *coupling* member 40 and the second [configuration] *coupling* member 42 of the coupling section 24 are joined together at the joining wall portions 56, 90. However, there is no limitation thereto, and as illustrated in FIG. 6, for example, configuration may be made in which a projection 142 is formed projecting out from a vehicle width direction outer side of the first [configuration] *coupling* member 40 toward the vehicle rear, with the projection 142 being abutted against or joined to a vehicle width direction outer side of the second [configuration] *coupling* member 42. Namely, the projection 142 projects out toward the second [configuration] *coupling* member 42 of the coupling section 24, and since the projection 142 overlaps with the second [configuration] *coupling* member 42 in the vehicle width direction, when load is input to one of the first [configuration] *coupling* member 40 [or] and the second [configuration] *coupling* member 42 substantially along the vehicle width direction, the second [configuration] *coupling* member 42 and the projection 142 abut one another, thereby enabling the load to be transmitted. This thereby enables shear deformation of the coupling sections 24 to be suppressed.

Note that here, configuration is made in which the projection 142 is provided to the first [configuration] *coupling* member 40. However, there is no limitation thereto, and configuration may be made in which the projection 142 is provided to the second [configuration] *coupling* member 42 so as to project out toward the first [configuration] *coupling* member 40. Moreover, the projection 142 is disposed at the vehicle width direction outer side of the first [configuration] *coupling* member 40. However, there is no limitation thereto, and the projection 142 may be disposed at the vehicle width direction inner side of the first [configuration] *coupling* member 40, or may be disposed at the upper side

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and/or lower side of the first [configuration] *coupling* member 40 in the vehicle vertical direction.

## Second Exemplary Embodiment

Next, explanation follows regarding a vehicle framework structure according to a second exemplary embodiment of the present invention, with reference to FIG. 7 to FIG. 10. Note that configuration portions that are basically the same as those of the first exemplary embodiment described above are allocated the same reference numerals, and explanation thereof is omitted.

The vehicle framework structure according to the second exemplary embodiment has the same basic configuration as the first exemplary embodiment, but is distinctive in the point that a hollow portion 152 is provided inside a coupling section 150.

Namely, as illustrated in FIG. 7, a pair of left and right coupling sections 150 are each [configured] *formed* including a first [configuration] *coupling* member 154 and a second [configuration] *coupling* member 156. The first [configuration] *coupling* member 154 is disposed on the intermediate frame section 22 side (not illustrated in FIG. 7), and is formed with a substantially L-shaped profile in vehicle front view. A base end portion 158 [configuring] *forming* the vehicle front of the first [configuration] *coupling* member 154 is formed with a substantially L-shaped profile in vehicle front view by a horizontal wall portion 160 with a plate thickness direction in the vehicle vertical direction, and a vertical wall portion 162 with a plate thickness direction in the vehicle width direction. The base end portion 158 is joined to the rocker 30 in a state in which a ridge line 164 between the horizontal wall portion 160 and the vertical wall portion 162 of the base end portion 158 is [substantially superimposed on] *adjacent to* the ridge line 52 (see FIG. 2) at the upper face of the rocker 30. Note that the horizontal wall portion 160 and the vertical wall portion 162 extend toward the vehicle rear and are joined to a joining wall portion 166, described later.

As illustrated in FIG. 8, a [leading] *larger* end portion 168 on the opposite side of the first [configuration] *coupling* member 154 to the base end portion 158 is [configured] *formed* including the joining wall portion 166 that has a plate thickness direction in the vehicle front-rear direction. In vehicle front view, the joining wall portion 166 is set with larger dimensions in the vehicle vertical direction and the vehicle width direction than the base end portion 158, and vehicle rear end portions of the horizontal wall portion 160 and the vertical wall portion 162 are respectively joined to the vicinity of a vehicle upper end portion of the joining wall portion 166. Accordingly, the horizontal wall portion 160 is curved toward the vehicle upper side on progression from the base end portion 158 toward the [leading] *larger* end portion 168, and the vertical wall portion 162 is curved toward the vehicle width direction inner side on progression from the base end portion 158 toward the [leading] *larger* end portion 168. The base end portion 158 and the [leading] *larger* end portion 168 (joining wall portion 166) are thus formed as a single body.

Moreover, the length direction end portion 72 of the rear cross member 38 is joined to the vehicle width direction inner side of the first [configuration] *coupling* member 154 so as to be superimposed thereon from the vehicle upper side.

The second [configuration] *coupling* member 156 is disposed at the vehicle rear of the first [configuration] *coupling* member 154, and is formed with a substantially L-shaped



profile in plan view of the vehicle. A base end portion 159 of the second [configuration] coupling member 156 is, for example, integrally formed to the rear frame section 20 disposed at the vehicle rear of the second [configuration] coupling member 156. Note that the second [configuration] coupling member 156 of a non-illustrated coupling section provided with front-rear symmetry is integrally formed to the front frame section 16.

As illustrated in FIG. 8, similarly to the first [configuration] coupling member 154, a [leading] larger end portion 172 of the second [configuration] coupling member 156 is [configured] formed including a joining wall portion 174 with a plate thickness direction in the vehicle front-rear direction. The joining wall portion 174 is formed with substantially the same shape as the joining wall portion 166 of the first [configuration] coupling member 154 in vehicle front view. The joining wall portion 174 is set with larger dimensions in the vehicle vertical direction and the vehicle width direction than the base end portion 159 of the second [configuration] coupling member 156.

As illustrated in FIG. 9, the joining wall portion 174 of the second [configuration] coupling member 156 is formed with a through hole 180 that serves as an opening and as a fitted-to portion, and that penetrates the joining wall portion 174 in the plate thickness direction. Moreover, as conceptually illustrated in FIG. 10, the first [configuration] coupling member 154 is formed with the hollow portion 152 that is open toward the vehicle rear at a position corresponding to the through hole 180. A portion of a suspension arm 182 is inserted toward the vehicle front into the through hole 180 and the hollow portion 152.

An outer peripheral edge of the hollow portion 152 projects out toward the vehicle rear and is inserted into the through hole 180 of the second [configuration] coupling member 156, and is provided with a fitting portion 184 that abuts against an inner peripheral wall face of the through hole 180 in the second [configuration] coupling member 156.

#### Operation and Advantageous Effects of the Second Exemplary Embodiment

Next, explanation follows regarding operation and advantageous effects of the present exemplary embodiment.

With the exception of the point that the hollow portion 152 is provided inside the coupling section 150, the configuration described above is similar to the vehicle framework structure of the first exemplary embodiment, and is thereby capable of obtaining the same advantageous effects as the first exemplary embodiment.

Moreover, the weight of the coupling section can be reduced as a result of forming the hollow portion 152 and the through hole 180 in the coupling section 150. This thereby enables a reduction in weight.

Moreover, a portion of the suspension arm 182 is inserted into the hollow portion 152 and the through hole 180 of the coupling section 150, thereby enabling space to be saved. This thereby enables more efficient utilization of space in the vehicle.

Moreover, in the coupling section 150, the fitting portion 184 is formed at one of the first [configuration] coupling member 154 or the second [configuration] coupling member 156, and the through hole 180, into which the fitting portion 184 is fitted by being inserted in the vehicle front-rear direction, is formed at the other of the first [configuration] coupling member 154 or the second [configuration] coupling member 156. Accordingly, when connecting the first [con-

figuration] coupling member 154 and the second [configuration] coupling member 156 together, positioning of the first [configuration] coupling member 154 and the second [configuration] coupling member 156 can be performed easily by inserting the fitting portion 184 into the through hole 180. Moreover, since it is possible for load to be transmitted either from the fitting portion 184 to the through hole 180 or from the through hole 180 to the fitting portion 184, when load is input to one of the first [configuration] coupling member 154 [or] and the second [configuration] coupling member 156 substantially along the vehicle vertical direction or substantially along the vehicle width direction, the load can be better transmitted to the other [out] of the first [configuration] coupling member 154 [or] and the second [configuration] coupling member 156. This thereby enables the load transmission efficiency to be improved for load input in any direction.

Moreover, the second [configuration] coupling member 156 of the coupling section 150 is formed as a single body with [at least] one of the front frame section 16 [or] and the rear frame section 20, rendering an operation to attach the second [configuration] coupling member 156 to [at least] one of the front frame section 16 [or] and the rear frame section 20 unnecessary. A reduction in the number of assembly processes can accordingly be achieved. This thereby enables an improvement in productivity.

Note that in the second exemplary embodiment described above, configuration is made in which the hollow portion 152 is formed in the first [configuration] coupling member 154. However, there is no limitation thereto, and the hollow portion 152 may be provided in the second [configuration] coupling member 156, or hollow portions 152 may be provided in both the first [configuration] coupling member 154 and the second [configuration] coupling member 156. Moreover, a member other than the suspension arm 182 may be inserted into the hollow portion 152, or configuration may be made in which nothing is inserted into the hollow portion 152.

Moreover, configuration is made in which the fitting portion 184 is provided to the first [configuration] coupling member 154, and is fitted into the through hole 180 in the second [configuration] coupling member 156. However, there is no limitation thereto, and configuration may be made in which a fitting hole, not illustrated in the drawings, is formed in the second [configuration] coupling member 156 for the fitting portion 184, and the fitting portion 184 is fitted into the fitting hole. Moreover, configuration may be made in which the fitting portion 184 is provided to the second [configuration] coupling member 156 and is fitted together with the hollow portion 152 formed in the first [configuration] coupling member 154, or with another fitting hole, not illustrated in the drawings, formed in the first [configuration] coupling member 154.

Moreover, in the first and second exemplary embodiments described above, configuration is made in which in each of the coupling sections 24, 32, 150, the cross member is attached to the first [configuration] coupling member 40, 154. However, there is no limitation thereto, and configuration may be made in which the cross member is attached to the second [configuration] coupling member 42, 156. Moreover, configuration may be made in which the cross member is not attached to the coupling sections 24, 32, 150.

Moreover, configuration is made in which the first [configuration] coupling member 40, 154 and the second [configuration] coupling member 42, 156 gradually increase in size in the vehicle vertical direction and in the vehicle width direction on progression from the base end portion 44, 80,



158, 159 toward the [leading] *larger* larger end portion 54, 92, 168, 172. However, there is no limitation thereto, and configuration may be made in which the gradual increase in size is only in at least one of the vehicle vertical direction or the vehicle width direction.

Moreover, in the first [configuration] *coupling* member 40, 154, the base end portion 44 that is joined to the rocker 30, and the portion of the first [configuration] *coupling* member 40, 154 that is joined to the cross member, are configured as a single body so as not to form [joins] *joints*. However, there is no limitation thereto, and configuration may be made in which these portions are each configured by separate bodies with a [join] *joint* present therebetween.

[Moreover, some ridge lines of the plural ridge lines of the joining wall portion 56, 166 of the first configuration member 40, 154 are disposed so as to be continuous with the ridge lines of the joining wall portion 90, 174 of the opposing second configuration member 42, 156. However, there is no limitation thereto, and these ridge lines may be non-continuous with each other.]

[Moreover, configuration is made in which at least one ridge line of each of the coupling sections 24, 32, 150 is continuous with at least one ridge line of the front frame 16, the rear frame 20, or the intermediate frame 22. However, there is no limitation thereto, and these ridge lines may be non-continuous with each other.]

Although explanation has been given regarding exemplary embodiment of the present invention, is the present invention is not limited to the above, and obviously various modification either than the above may be implemented in a range that does not depart from the spirit of the present invention.

What is claimed is:

1. A vehicle framework structure, comprising:

a front frame *member* that [configures] *forms* a part of a vehicle framework [of] *at* a vehicle front section of a vehicle;

a rear frame *member* that [configures] *forms* a part of [a] the vehicle framework [of] *at* a vehicle rear section of the vehicle;

an intermediate frame *member* that [configures] *forms* a part of [a] the vehicle framework [of] *at* a vehicle intermediate section of the vehicle, and that [includes a framework member] *is* disposed between the front frame *member* and the rear frame *member* and [having] *has* a length direction in a vehicle front-rear direction; and

a coupling section that includes a first [configuration] *coupling* member attached to [the framework member of] the intermediate frame *member* so as to [be continuous with the framework member] *extend* in the vehicle front-rear direction, the first [configuration] *coupling* member having a [leading] *larger* end portion and a base end portion, and a second [configuration] *coupling* member attached to the first [configuration] *coupling* member so as to [be continuous with the first configuration member] *extend* in the vehicle front-rear direction, the second [configuration] *coupling* member having a [leading] *larger* end portion and a base end portion, the coupling section coupling [at least] one of the front frame [or] *member and* the rear frame *member* to the intermediate frame *member* in the vehicle front-rear direction by joining the [leading] *larger* end portion of the first [configuration] *coupling* member to the [leading] *larger* end portion of the second [configuration] *coupling* member opposing the [leading] *larger* end portion of the first [configuration] *coupling* mem-

ber, with both the first [configuration] *coupling* member and the second [configuration] *coupling* member being formed so as to gradually increase in size in at least one of a vehicle width direction [or] *and* a vehicle vertical direction on progression from the respective base end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member toward the respective [leading] *larger* end portions of the first [configuration] *coupling* member and the second [configuration] *coupling* member,

wherein the *first* coupling [section] *member* is formed with [at least one of] a hollow portion [or an opening] *and the second coupling member is formed with a through-hole that is joined to the hollow portion due to the second coupling member being attached to the first coupling member, and*

wherein [a portion of a suspension arm is inserted into the at least one of] the hollow portion [or] *and the [opening] through-hole are configured to receive a portion of a suspension arm.*

2. The vehicle framework structure of claim 1, wherein the vehicle intermediate [frame] *section* includes:

a pair of left and right rockers [that constitute the framework member]; and

a cross member [coupling] *coupled between* the pair of left and right rockers [together] in the vehicle width direction, *one of the pair of left and right rockers constituting the intermediate frame member and being coupled to the cross member via the first [configuration] coupling member of the coupling section.*

3. The vehicle framework structure of claim 2, wherein a portion of the first [configuration] *coupling* member of the coupling section that is joined to *the* one of the pair of left and right rockers[,] and a portion of the first [configuration] *coupling* member of the coupling section that is joined to the cross member[,] are configured as a single body.

[4. The vehicle framework structure of claim 1, wherein, in the coupling section, at least one ridge line, of a plurality of ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the first configuration member, is disposed so as to be continuous with at least one ridge line of a plurality of ridge lines extending along the vehicle front-rear direction in the vicinity of the leading end portion of the second configuration member.]

[5. The vehicle framework structure of claim 1, wherein, in a vehicle front view of the coupling section, at least one ridge line, of a plurality of ridge lines within a face of the leading end portion of the first configuration member that is a face opposing the second configuration member, is disposed so as to be substantially superimposed on at least one ridge line of a plurality of ridge lines within a face of the leading end portion of the second configuration member that is a face opposing the first configuration member.]

6. The vehicle framework structure of claim 1, wherein the first [configuration] *coupling* member and the second [configuration] *coupling* member of the coupling section are each formed with a rib extending along the vehicle front-rear direction, and the rib of the first [configuration] *coupling* member and the rib of the second [configuration] *coupling* member are disposed so as to be substantially superimposed on each other in a vehicle front view.

7. The vehicle framework structure of claim 1, wherein [at least] one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section is provided with a projection that projects toward the other of the first [configuration] *coupling* mem-



ber [or] *and* the second [configuration] *coupling* member, and that overlaps the other of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member in the vehicle width direction.

8. The vehicle framework structure of claim 1, wherein a fitting portion is formed [at] *on* one of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member of the coupling section, and *either the hollow portion or the through-hole serves as* a fitted-to portion [is] formed [at] *on* the other of the first [configuration] *coupling* member [or] *and* the second [configuration] *coupling* member, with the fitting portion being fitted to the fitted-to portion by being inserted into the fitted-to portion of the vehicle front-rear direction.

9. The vehicle framework structure of claim 1, wherein the second configuration member of the coupling section is formed as a single body with at least one of the front frame or the rear frame.]

10. The vehicle framework structure of claim 1, wherein at least one ridge line of a plurality of ridge lines provided at the coupling section is configured so as to be continuous with at least one ridge line of a plurality of ridge lines provided at either the front frame or the rear frame.]

11. The vehicle framework structure of claim 1, wherein the first [configuration] *coupling* member and the second [configuration] *coupling* member of the coupling section are fastened together using a fastener.

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