A vehicle body side structure according to the present invention includes: a side sill inner member (10) extending in a fore-and-aft direction of a vehicle body; a side outer panel (26) including a side sill outer portion (28) that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member (10) in a vehicle width direction and is attached to the side sill inner member (10) by welding to form a closed cross section jointly with the side sill inner member (10); a side sill reinforcement member (30) extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28), the side sill reinforcement member (30) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding; a rear frame (12) attached to a rear end part of the side sill inner member (10) by welding and extending in the fore-and-aft direction of the vehicle body; and an end plate (40) disposed to close a rear opening of the closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28) and to abut a rear edge of the side sill reinforcement member (30), the end plate (40) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, wherein the end plate (40) is further secured to a rear end part of the side sill reinforcement member (30) by bolting (34, 36).

[0008]

According to this structure, the end plate (40) is secured to the side sill reinforcement member (30) in addition to being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, whereby the bonding strength between these vehicle body components is improved, and particularly, sufficient rigidity of the side sill rear end part is achieved. This also enables efficient transmission of collision load between the side sill, which includes the side sill reinforcement member

(30) in addition to the side sill inner member (10) and the side sill outer portion (28), and the rear frame (12), whereby even if a large collision load is applied, deformation of the side sill and / or the rear frame (12) can be avoided.

[0009]

Further, since the end plate (40) and the side sill reinforcement member (30) are joined to each other by bolting instead of welding, it is possible to eliminate the need for MIG welding, and thus, the work environment can be improved and the productivity of the line can be increased.

[0010]

In the vehicle body side structure according to the present invention, preferably, the side sill reinforcement member (30) includes a U-shaped channel-like portion (30A) and a pair of attachment flanges (30B) respectively provided at upper and lower edges of the channel-like portion (30A) to serve as welding margins for attachment to the side sill inner member (10) and the side sill outer portion (28), such that the side sill reinforcement member (30) has a hat-shaped cross section, the side sill reinforcement member (30) further including three bolting flanges (30D) formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion (30A), respectively, and the end plate (40) is secured to the side sill reinforcement member (30) by being bolted to each of the three bolting flanges (30D).

[0011]

According to this structure, the end plate (40) is bolted to each of the bolting flanges (30D) that are formed on three sides of the channel-like portion (30A) of the side sill reinforcement member (30), and thus, a necessary bonding strength between the end plate (40) and the side sill reinforcement member (30) can be achieved easily.

[0012]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) includes: a main surface section (40A) that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member (30), and is bolted to the rear end part of the side sill reinforcement member (30); an outer attachment flange (40D) formed by bending a vehicle widthwise outer edge portion of the main surface section (40A) and attached to the side sill outer portion (28) by welding; and an inner attachment flange (40B) formed by bending a vehicle widthwise inner edge portion of the main surface section (40A) and attached to the side sill inner member (10) by welding.

[0013]

According to this structure, the end plate (40) is appropriately attached to the side sill inner member (10) and the side sill outer portion (28) by welding by use of the inner attachment flange (40B) and the outer attachment flange (40D), where the inner attachment flange (40B) and the outer attachment flange (40D) are each formed to be bent relative to the main surface section (40A), whereby the end plate (40) itself has a high rigidity.

[0014]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) is also attached to the rear frame (12) by welding by use of the inner attachment flange (40B).

[0015]

According to this structure, the bonding strength between the vehicle body components in the side sill rear end part is further increased, and sufficient rigidity is obtained.

[0016]

Preferably, the vehicle body side structure according to the present invention further includes: a rear wheel housing member (18) formed with a semicircular recess (18A) that is concave inward in the vehicle width direction, and attached to the rear frame (12) by welding; and a rear inner panel (24) attached to a vehicle-widthwise outer side of the rear wheel housing member (18) and defining a rear wheel housing portion (22) having a predetermined depth jointly with the recess (18A), wherein the end plate (40) is configured such that a top edge of the main surface section (40A) has a difference in vertical level between a vehicle-widthwise inner portion (41A) and a vehicle-widthwise outer portion (41B), and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion (41A) is lap-welded to a lower end part (18B) of the recess (18A) of the rear wheel housing member (18), while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion (41B) is lap-welded to a lower end part of the rear inner panel (24).

[0017]

According to this structure, because the connection of the end plate (40) with the rear inner panel (24) and the rear wheel housing member (18) in the rear wheel housing portion (22) is made with the rear inner panel (24) and the rear wheel housing member (18) interposing the end plate (40) therebetween in the fore-and-aft direction, the end plate (40) is united more firmly with the attachment structure of the rear inner panel (24) and the rear wheel housing member (18), and the bonding strength between these vehicle body components is improved.

[0018]

In the vehicle body side structure according to the present invention, preferably, at least one of bolts (36) that secure the end plate (40) to the side sill reinforcement member (30) also secures a rear strake (48), which is suspended from the vehicle body

at a front side of the rear wheel housing portion (22) to block wind caused by traveling of a vehicle.

[0019]

According to this structure, it is possible to reduce the number of bolts for mounting the rear strake (48) to the vehicle body.

[0020]

In the vehicle body side structure according to the present invention, preferably, the rear end part of the side sill inner member (10) includes a part (10D) serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange (40B) of the end plate (40) is lap-welded to the part (10D) of the side sill inner member (10) serving as the one of the support portions.

[0021]

According to this structure, the inner attachment flange (40B) of the end plate (40) is lap-welded to the outboard surface of the part (10D) of the side sill inner member (10) serving as one of the support portions of the trailing arm bracket, thereby reinforcing this part (10D) of the side sill inner member (10).

EFFECT OF THE INVENTION

[0022]

According to the present invention, it is possible to eliminate the need for performing MIG welding in mounting of the end plate, thereby improving the productivity of the line, and to increase the bonding strength between components of the vehicle body side structure, thereby improving the impact absorbing ability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 is a perspective view of a sub-assembly of a vehicle body rear portion

side sill reinforcement member 30. Thereby, as shown in FIG. 3, the side outer panel 26 can be treated as a sub-assembly (sub-assy) including the side sill reinforcement member 30 and jack-up plate 31 attached thereto.

[0034]

As shown in FIG. 10, the side sill is formed by interposing the upper and lower attachment flanges 30B of the side sill reinforcement member 30 between the upper and lower attachment flanges 10B of the side sill inner member 10 and the upper and lower attachment flanges 28B of the side sill outer portion 28, respectively, and attaching together these attachment flanges. Thereby, the side sill inner member 10 and the side sill outer portion 28 form a tubular body having a closed cross section, and the side sill reinforcement member 30 extends in the fore-and-aft direction of the vehicle body inside this closed cross section portion.

[0035]

The closed cross section portion formed by the side sill inner member 10 and the side sill outer portion 28, or the tubular body formed by the side sill inner member 10 and the side sill outer portion 28, defines an opening 32 (see FIG. 7) that opens toward the rear of the vehicle body. An inboard part 32A of the opening 32 is closed by the rear frame 12 attached to the side sill inner member 10, and a remaining outboard part 32B thereof is closed by the end plate 40. It is to be noted that the side sill outer portion 28 is provided with an attachment flange 28C for end plate welding, where the attachment flange 28C is formed by bending a rear end edge of the side sill outer portion 28 toward the inside of the vehicle body by about 90 degrees.

[0036]

Next, description will be made of the end plate 40 and a mounting structure therefor. As shown in FIGS. 4 to 6, the end plate 40 is a press-formed article and

includes a main surface section 40A, which extends along a plane separating the vehicle body into front and rear sides and, when in contact with a rear edge 30C of the side sill reinforcement member 30, has the same shape as that of the outboard part 32B of the opening 32 and substantially closes the outboard part 32B, an inner attachment flange 40B formed by bending a vehicle-widthwise inner edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, a bent part 40C formed by bending a vehicle-widthwise outer edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, an outer attachment flange 40D formed by further bending the end portion of the bent part 40C in the inward direction of the vehicle body by about 90 degrees, and a bent part 40E connecting between the inner attachment flange 40B and the bent part 40C at a bottom portion. The main surface section 40A is provided with a through-hole 40G through which anti-rust wax is introduced into an interior of the side sill.

[0037]

The end plate 40 is realized as a highly rigid component owing to the features that the main surface section 40A includes portions offset in the fore-and-aft direction of the vehicle body, that the end plate 40 has many bending ridge lines, and that the end plate 40 assumes a box-like shape resulting from the inner attachment flange 40B and the bent part 40C connected by the bent part 40E.

[0038]

The end plate 40 is attached to the side plate portion 10D of the side sill inner member 10, with the inner attachment flange 40B overlapping the side plate portion 10D. The inner attachment flange 40B is also attached to an outboard side surface of the rear frame 12. The end plate 40 is further attached to the attachment flange 28C of the side sill outer portion 28, with the outer attachment flange 40D overlapping the

rearward facing surface of the attachment flange 28C.

[0039]

As shown in FIGS. 8 and 9, the end plate 40 is configured such that the top edge of the main surface section 40A has a difference in vertical level between a vehicle-widthwise inner top edge portion 41A and a vehicle-widthwise outer top edge portion 41B. The top edge in the vehicle-widthwise inner top edge portion 41A is located higher than in the vehicle-widthwise outer top edge portion 41B, and the lower end part 18B defining a depth of the recess 18A of the rear wheel housing member 18 and extending in the vehicle width direction at a front part of the rear wheel housing member 18 is lap-welded to the rearward facing surface of the top edge portion 41A. The lower end part 24C of the rear inner panel 24 extending in the vehicle width direction and projecting more downward than the lower end part 18B of the recess 18A is lap-welded to the forward facing surface of the vehicle-widthwise outer top edge portion 41B of the end plate 40. Thereby, the end plate 40 is continuously connected with the part defining the depth of the recess 18A of the rear wheel housing member 18 and with the rear wheel housing portion 22, and forms a part of a front portion of the rear wheel housing portion 22. It is to be noted that the lower end part 18B of the recess 18A and the lower end part 24C of the rear inner panel 24 are offset in position in the fore-and-aft direction of the vehicle body by the thickness of the end plate 40.

[0040]

Since the connection of the end plate 40 with the rear wheel housing member 18 and the rear inner panel 24 in the rear wheel housing portion 22 is made with the rear wheel housing member 18 and the rear inner panel 24 interposing the end plate 40 therebetween in the fore-and-aft direction, the end plate 40 is united more firmly with the attachment structure of the rear wheel housing member 18 and the rear inner panel

CLAIMS

1. A vehicle body side structure, comprising:

a side sill inner member extending in a fore-and-aft direction of a vehicle body;

a side outer panel including a side sill outer portion that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member in a vehicle width direction and is attached to the side sill inner member by welding to form a closed cross section jointly with the side sill inner member;

a side sill reinforcement member extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member and the side sill outer portion, the side sill reinforcement member being attached to the side sill inner member and the side sill outer portion by welding;

a rear frame attached to a rear end part of the side sill inner member by welding and extending in the fore-and-aft direction of the vehicle body; and

an end plate disposed to close a rear opening of the closed cross section portion formed by the side sill inner member and the side sill outer portion and to abut a rear edge of the side sill reinforcement member, the end plate being attached to the side sill inner member and the side sill outer portion by welding,

wherein the end plate is also secured to a rear end part of the side sill reinforcement member by bolting.

2. The vehicle body side structure according to claim 1, wherein:

the side sill reinforcement member includes a U-shaped channel-like portion and a pair of attachment flanges respectively provided at upper and lower edges of the channel-like portion to serve as welding margins for attachment to the side sill inner member and the side sill outer portion, such that the side sill reinforcement member has

a hat-shaped cross section, the side sill reinforcement member further including three bolting flanges formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion, respectively; and

the end plate is secured to the side sill reinforcement member by being bolted to each of the three bolting flanges.

3. The vehicle body side structure according to claim 1 or 2, wherein the end plate comprises:

a main surface section that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member, and is bolted to the rear end part of the side sill reinforcement member;

an outer attachment flange formed by bending a vehicle widthwise outer edge portion of the main surface section and attached to the side sill outer portion by welding; and

an inner attachment flange formed by bending a vehicle widthwise inner edge portion of the main surface section and attached to the side sill inner member by welding.

4. The vehicle body side structure according to claim 3, wherein the end plate is also attached to the rear frame by welding by use of the inner attachment flange.

5. The vehicle body side structure according to claim 3 or 4, further comprising:

a rear wheel housing member formed with a semicircular recess that is concave inward in the vehicle width direction, and attached to the rear frame by welding; and

a rear inner panel attached to a vehicle-widthwise outer side of the rear wheel

housing member and defining a rear wheel housing portion having a predetermined depth jointly with the recess,

wherein the end plate is configured such that a top edge of the main surface section has a difference in vertical level between a vehicle-widthwise inner portion and a vehicle-widthwise outer portion, and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion is lap-welded to a lower end part of the recess of the rear wheel housing member, while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion is lap-welded to a lower end part of the rear inner panel.

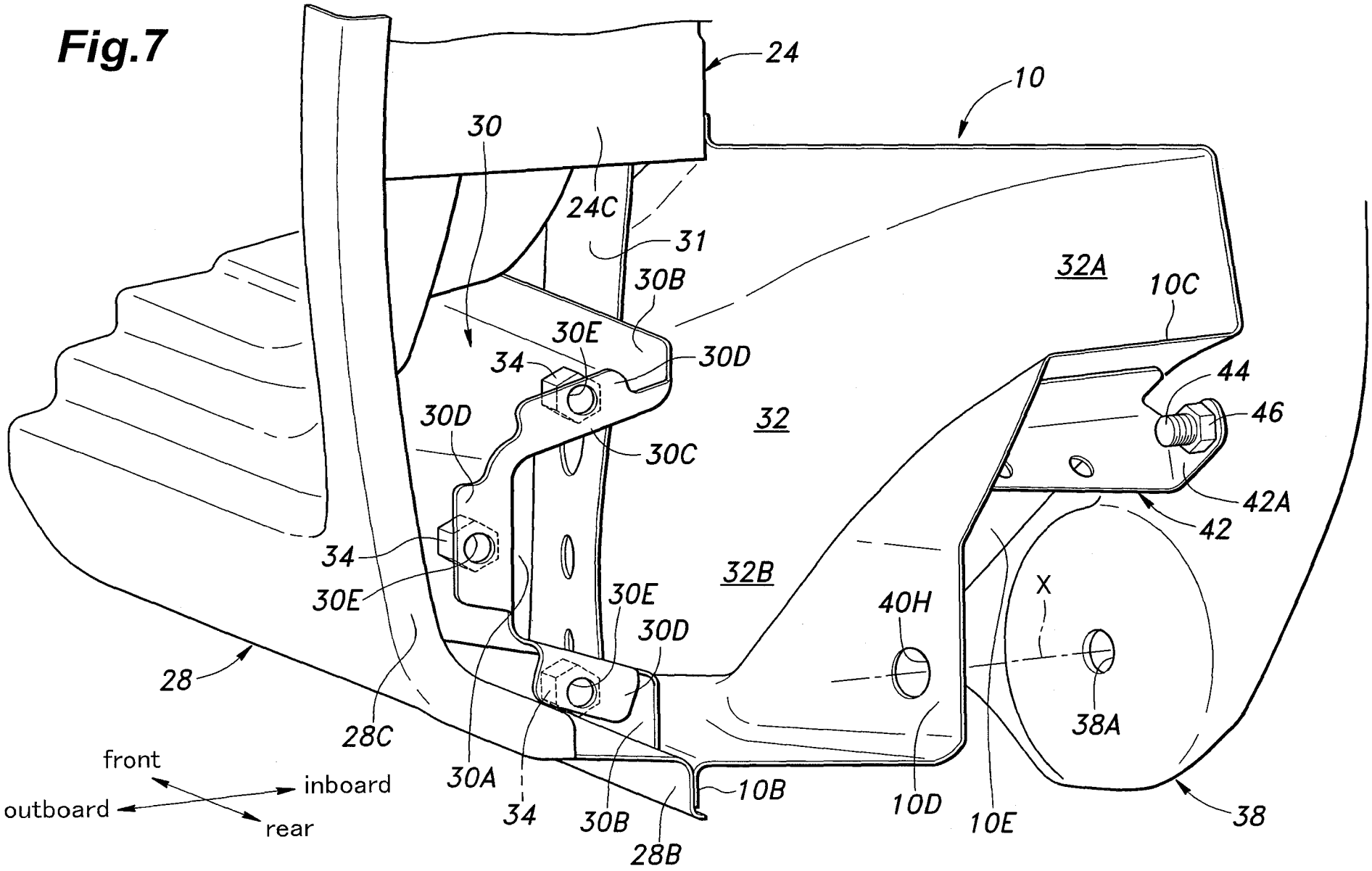
6. The vehicle body side structure according to claim 5, wherein at least one of bolts that secure the end plate to the side sill reinforcement member also secures a rear strake, which is suspended from the vehicle body at a front side of the rear wheel housing portion to block wind caused by traveling of a vehicle.

7. The vehicle body side structure according to any one of claims 3 to 6, wherein the rear end part of the side sill inner member includes a part serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange of the end plate is lap-welded to the part of the side sill inner member serving as the one of the support portions.

Dated this 23 April 2014

(Anand Barnabas)
Reg. No.IN/PA - 974
Of De Penning & De

Fig.7


24
10
30
24C
31
32A
10C
30B
30E
30D
34
44
46
30D
32
30C
42A
42
34
30E
32B
30E
40H
X
30D
28
28C
38A
front
inboard
outboard
rear
30A
34
30B
28B
10B
10D
10E
38

A vehicle body side structure according to the present invention includes: a side sill inner member (10) extending in a fore-and-aft direction of a vehicle body; a side outer panel (26) including a side sill outer portion (28) that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member (10) in a vehicle width direction and is attached to the side sill inner member (10) by welding to form a closed cross section jointly with the side sill inner member (10); a side sill reinforcement member (30) extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28), the side sill reinforcement member (30) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding; a rear frame (12) attached to a rear end part of the side sill inner member (10) by welding and extending in the fore-and-aft direction of the vehicle body; and an end plate (40) disposed to close a rear opening of the closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28) and to abut a rear edge of the side sill reinforcement member (30), the end plate (40) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, wherein the end plate (40) is further secured to a rear end part of the side sill reinforcement member (30) by bolting (34, 36).

[0008]

According to this structure, the end plate (40) is secured to the side sill reinforcement member (30) in addition to being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, whereby the bonding strength between these vehicle body components is improved, and particularly, sufficient rigidity of the side sill rear end part is achieved. This also enables efficient transmission of collision load between the side sill, which includes the side sill reinforcement member

(30) in addition to the side sill inner member (10) and the side sill outer portion (28), and the rear frame (12), whereby even if a large collision load is applied, deformation of the side sill and / or the rear frame (12) can be avoided.

[0009]

Further, since the end plate (40) and the side sill reinforcement member (30) are joined to each other by bolting instead of welding, it is possible to eliminate the need for MIG welding, and thus, the work environment can be improved and the productivity of the line can be increased.

[0010]

In the vehicle body side structure according to the present invention, preferably, the side sill reinforcement member (30) includes a U-shaped channel-like portion (30A) and a pair of attachment flanges (30B) respectively provided at upper and lower edges of the channel-like portion (30A) to serve as welding margins for attachment to the side sill inner member (10) and the side sill outer portion (28), such that the side sill reinforcement member (30) has a hat-shaped cross section, the side sill reinforcement member (30) further including three bolting flanges (30D) formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion (30A), respectively, and the end plate (40) is secured to the side sill reinforcement member (30) by being bolted to each of the three bolting flanges (30D).

[0011]

According to this structure, the end plate (40) is bolted to each of the bolting flanges (30D) that are formed on three sides of the channel-like portion (30A) of the side sill reinforcement member (30), and thus, a necessary bonding strength between the end plate (40) and the side sill reinforcement member (30) can be achieved easily.

[0012]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) includes: a main surface section (40A) that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member (30), and is bolted to the rear end part of the side sill reinforcement member (30); an outer attachment flange (40D) formed by bending a vehicle widthwise outer edge portion of the main surface section (40A) and attached to the side sill outer portion (28) by welding; and an inner attachment flange (40B) formed by bending a vehicle widthwise inner edge portion of the main surface section (40A) and attached to the side sill inner member (10) by welding.

[0013]

According to this structure, the end plate (40) is appropriately attached to the side sill inner member (10) and the side sill outer portion (28) by welding by use of the inner attachment flange (40B) and the outer attachment flange (40D), where the inner attachment flange (40B) and the outer attachment flange (40D) are each formed to be bent relative to the main surface section (40A), whereby the end plate (40) itself has a high rigidity.

[0014]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) is also attached to the rear frame (12) by welding by use of the inner attachment flange (40B).

[0015]

According to this structure, the bonding strength between the vehicle body components in the side sill rear end part is further increased, and sufficient rigidity is obtained.

[0016]

Preferably, the vehicle body side structure according to the present invention further includes: a rear wheel housing member (18) formed with a semicircular recess (18A) that is concave inward in the vehicle width direction, and attached to the rear frame (12) by welding; and a rear inner panel (24) attached to a vehicle-widthwise outer side of the rear wheel housing member (18) and defining a rear wheel housing portion (22) having a predetermined depth jointly with the recess (18A), wherein the end plate (40) is configured such that a top edge of the main surface section (40A) has a difference in vertical level between a vehicle-widthwise inner portion (41A) and a vehicle-widthwise outer portion (41B), and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion (41A) is lap-welded to a lower end part (18B) of the recess (18A) of the rear wheel housing member (18), while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion (41B) is lap-welded to a lower end part of the rear inner panel (24).

[0017]

According to this structure, because the connection of the end plate (40) with the rear inner panel (24) and the rear wheel housing member (18) in the rear wheel housing portion (22) is made with the rear inner panel (24) and the rear wheel housing member (18) interposing the end plate (40) therebetween in the fore-and-aft direction, the end plate (40) is united more firmly with the attachment structure of the rear inner panel (24) and the rear wheel housing member (18), and the bonding strength between these vehicle body components is improved.

[0018]

In the vehicle body side structure according to the present invention, preferably, at least one of bolts (36) that secure the end plate (40) to the side sill reinforcement member (30) also secures a rear strake (48), which is suspended from the vehicle body

at a front side of the rear wheel housing portion (22) to block wind caused by traveling of a vehicle.

[0019]

According to this structure, it is possible to reduce the number of bolts for mounting the rear strake (48) to the vehicle body.

[0020]

In the vehicle body side structure according to the present invention, preferably, the rear end part of the side sill inner member (10) includes a part (10D) serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange (40B) of the end plate (40) is lap-welded to the part (10D) of the side sill inner member (10) serving as the one of the support portions.

[0021]

According to this structure, the inner attachment flange (40B) of the end plate (40) is lap-welded to the outboard surface of the part (10D) of the side sill inner member (10) serving as one of the support portions of the trailing arm bracket, thereby reinforcing this part (10D) of the side sill inner member (10).

EFFECT OF THE INVENTION

[0022]

According to the present invention, it is possible to eliminate the need for performing MIG welding in mounting of the end plate, thereby improving the productivity of the line, and to increase the bonding strength between components of the vehicle body side structure, thereby improving the impact absorbing ability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 is a perspective view of a sub-assembly of a vehicle body rear portion

side sill reinforcement member 30. Thereby, as shown in FIG. 3, the side outer panel 26 can be treated as a sub-assembly (sub-assy) including the side sill reinforcement member 30 and jack-up plate 31 attached thereto.

[0034]

As shown in FIG. 10, the side sill is formed by interposing the upper and lower attachment flanges 30B of the side sill reinforcement member 30 between the upper and lower attachment flanges 10B of the side sill inner member 10 and the upper and lower attachment flanges 28B of the side sill outer portion 28, respectively, and attaching together these attachment flanges. Thereby, the side sill inner member 10 and the side sill outer portion 28 form a tubular body having a closed cross section, and the side sill reinforcement member 30 extends in the fore-and-aft direction of the vehicle body inside this closed cross section portion.

[0035]

The closed cross section portion formed by the side sill inner member 10 and the side sill outer portion 28, or the tubular body formed by the side sill inner member 10 and the side sill outer portion 28, defines an opening 32 (see FIG. 7) that opens toward the rear of the vehicle body. An inboard part 32A of the opening 32 is closed by the rear frame 12 attached to the side sill inner member 10, and a remaining outboard part 32B thereof is closed by the end plate 40. It is to be noted that the side sill outer portion 28 is provided with an attachment flange 28C for end plate welding, where the attachment flange 28C is formed by bending a rear end edge of the side sill outer portion 28 toward the inside of the vehicle body by about 90 degrees.

[0036]

Next, description will be made of the end plate 40 and a mounting structure therefor. As shown in FIGS. 4 to 6, the end plate 40 is a press-formed article and

includes a main surface section 40A, which extends along a plane separating the vehicle body into front and rear sides and, when in contact with a rear edge 30C of the side sill reinforcement member 30, has the same shape as that of the outboard part 32B of the opening 32 and substantially closes the outboard part 32B, an inner attachment flange 40B formed by bending a vehicle-widthwise inner edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, a bent part 40C formed by bending a vehicle-widthwise outer edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, an outer attachment flange 40D formed by further bending the end portion of the bent part 40C in the inward direction of the vehicle body by about 90 degrees, and a bent part 40E connecting between the inner attachment flange 40B and the bent part 40C at a bottom portion. The main surface section 40A is provided with a through-hole 40G through which anti-rust wax is introduced into an interior of the side sill.

[0037]

The end plate 40 is realized as a highly rigid component owing to the features that the main surface section 40A includes portions offset in the fore-and-aft direction of the vehicle body, that the end plate 40 has many bending ridge lines, and that the end plate 40 assumes a box-like shape resulting from the inner attachment flange 40B and the bent part 40C connected by the bent part 40E.

[0038]

The end plate 40 is attached to the side plate portion 10D of the side sill inner member 10, with the inner attachment flange 40B overlapping the side plate portion 10D. The inner attachment flange 40B is also attached to an outboard side surface of the rear frame 12. The end plate 40 is further attached to the attachment flange 28C of the side sill outer portion 28, with the outer attachment flange 40D overlapping the

rearward facing surface of the attachment flange 28C.

[0039]

As shown in FIGS. 8 and 9, the end plate 40 is configured such that the top edge of the main surface section 40A has a difference in vertical level between a vehicle-widthwise inner top edge portion 41A and a vehicle-widthwise outer top edge portion 41B. The top edge in the vehicle-widthwise inner top edge portion 41A is located higher than in the vehicle-widthwise outer top edge portion 41B, and the lower end part 18B defining a depth of the recess 18A of the rear wheel housing member 18 and extending in the vehicle width direction at a front part of the rear wheel housing member 18 is lap-welded to the rearward facing surface of the top edge portion 41A. The lower end part 24C of the rear inner panel 24 extending in the vehicle width direction and projecting more downward than the lower end part 18B of the recess 18A is lap-welded to the forward facing surface of the vehicle-widthwise outer top edge portion 41B of the end plate 40. Thereby, the end plate 40 is continuously connected with the part defining the depth of the recess 18A of the rear wheel housing member 18 and with the rear wheel housing portion 22, and forms a part of a front portion of the rear wheel housing portion 22. It is to be noted that the lower end part 18B of the recess 18A and the lower end part 24C of the rear inner panel 24 are offset in position in the fore-and-aft direction of the vehicle body by the thickness of the end plate 40.

[0040]

Since the connection of the end plate 40 with the rear wheel housing member 18 and the rear inner panel 24 in the rear wheel housing portion 22 is made with the rear wheel housing member 18 and the rear inner panel 24 interposing the end plate 40 therebetween in the fore-and-aft direction, the end plate 40 is united more firmly with the attachment structure of the rear wheel housing member 18 and the rear inner panel

CLAIMS

1. A vehicle body side structure, comprising:

a side sill inner member extending in a fore-and-aft direction of a vehicle body;

a side outer panel including a side sill outer portion that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member in a vehicle width direction and is attached to the side sill inner member by welding to form a closed cross section jointly with the side sill inner member;

a side sill reinforcement member extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member and the side sill outer portion, the side sill reinforcement member being attached to the side sill inner member and the side sill outer portion by welding;

a rear frame attached to a rear end part of the side sill inner member by welding and extending in the fore-and-aft direction of the vehicle body; and

an end plate disposed to close a rear opening of the closed cross section portion formed by the side sill inner member and the side sill outer portion and to abut a rear edge of the side sill reinforcement member, the end plate being attached to the side sill inner member and the side sill outer portion by welding,

wherein the end plate is also secured to a rear end part of the side sill reinforcement member by bolting.

2. The vehicle body side structure according to claim 1, wherein:

the side sill reinforcement member includes a U-shaped channel-like portion and a pair of attachment flanges respectively provided at upper and lower edges of the channel-like portion to serve as welding margins for attachment to the side sill inner member and the side sill outer portion, such that the side sill reinforcement member has

a hat-shaped cross section, the side sill reinforcement member further including three bolting flanges formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion, respectively; and

the end plate is secured to the side sill reinforcement member by being bolted to each of the three bolting flanges.

3. The vehicle body side structure according to claim 1 or 2, wherein the end plate comprises:

a main surface section that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member, and is bolted to the rear end part of the side sill reinforcement member;

an outer attachment flange formed by bending a vehicle widthwise outer edge portion of the main surface section and attached to the side sill outer portion by welding; and

an inner attachment flange formed by bending a vehicle widthwise inner edge portion of the main surface section and attached to the side sill inner member by welding.

4. The vehicle body side structure according to claim 3, wherein the end plate is also attached to the rear frame by welding by use of the inner attachment flange.

5. The vehicle body side structure according to claim 3 or 4, further comprising:

a rear wheel housing member formed with a semicircular recess that is concave inward in the vehicle width direction, and attached to the rear frame by welding; and

a rear inner panel attached to a vehicle-widthwise outer side of the rear wheel

housing member and defining a rear wheel housing portion having a predetermined depth jointly with the recess,

wherein the end plate is configured such that a top edge of the main surface section has a difference in vertical level between a vehicle-widthwise inner portion and a vehicle-widthwise outer portion, and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion is lap-welded to a lower end part of the recess of the rear wheel housing member, while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion is lap-welded to a lower end part of the rear inner panel.

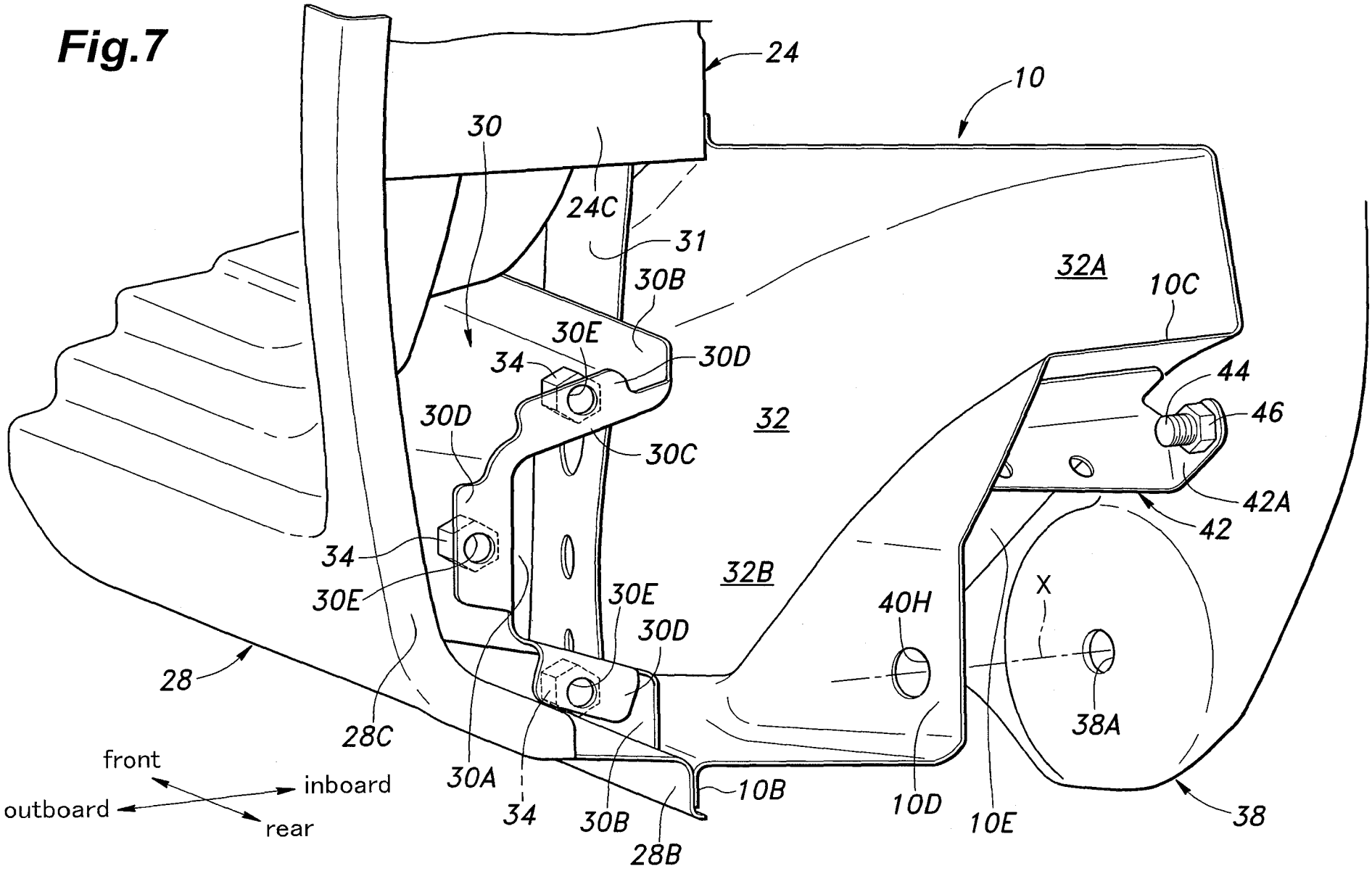
6. The vehicle body side structure according to claim 5, wherein at least one of bolts that secure the end plate to the side sill reinforcement member also secures a rear strake, which is suspended from the vehicle body at a front side of the rear wheel housing portion to block wind caused by traveling of a vehicle.

7. The vehicle body side structure according to any one of claims 3 to 6, wherein the rear end part of the side sill inner member includes a part serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange of the end plate is lap-welded to the part of the side sill inner member serving as the one of the support portions.

Dated this 23 April 2014

(Anand Barnabas)
Reg. No.IN/PA - 974
Of De Penning & De

Fig.7


24
10
30
24C
31
32A
10C
30B
30E
30D
34
44
46
30D
32
30C
42A
42
34
30E
32B
30E
40H
X
30D
28
28C
38A
front
inboard
outboard
rear
30A
34
30B
28B
10B
10D
10E
38

A vehicle body side structure according to the present invention includes: a side sill inner member (10) extending in a fore-and-aft direction of a vehicle body; a side outer panel (26) including a side sill outer portion (28) that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member (10) in a vehicle width direction and is attached to the side sill inner member (10) by welding to form a closed cross section jointly with the side sill inner member (10); a side sill reinforcement member (30) extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28), the side sill reinforcement member (30) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding; a rear frame (12) attached to a rear end part of the side sill inner member (10) by welding and extending in the fore-and-aft direction of the vehicle body; and an end plate (40) disposed to close a rear opening of the closed cross section portion formed by the side sill inner member (10) and the side sill outer portion (28) and to abut a rear edge of the side sill reinforcement member (30), the end plate (40) being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, wherein the end plate (40) is further secured to a rear end part of the side sill reinforcement member (30) by bolting (34, 36).

[0008]

According to this structure, the end plate (40) is secured to the side sill reinforcement member (30) in addition to being attached to the side sill inner member (10) and the side sill outer portion (28) by welding, whereby the bonding strength between these vehicle body components is improved, and particularly, sufficient rigidity of the side sill rear end part is achieved. This also enables efficient transmission of collision load between the side sill, which includes the side sill reinforcement member

(30) in addition to the side sill inner member (10) and the side sill outer portion (28), and the rear frame (12), whereby even if a large collision load is applied, deformation of the side sill and / or the rear frame (12) can be avoided.

[0009]

Further, since the end plate (40) and the side sill reinforcement member (30) are joined to each other by bolting instead of welding, it is possible to eliminate the need for MIG welding, and thus, the work environment can be improved and the productivity of the line can be increased.

[0010]

In the vehicle body side structure according to the present invention, preferably, the side sill reinforcement member (30) includes a U-shaped channel-like portion (30A) and a pair of attachment flanges (30B) respectively provided at upper and lower edges of the channel-like portion (30A) to serve as welding margins for attachment to the side sill inner member (10) and the side sill outer portion (28), such that the side sill reinforcement member (30) has a hat-shaped cross section, the side sill reinforcement member (30) further including three bolting flanges (30D) formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion (30A), respectively, and the end plate (40) is secured to the side sill reinforcement member (30) by being bolted to each of the three bolting flanges (30D).

[0011]

According to this structure, the end plate (40) is bolted to each of the bolting flanges (30D) that are formed on three sides of the channel-like portion (30A) of the side sill reinforcement member (30), and thus, a necessary bonding strength between the end plate (40) and the side sill reinforcement member (30) can be achieved easily.

[0012]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) includes: a main surface section (40A) that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member (30), and is bolted to the rear end part of the side sill reinforcement member (30); an outer attachment flange (40D) formed by bending a vehicle widthwise outer edge portion of the main surface section (40A) and attached to the side sill outer portion (28) by welding; and an inner attachment flange (40B) formed by bending a vehicle widthwise inner edge portion of the main surface section (40A) and attached to the side sill inner member (10) by welding.

[0013]

According to this structure, the end plate (40) is appropriately attached to the side sill inner member (10) and the side sill outer portion (28) by welding by use of the inner attachment flange (40B) and the outer attachment flange (40D), where the inner attachment flange (40B) and the outer attachment flange (40D) are each formed to be bent relative to the main surface section (40A), whereby the end plate (40) itself has a high rigidity.

[0014]

In the vehicle body side structure according to the present invention, preferably, the end plate (40) is also attached to the rear frame (12) by welding by use of the inner attachment flange (40B).

[0015]

According to this structure, the bonding strength between the vehicle body components in the side sill rear end part is further increased, and sufficient rigidity is obtained.

[0016]

Preferably, the vehicle body side structure according to the present invention further includes: a rear wheel housing member (18) formed with a semicircular recess (18A) that is concave inward in the vehicle width direction, and attached to the rear frame (12) by welding; and a rear inner panel (24) attached to a vehicle-widthwise outer side of the rear wheel housing member (18) and defining a rear wheel housing portion (22) having a predetermined depth jointly with the recess (18A), wherein the end plate (40) is configured such that a top edge of the main surface section (40A) has a difference in vertical level between a vehicle-widthwise inner portion (41A) and a vehicle-widthwise outer portion (41B), and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion (41A) is lap-welded to a lower end part (18B) of the recess (18A) of the rear wheel housing member (18), while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion (41B) is lap-welded to a lower end part of the rear inner panel (24).

[0017]

According to this structure, because the connection of the end plate (40) with the rear inner panel (24) and the rear wheel housing member (18) in the rear wheel housing portion (22) is made with the rear inner panel (24) and the rear wheel housing member (18) interposing the end plate (40) therebetween in the fore-and-aft direction, the end plate (40) is united more firmly with the attachment structure of the rear inner panel (24) and the rear wheel housing member (18), and the bonding strength between these vehicle body components is improved.

[0018]

In the vehicle body side structure according to the present invention, preferably, at least one of bolts (36) that secure the end plate (40) to the side sill reinforcement member (30) also secures a rear strake (48), which is suspended from the vehicle body

at a front side of the rear wheel housing portion (22) to block wind caused by traveling of a vehicle.

[0019]

According to this structure, it is possible to reduce the number of bolts for mounting the rear strake (48) to the vehicle body.

[0020]

In the vehicle body side structure according to the present invention, preferably, the rear end part of the side sill inner member (10) includes a part (10D) serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange (40B) of the end plate (40) is lap-welded to the part (10D) of the side sill inner member (10) serving as the one of the support portions.

[0021]

According to this structure, the inner attachment flange (40B) of the end plate (40) is lap-welded to the outboard surface of the part (10D) of the side sill inner member (10) serving as one of the support portions of the trailing arm bracket, thereby reinforcing this part (10D) of the side sill inner member (10).

EFFECT OF THE INVENTION

[0022]

According to the present invention, it is possible to eliminate the need for performing MIG welding in mounting of the end plate, thereby improving the productivity of the line, and to increase the bonding strength between components of the vehicle body side structure, thereby improving the impact absorbing ability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 is a perspective view of a sub-assembly of a vehicle body rear portion

side sill reinforcement member 30. Thereby, as shown in FIG. 3, the side outer panel 26 can be treated as a sub-assembly (sub-assy) including the side sill reinforcement member 30 and jack-up plate 31 attached thereto.

[0034]

As shown in FIG. 10, the side sill is formed by interposing the upper and lower attachment flanges 30B of the side sill reinforcement member 30 between the upper and lower attachment flanges 10B of the side sill inner member 10 and the upper and lower attachment flanges 28B of the side sill outer portion 28, respectively, and attaching together these attachment flanges. Thereby, the side sill inner member 10 and the side sill outer portion 28 form a tubular body having a closed cross section, and the side sill reinforcement member 30 extends in the fore-and-aft direction of the vehicle body inside this closed cross section portion.

[0035]

The closed cross section portion formed by the side sill inner member 10 and the side sill outer portion 28, or the tubular body formed by the side sill inner member 10 and the side sill outer portion 28, defines an opening 32 (see FIG. 7) that opens toward the rear of the vehicle body. An inboard part 32A of the opening 32 is closed by the rear frame 12 attached to the side sill inner member 10, and a remaining outboard part 32B thereof is closed by the end plate 40. It is to be noted that the side sill outer portion 28 is provided with an attachment flange 28C for end plate welding, where the attachment flange 28C is formed by bending a rear end edge of the side sill outer portion 28 toward the inside of the vehicle body by about 90 degrees.

[0036]

Next, description will be made of the end plate 40 and a mounting structure therefor. As shown in FIGS. 4 to 6, the end plate 40 is a press-formed article and

includes a main surface section 40A, which extends along a plane separating the vehicle body into front and rear sides and, when in contact with a rear edge 30C of the side sill reinforcement member 30, has the same shape as that of the outboard part 32B of the opening 32 and substantially closes the outboard part 32B, an inner attachment flange 40B formed by bending a vehicle-widthwise inner edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, a bent part 40C formed by bending a vehicle-widthwise outer edge portion of the main surface section 40A in the rearward direction of the vehicle body by about 90 degrees, an outer attachment flange 40D formed by further bending the end portion of the bent part 40C in the inward direction of the vehicle body by about 90 degrees, and a bent part 40E connecting between the inner attachment flange 40B and the bent part 40C at a bottom portion. The main surface section 40A is provided with a through-hole 40G through which anti-rust wax is introduced into an interior of the side sill.

[0037]

The end plate 40 is realized as a highly rigid component owing to the features that the main surface section 40A includes portions offset in the fore-and-aft direction of the vehicle body, that the end plate 40 has many bending ridge lines, and that the end plate 40 assumes a box-like shape resulting from the inner attachment flange 40B and the bent part 40C connected by the bent part 40E.

[0038]

The end plate 40 is attached to the side plate portion 10D of the side sill inner member 10, with the inner attachment flange 40B overlapping the side plate portion 10D. The inner attachment flange 40B is also attached to an outboard side surface of the rear frame 12. The end plate 40 is further attached to the attachment flange 28C of the side sill outer portion 28, with the outer attachment flange 40D overlapping the

rearward facing surface of the attachment flange 28C.

[0039]

As shown in FIGS. 8 and 9, the end plate 40 is configured such that the top edge of the main surface section 40A has a difference in vertical level between a vehicle-widthwise inner top edge portion 41A and a vehicle-widthwise outer top edge portion 41B. The top edge in the vehicle-widthwise inner top edge portion 41A is located higher than in the vehicle-widthwise outer top edge portion 41B, and the lower end part 18B defining a depth of the recess 18A of the rear wheel housing member 18 and extending in the vehicle width direction at a front part of the rear wheel housing member 18 is lap-welded to the rearward facing surface of the top edge portion 41A. The lower end part 24C of the rear inner panel 24 extending in the vehicle width direction and projecting more downward than the lower end part 18B of the recess 18A is lap-welded to the forward facing surface of the vehicle-widthwise outer top edge portion 41B of the end plate 40. Thereby, the end plate 40 is continuously connected with the part defining the depth of the recess 18A of the rear wheel housing member 18 and with the rear wheel housing portion 22, and forms a part of a front portion of the rear wheel housing portion 22. It is to be noted that the lower end part 18B of the recess 18A and the lower end part 24C of the rear inner panel 24 are offset in position in the fore-and-aft direction of the vehicle body by the thickness of the end plate 40.

[0040]

Since the connection of the end plate 40 with the rear wheel housing member 18 and the rear inner panel 24 in the rear wheel housing portion 22 is made with the rear wheel housing member 18 and the rear inner panel 24 interposing the end plate 40 therebetween in the fore-and-aft direction, the end plate 40 is united more firmly with the attachment structure of the rear wheel housing member 18 and the rear inner panel

CLAIMS

1. A vehicle body side structure, comprising:

a side sill inner member extending in a fore-and-aft direction of a vehicle body;

a side outer panel including a side sill outer portion that extends in the fore-and-aft direction of the vehicle body at a position outside the side sill inner member in a vehicle width direction and is attached to the side sill inner member by welding to form a closed cross section jointly with the side sill inner member;

a side sill reinforcement member extending in the fore-and-aft direction of the vehicle body in an interior of a closed cross section portion formed by the side sill inner member and the side sill outer portion, the side sill reinforcement member being attached to the side sill inner member and the side sill outer portion by welding;

a rear frame attached to a rear end part of the side sill inner member by welding and extending in the fore-and-aft direction of the vehicle body; and

an end plate disposed to close a rear opening of the closed cross section portion formed by the side sill inner member and the side sill outer portion and to abut a rear edge of the side sill reinforcement member, the end plate being attached to the side sill inner member and the side sill outer portion by welding,

wherein the end plate is also secured to a rear end part of the side sill reinforcement member by bolting.

2. The vehicle body side structure according to claim 1, wherein:

the side sill reinforcement member includes a U-shaped channel-like portion and a pair of attachment flanges respectively provided at upper and lower edges of the channel-like portion to serve as welding margins for attachment to the side sill inner member and the side sill outer portion, such that the side sill reinforcement member has

a hat-shaped cross section, the side sill reinforcement member further including three bolting flanges formed by bending rear end parts of a bottom wall, upper side wall and lower side wall of the channel-like portion, respectively; and

the end plate is secured to the side sill reinforcement member by being bolted to each of the three bolting flanges.

3. The vehicle body side structure according to claim 1 or 2, wherein the end plate comprises:

a main surface section that extends along a plane separating the vehicle body into front and rear sides, abuts the rear edge of the side sill reinforcement member, and is bolted to the rear end part of the side sill reinforcement member;

an outer attachment flange formed by bending a vehicle widthwise outer edge portion of the main surface section and attached to the side sill outer portion by welding; and

an inner attachment flange formed by bending a vehicle widthwise inner edge portion of the main surface section and attached to the side sill inner member by welding.

4. The vehicle body side structure according to claim 3, wherein the end plate is also attached to the rear frame by welding by use of the inner attachment flange.

5. The vehicle body side structure according to claim 3 or 4, further comprising:

a rear wheel housing member formed with a semicircular recess that is concave inward in the vehicle width direction, and attached to the rear frame by welding; and

a rear inner panel attached to a vehicle-widthwise outer side of the rear wheel

housing member and defining a rear wheel housing portion having a predetermined depth jointly with the recess,

wherein the end plate is configured such that a top edge of the main surface section has a difference in vertical level between a vehicle-widthwise inner portion and a vehicle-widthwise outer portion, and wherein one of a forward facing surface and a rearward facing surface of the end plate in the vehicle-widthwise inner portion is lap-welded to a lower end part of the recess of the rear wheel housing member, while the other of the forward facing surface and the rearward facing surface of the end plate in the vehicle-widthwise outer portion is lap-welded to a lower end part of the rear inner panel.

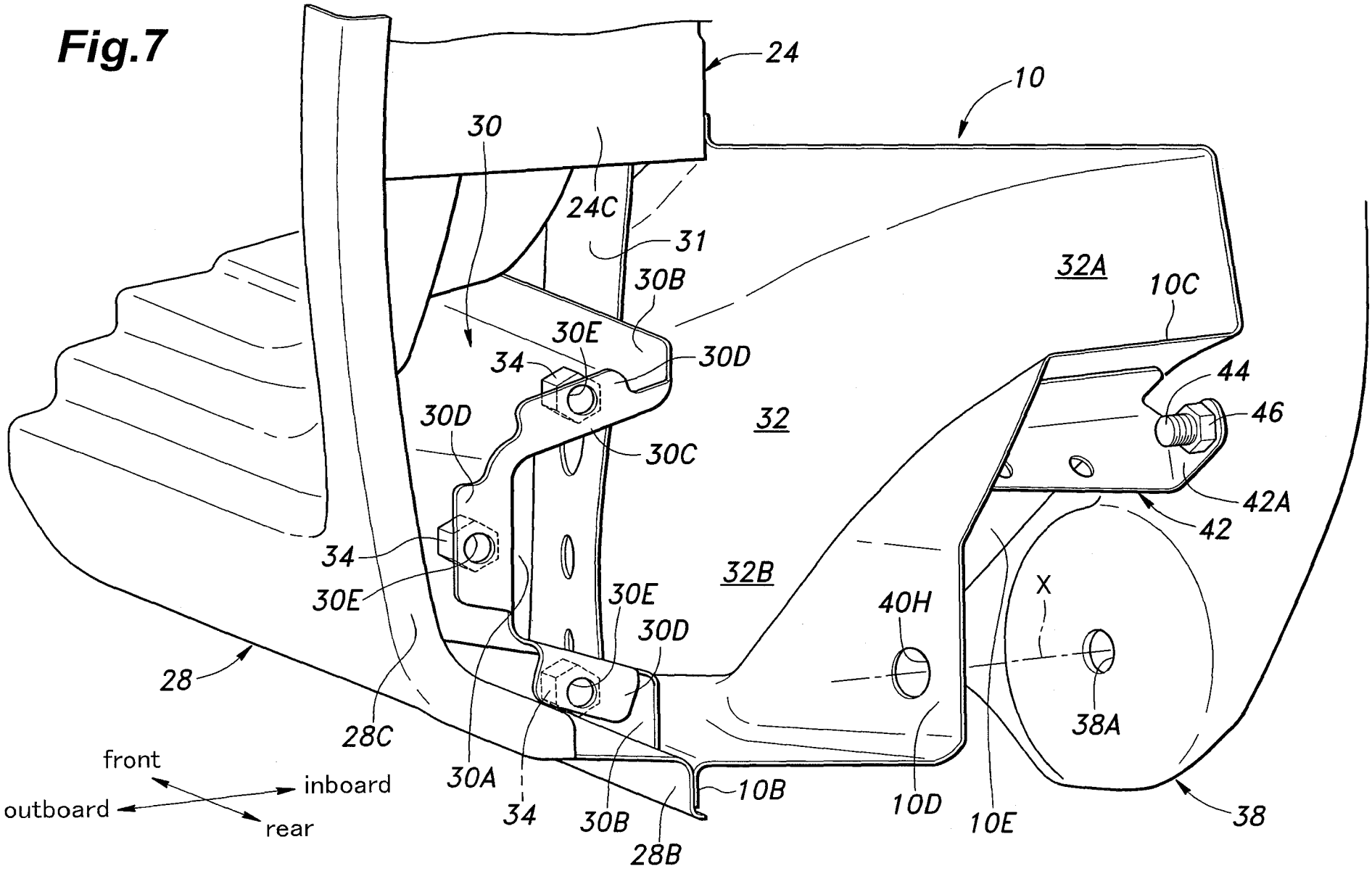
6. The vehicle body side structure according to claim 5, wherein at least one of bolts that secure the end plate to the side sill reinforcement member also secures a rear strake, which is suspended from the vehicle body at a front side of the rear wheel housing portion to block wind caused by traveling of a vehicle.

7. The vehicle body side structure according to any one of claims 3 to 6, wherein the rear end part of the side sill inner member includes a part serving as one of support portions of a trailing arm bracket that supports a support shaft of a trailing arm of a rear wheel suspension mechanism at two axial positions, and the inner attachment flange of the end plate is lap-welded to the part of the side sill inner member serving as the one of the support portions.

Dated this 23 April 2014

(Anand Barnabas)
Reg. No.IN/PA - 974
Of De Penning & De

Fig.7


24
10
30
24C
31
32A
10C
30B
30E
30D
34
44
46
30D
32
30C
42A
42
34
30E
32B
30E
40H
X
30D
28
28C
38A
front
inboard
outboard
rear
30A
34
30B
28B
10B
10D
10E
38