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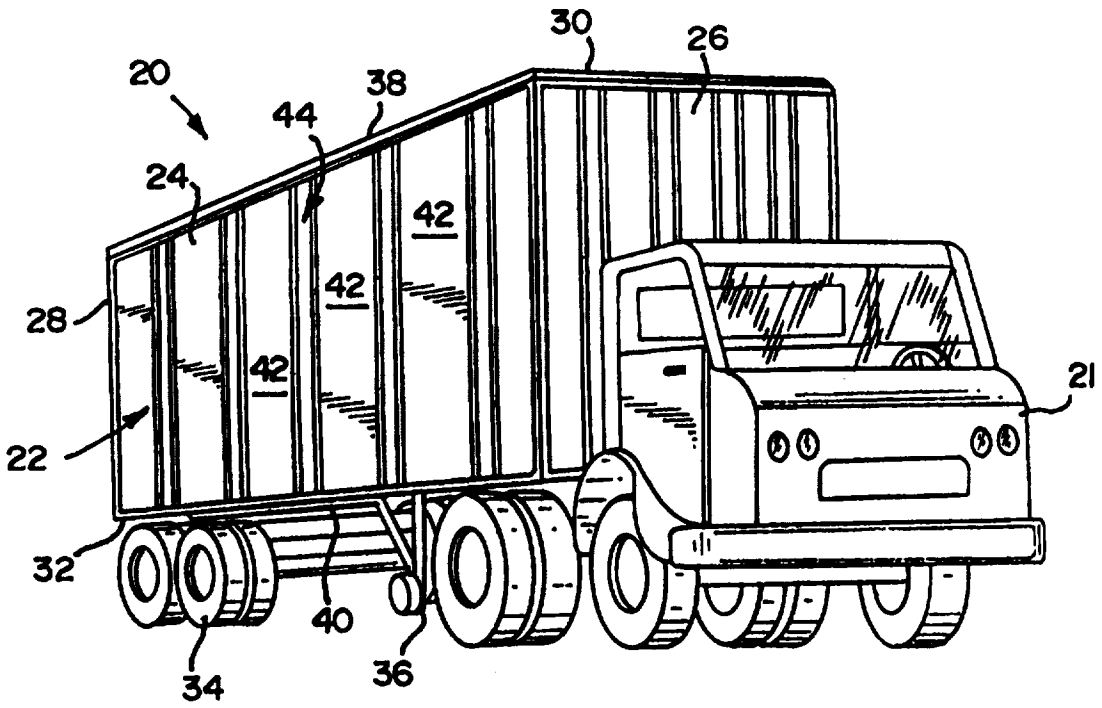
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(57) Abstract

A sidewall (24) of a trailer (20) is formed from at least two composite panels (42) joined together by a novel joining configuration. Each panel is formed from inner (48) and outer (50) thin metal skins and a plastic core (46) sandwiched between the skins. In some embodiments, one or two ends of the panels are of reduced thickness and either inserted into an adjoining panel end, or joined together via a splicing plate (152). In other embodiments, an insert member (452) is used to join the adjoining plates.

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COMPOSITE JOINT CONFIGURATION

BACKGROUND OF THE INVENTION

This invention is generally directed to a novel sidewall for a trailer body. More particularly, the invention relates to joined composite panels for trailer bodies, wherein each composite panel includes a plastic core member sandwiched between thin metal skins and joined together by novel joints.

Trailers of the general type disclosed herein include a variety of types of sidewalls. A typical well-known construction is a panel-type trailer which includes aluminum side posts. Generally, it is desirable to have a relatively thin trailer sidewall so that the total inside dimensions of the trailer body can be increased to carry the optimum amount of cargo. In addition, it is

desirable to have a trailer sidewall which is lightweight.

OBJECTS AND SUMMARY OF THE INVENTION

A general object of the present invention is to provide a novel joint configuration for joining a pair of composite panels together in a trailer sidewall, wherein a plurality of such joined panels may be used to form the trailer sidewall.

An object of the present invention is to provide a novel sidewall for use in a trailer body, which sidewall is simple in design and economical to manufacture while at the same time providing maximum interior space in the trailer body.

Another object of the present invention is to provide a novel sidewall having a plurality of joined composite panels, wherein each composite panel includes a plastic core member sandwiched between thin metal skins.

These and other objects and features of the present invention will become more apparent from a reading of the following descriptions.

Briefly, and in accordance with the foregoing, the present invention discloses a sidewall of a trailer which is formed from at least two composite panels joined together by a novel joining configuration. Each panel is formed from inner and outer thin metal skins and a plastic core sandwiched between the skins. In several

embodiments, at least one of the skins has at least one end coined to as to compress the core between the skins to define a coined end section. A logistics plate and a splicing member are used to join the panels together and are secured thereto by rivets. The logistics plate and/or the splicing member sit against the coined end sections. In other embodiments, a logistics plate member is secured by rivets to the panels for joining them together. The splicing member is eliminated and instead, the outer skin of at least one panel is extended to lie behind the logistics plate. In yet other embodiments, one end of each panel has a thickness which is less than the other end of the panel. The skins at the greater thickness end of the panel freely project beyond an end of the core member. The lesser thickness end is inserted between the skins of the other panel at the greater thickness end and secured thereto by rivets. To form the lesser thickness, the end of the panel may be coined or the panel may taper from one end to the other end. An insert member, made of hard plastic or metal, may be used between the skins where the rivet is inserted in any of the embodiments to substantially prevent compression of the panels.

BRIEF DESCRIPTION OF THE DRAWINGS

The organization and manner of the structure and operation of the invention, together with further objects

and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, wherein like reference numerals identify like elements in which:

FIGURE 1 is a perspective view of a trailer having a plurality of joined panels forming the sidewalls of the trailer which incorporates the features of the invention, with the trailer connected to a tractor;

FIGURE 2 is a perspective view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a first embodiment of the invention;

FIGURE 3 is a perspective view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a second embodiment of the invention;

FIGURE 4 is a perspective view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a third embodiment of the invention;

FIGURE 5 is a perspective view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a fourth embodiment of the invention;

FIGURE 6 is a cross-sectional view of the joined panels shown in FIGURE 5 along line 6-6;

FIGURE 7 is a cross-sectional view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a

fifth embodiment of the invention;

FIGURE 8 is a perspective view of a pair of joined panels used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a sixth embodiment of the invention;

FIGURE 9 is a cross-sectional view of the joined panels shown in FIGURE 8 along line 9-9;

FIGURE 10 is a cross-sectional view of a panel used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a seventh embodiment of the invention;

FIGURE 11 is a cross-sectional view of a pair of panels shown in FIGURE 10 joined together, for use in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of the seventh embodiment of the invention;

FIGURE 12 is a cross-sectional view of a panel used in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of a eighth embodiment of the invention; and

FIGURE 13 is a cross-sectional view of a pair of panels shown in FIGURE 12 joined together, for use in forming a sidewall of the trailer shown in FIGURE 1 which incorporates the features of the eighth embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

While the invention may be susceptible to embodiment in different forms, there is shown in the drawings, and herein will be described in detail, specific embodiments with the understanding that the present disclosure is to be considered an exemplification of the principles of the invention, and is not intended to limit the invention to that as illustrated and described herein.

Turning now to the drawings, a trailer 20 constructed in accordance with the present invention is shown in FIGURE 1 connected to a tractor 21 by conventional means, such as a fifth wheel assembly. The trailer 20 includes a body 22 formed from a pair of rectangular sidewalls 24, a front wall 26, rear doors 28, a top panel or roof 30 and a floor 32. The floor 32 is supported by a conventional rear undercarriage assembly 34 and has a landing gear 36 secured thereunder. The top panel 30 and an upper portion of the sidewalls 22 are secured to a top rail 38 and the floor 32 and lower portion of the sidewalls 22 are secured to a bottom rail 40.

Each sidewall 22 includes a plurality of vertical upstanding composite side panels 42 joined together by a novel joint configuration 44. Each composite side panel 42 includes a plastic core member 46 sandwiched between an inner thin metal skin 48 and an outer thin metal skin 50 and bonded thereto by a suitable known adhesive or other like means. One advantage the composite panel 42

used in the present invention is that it can be coined or stepped down easily by applying pressure to the area to be coined or stepped down, whereas in the prior art aluminum sidewalls, the aluminum sidewall could not be easily coined.

The inner skin 48 and the outer skin 50 are preferably approximately 0.026 inches thick. The skins 48, 50 are preferably made of aluminum; galvanized, full hardened steel, such as AISI Grade E full hard steel because of its cost effectiveness, or the like. Preferably, the outer skin 50 is made of ASTM G90 galvanized steel and the inner skin 48 is made of ASTM G60 galvanized steel. Aluminum may be used, but it may be too soft for some purposes and strength and punch resistance are sacrificed, however, aluminum is lightweight. Typically, each panel 42 is four feet in width, but can be longer or shorter depending on the application. At least two panels 42a, 42b are joined together by the novel joint configuration 44 to form the sidewall 24 of the trailer body 22.

Each core member 46 is made of some type of compressible non-metal material, preferably thermoplastic, such as polypropylene or high density polyethylene. These materials are relatively inexpensive as compared to aluminum found in prior trailer wall constructions. In addition, because a composite panel 42 is used, the weight of the trailer construction is reduced over trailers having aluminum sidewalls.

Attention is now directed to the various embodiments

of the novel joint configuration 44 used in forming the trailer sidewalls 24 as shown in FIGURES 2-13. A first embodiment of the joint configuration 144 is shown in FIGURE 2. A second embodiment of the joint configuration 244 is shown in FIGURE 3; a third embodiment of the joint configuration 344 is shown in FIGURE 4; a fourth embodiment of the joint configuration 444 is shown in FIGURES 5 and 6; a fifth embodiment of the joint configuration 544 is shown in FIGURE 7; a sixth embodiment of the joint configuration 644 is shown in FIGURES 8 and 9; a seventh embodiment of the joint configuration 744 is shown in FIGURE 10; and a eighth embodiment of the joint configuration 144 is shown in FIGURE 13. Like elements are denoted with like reference numerals with the first embodiment being in the one hundreds, the second embodiment being in the two hundreds, the third embodiment being in the three hundreds, the fourth embodiment being in the four hundreds, the fifth embodiment being in the five hundreds, the sixth embodiment being in the six hundreds, the seventh embodiment being in the seven hundreds and the eighth embodiment being in the eight hundreds. As shown in the drawings, only a portion of two joined panels 142a, 142b; 242a, 242b; 342a, 342b; 442a, 442b; 542a, 542b; 642a, 642b; 742a, 742b; 842a, 842b are shown. It is to be understood that a plurality of panels may be used to form each sidewall 124, 224, 324, 424, 524, 624, 724, 824. In addition, the novel joint 144, 24, 344, 444, 544, 644, 744, 844 is only shown between one end of

the two panels 142a, 142b; 242a, 242b; 342a, 342b; 442a, 442b; 542a, 542b; 642a, 642b; 742a, 742b; 842a, 842b. It is to be understood that a like joint is provided between each adjacent end of each panel used to form the trailer sidewall.

Directing attention to the first embodiment of the novel joint configuration 144 shown in FIGURE 2, first and second composite panels 142a, 142b are shown and are joined together by a logistics plate 152 on the inside of the trailer 20 which extends along the entire height of the panels 142a, 142b and by a splicing member 154 on the outside of the trailer 20 which extends along the entire height of the panels 142a, 142b. The ends 156a, 156b of the panels 142a, 142b are spaced apart from each other when joined by the logistics plate 152 and the splicing member 154 such that an air pocket 158 is formed between the logistics plate 152 and the splicing member 154.

Each end of the inner skins 148a, 148b of each panel 142a, 142b have an end section 160a, 160b (only one of which is shown on each panel 142a, 142b) which is coined or stepped down with an intermediate section 161a, 161b of each panel 142a, 142b remaining planar. The outer skin 150a, 150b of the panels 142a, 142b is not coined and remains planar. When the end section 160a, 160b of each inner skin 148a, 148b is coined, the core member 146a, 146b is squeezed or compressed between the inner and outer skins 148a, 150a; 148b, 150b and the core member 146a, 146b may slightly extrude outwardly from the ends of the skins 148a, 150a; 148b, 150b and into the air

pocket 158 formed between the panels 142a, 142b.

The logistics plate 152 is a flat member having an inner surface and an outer surface and which has a plurality of spaced openings or slots 162 therethrough along an intermediate portion of the logistics plate 152. The slots 162 provide a means for which equipment can be engaged, for example by a clip, to the sidewall 24 of the trailer 20. The logistics plate 152 is preferably formed from a heavier and stronger material than the material that is used for the skins 148a, 150a; 148b, 150b to provide the sidewall with strength and rigidity. When the logistics plate 152 is joined with the inner skins 148a, 148b of the panels 142a, 142b, the outer surface of the logistics plate 152 sits against the inner surfaces of the inner end sections 160a, 160b such that the inner surface of the logistics plate 152 is flush with the inner surfaces of the intermediate sections 161a, 161b of the inner skins 148a, 148b to provide a co-planar surface along the length of the sidewall 24 in the interior of the trailer 20. Because the ends of the logistics plate 152 are flush with the intermediate sections 161a, 161b of the inner skins 148a, 148b, snagging of cargo on the edges of the logistics plate 152 is substantially prevented. The logistics plate 152 bridges the gap between the panels 142a, 142b such that the slots 162 align with the air pocket 158 so that clips can be engaged with the slots 162.

The splicing member 154, which is like a post, is attached to the outer surface of the outer skins 150a,

150b and extends to clear the top and bottom rails 38, 40 of the trailer 20. The splicing member 154 has flat end portions 164 which lie against the outer surfaces of the outer skins 150a, 150b and an intermediate portion 166 which bulges outwardly from the end portions 164. When the splicing member 154 is joined with the outer surfaces of the outer skins 150a, 150b of the panels 142a, 142b, the inner surfaces of the end portions 164 lie against the planar outer skins 150a, 150b and the intermediate portion 166 bulges outwardly from the sidewall. The splicing member 154 bridges the gap formed between the panels 142a, 142b such that the bulging intermediate portion 166 aligns with the air pocket 158. Because the bulge is provided on the outside of the trailer 20, a smooth inner surface is provided within the trailer 20. This allows for more width within the inside of the trailer 20 to load freight therein.

The logistics plate 152 and splicing member 154 are attached to the first and second panels 142a, 142b by suitable means, such as rivets 168, which extend through the logistics plate 152, the respective coined sections 160a, 160b of the panels 142a, 142b and the end portions 164 of the splicing member 154. The splicing member 154 seals the junction between the panels 142a, 142b on the exterior of the trailer 20 so as to seal the interior from moisture.

Attention is now directed to the second embodiment of the novel joint configuration 244 shown in FIGURE 3. In this embodiment, first and second composite panels

242a, 242b are joined together by a logistics plate 252 on the inside of the trailer 20 which extends along the entire height of the panels 242a, 242b and by a splicing member 254 on the outside of the trailer 20 which extends along the entire height of the panels 242a, 242b. The ends 256a, 256b of the panels 242a, 242b are spaced apart from each other to provide a gap therebetween when joined by the logistics plate 252 and the splicing member 254 such that an air pocket 258 is formed between the logistics plate 252 and the splicing member 254.

Each end of the outer skins 250a, 250b of each panel 242a, 242b have an end section 263a, 263b (only one of which is shown on each panel 242a, 242b) which is coined or stepped down with an intermediate section 265a, 265b of each panel 242a, 242b remaining planar. The inner skin 248a, 248b of the panels 242a, 242b is not coined and remains planar. When the end section 263a, 263b of each outer skin 250a, 250b is coined, the core member 246a, 246b is squeezed or compressed between the skins 248a, 250a; 248b, 250b and the core member 246a, 246b may slightly extrude outwardly from the ends 256a, 256b of the panels 242a, 242b and into the air pocket 258.

The logistics plate 252 acts like a post and has end portions 270 which are flat and an intermediate portion 272 which bulges inwardly from the end portions 270. The bulging intermediate portion 272 has a plurality of spaced openings or slots 274 therethrough. The slots 274 provide a means for which equipment can be engaged, for example by a clip, to the trailer sidewall. The

logistics plate 252 is preferably formed from a heavier and stronger material than the material that is used for the skins 248a, 250a, 248b, 250b to provide the sidewall 24 with strength and rigidity. When the logistics plate 252 is joined with the inner skins 248a, 248b of the panels 242a, 242b, the outer surface of the end portions 270 sits against the inner surface of the inner skins 248a, 248b such that the intermediate portion 272 bulges to the inside of the trailer 20. The logistics plate 252 bridges the gap formed between the panels 242a, 242b such that the bulging intermediate portion 272 which has the slots 274 therethrough aligns with the gap.

The splicing member 254 is flat and extends to clear the top and bottom rails 38, 40 of the trailer 20. When the splicing member is joined with the outer skins 250a, 250b of the panels 242a, 242b, the inner surface of the splicing member 254 sits against the coined end sections 263a, 263b such that the outer surface of the splicing member 254 is flush with the outer surface of the respective intermediate sections 265a, 265b of the outer skins 250a, 250b to provide a co-planar surface along the length of the sidewall 24 on the outside of the trailer 20. The splicing member 254 bridges the gap formed between the panels 242a, 242b.

The logistics plate 252 and the splicing member 254 are attached to the respective first and second panels 242a, 242b by suitable means, such as rivets 268, through the end portions 270 of the logistics plate 252, the respective coined sections 263a, 263b of the panels 242a,

242b and the splicing member 254. The splicing member 254 seals the junction between the panels 242a, 242b on the exterior of the trailer 20 so as to seal the interior from moisture.

Directing attention to the third embodiment of the novel joint configuration 344 shown in FIGURE 4, first and second composite panels 342a, 342b are joined together by a logistics plate 352 on the inside of the trailer 20 which extends along the entire height of the panels 342a, 342b and by a splicing member 354 on the outside of the trailer 20 which extends along the entire height of the panels 342a, 342b. The ends 356a, 356b of the panels 342a, 342b are spaced apart from each other to provide a gap therebetween when joined by the logistics plate 352 and the splicing member 354 such that an air pocket 358 is formed between the logistics plate 352 and the splicing member 354.

Each end of the inner skins 348a, 348b of each panel 342a, 342b has an end section 360a, 360b (only one of which is shown on each panel 342a, 342b) which is coined or stepped down with an intermediate section 361a, 361b of each panel 342a, 342b remaining planar. Each end of the outer skins 350a, 350b of each panel 342a, 342b have an end section 363a, 363b (only one of which is shown on each panel 342a, 342b) which is coined or stepped down with an intermediate section 365a, 365b of each panel 342a, 342b remaining planar. When the end sections 360a, 363a; 360b, 363b are coined, the respective core members 346a, 346b are squeezed or compressed between the skins

348a, 348b; 350a, 350b and may slightly extrude outwardly from the ends 356a, 356b of the panels 342a, 342b and into the air pocket 358.

The logistics plate 352 and the splicing member 354 are identical in construction to the second embodiment of the logistics plate 252 and the splicing member 254 shown and described with respect to FIGURE 3. Therefore, the specifics of the construction of the logistics plate 352 and the splicing member 354 are not repeated herein and instead, the reference numerals are denoted with like numerals and are shown in the drawings.

When the logistics plate 354 is joined with the inner skins 348a, 348b of the panels 342a, 342b, the outer surfaces of the flat end portions 370 sit against the inner surfaces of the respective coined end sections 360a, 360b such that the inner surfaces of the end portions 370 are flush with the inner surfaces of the intermediate sections 361a, 361b of the inner skins 348a, 348b and the intermediate portion 372 of the logistics plate 352 bulges to the inside of the trailer 20. The ends 356a, 356b of the panels 342a, 342b are spaced apart from each other. Because the inner surfaces of the end portions 370 are flush with the inner surfaces of the intermediate sections 361a, 361b of the skins 348a, 348b, snagging of cargo on the edges of the logistics plate 352 is substantially prevented. The logistics plate 352 bridges the gap formed between the panels 342a, 342b such that the bulging intermediate portion 372, which has the openings or slots 372 therein, aligns with the air pocket

358.

When the flat splicing member 354 is joined with the outer skins 350a, 350b of the panels 342a, 342b, the inner surface of the splicing member 354 sits against the outer surfaces of the coined end sections 363a, 363b such that the outer surface of the flat splicing member 354 is flush with the outer surfaces of the intermediate sections 365a, 365b of the outer skins 350a, 350b to provide a co-planar surface along the length of the sidewall 24 on the outside of the trailer 20. The splicing member 354 bridges the gap formed between the panels 342a, 342b.

The logistics plate 352 and the splicing member 354 are attached to the respective first and second panels 342a, 342b by suitable means, such as rivets 368, through the end portions 370 of the logistics plate 352, the coined portions of the panels 342a, 342b and the splicing member 354. The splicing member 354 seals the junction between the panels 342a, 342b on the exterior of the trailer 20 so as to seal the interior from moisture.

In the first, second and third embodiments of the novel composite joint constructions 144, 244, 344, to engage the rivets 168, 268, 368 with the logistics plate 152, 252, 353, the splicing member 154, 254, 354 and the respective first and second panels 142a, 142b; 242a, 242b; 342a, 342b, each rivet 168, 268, 368 is engaged by using the method and apparatus disclosed in co-pending United States Patent Application Serial No. 08/620,999 entitled "Method Of Punching A Composite Plate", which is

commonly owned by the assignee herein and which disclosure is herein incorporated by reference. Coining the ends of the panels 142a, 142b; 242a, 242b; 342a, 342b, as described herein, condenses the plastic core member 146a, 146b; 246a, 246b; 346a, 346b sufficiently to support clamping force or pressure from the rivets 168, 268, 368 without subsequent loosening. If desired, holes can be provided through the logistic panel 152, 252, 352 and the splicing member 154, 254, 354 through which the rivets 168, 268, 368 are engaged.

In addition, in the first, second and third embodiments of the composite joint configurations 144, 244, 344, it is envisioned that an insert, as discussed hereinbelow with respect to the fifth embodiment shown in FIGURE 7, can be provided in the construction of these embodiments of the trailer sidewalls.

Attention is now directed to the fourth embodiment of the novel joint configuration 444 shown in FIGURES 5 and 6. In this embodiment, first and second composite panels 442a, 442b are joined together by a logistics plate 452 on the inside of the trailer 20 which extends along the entire height of the panels 442a, 442b and the splicing member provided in the previous embodiments has been eliminated.

At one end of the first panel 442a, as shown in FIGURES 5 and 6, the outer skin 450a has a length that is substantially longer than the length of the inner skin 448a. The ends of the inner and outer skins 448a, 450a freely project beyond the end of the core member 446a so

as to leave an open area between the inner and outer skins 448a, 450a at the ends of the first panel 442a. At the other end of the panel 442a (not shown), the inner and outer skins 448a, 448b freely project beyond the end of the core member 446a the same distance so as to leave an open area between the inner and outer skins 448a, 450a.

At one end of the second panel 442b, the inner and outer skins 448b, 450b are of the same length and freely project beyond the end of the core member 446b the same amount so as to leave an open area between the inner and outer skins 448b, 450b. This structure is identical to the end of panel 442a which is not shown. At the opposite end of the second panel 442b, the construction is identical to the end of the first panel 442a shown in FIGURES 5 and 6.

The logistics plate 452 is form by extruded or formed aluminum. The logistics plate 452 has flat end portions 470 with an intermediate portion 472 that bulges inwardly therefrom. The end portions 470 are approximately the same thickness as the thickness of the core members 446a, 446b and each have a length which is approximately equal to the distance between the end of each inner skin 448a, 448b to the respective core members 446a, 446b. The bulging intermediate portion 472 has a thickness which is substantially less than the thickness of the end portions 470 and has a plurality of spaced openings or slots 474 along the length thereof.

To assemble the logistics plate 452 with the first

and second panels 442a, 442b, the end portions 470 of the logistics plate 452 are inserted between the inner and outer skins 448a, 450a; 448b, 450b of the first and second panels 442a, 442b such that the ends of the end portions 470 generally abut against the ends of the core members 446a, 446b. The ends of the inner skins 448a, 448b sit adjacent to the junction between the respective end portions 470 and the bulging intermediate portion 472 of the logistics plate 452. The outer skin 450a of the first panel 442a extends behind the logistics plate 452 and lies against the outer skin 450b of the second panel 442b. The outer skin 450a may lie against outer skin 450b on the inside thereof or the outside thereof. An air pocket 458 is formed between the bulging intermediate portion 472 of the logistics plate 452 and the outer skin 450a of the first panel 442a. The slots 472 align with the air pocket 458 so that clips or the like can be attached thereto for attaching equipment to the logistics plate 452. Rivets 468 are engaged through the respective inner skins 448a, 448b, the respective end portions 470 of the logistics plate 452, the respective outer skins 450a, 450b and the extension of the outer skin 450a.

The extension of the first panel outer skin 450a eliminates the need for the separate splicing member as used in the first, second and third embodiments. The outer skin 450a is very thin, however, and, as such, does not provide as much reinforcement as the splicing member provides. The extension of the first panel outer skin 450a seals the junction between the panels 542a, 542b on

the exterior of the trailer 20 so as to seal the interior from moisture.

Directing attention to the fifth embodiment of the novel joint configuration 544 shown in FIGURE 7, this embodiment is the same as the joint configuration 444 shown in the fourth embodiment except that the flat end portions 570 of the logistics plate 552 are not the same thickness as the core members 546a, 546b. Instead, the flat end portions 570 and the bulging intermediate portion 572 of the logistics plate 552 are of a substantially uniform thickness.

To fill the space between the respective end portions 570 of the logistics plate 552 and the respective outer skins 550a, 550b, an insert 576 is provided in each such space. Each insert 576 is made of high density plastic or metal and completely fills the space between the outer skin 550a, 550b and the end portion 570 of the logistics plate 552. The rivets 568 are engaged through the respective inner skins 548a, 548b, the respective end portions 570 of the logistics plate 532, the respective inserts 576 and the respective outer skins 550a, 550b. When the rivets 568 are inserted through the panels 542a, 542b, the insert 576 substantially prevents compression of the panels 542a, 542b, which can occur during the insertion of a rivet because the core member 546a, 546b is made of a compressible material.

Alternatively, the logistics plate 552 could be attached to the inner surface of the inner skins 548a,

548b with the respective inserts 576 completely filling the space between the skins 548a, 550a; 548b, 550b. In addition, the logistics plate 552 could be attached to the inner surface of the inner skins 548a, 548b, the insert 576 eliminated, and the core member 546a, 546b used to completely fill the space between the skins 548a, 550a; 548a, 550a.

Directing attention to the sixth embodiment of the novel joint configuration 644 shown in FIGURES 8 and 9, first and second composite panels 642a, 642b are joined together by a logistics plate 652 on the inside of the trailer 20 which extends along the entire height of the panels 642a, 642b and, like the fourth and fifth embodiments, the splicing member provided in the previous embodiments has been eliminated.

At each end of the first panel 642a, the outer skin 650a has a length that is substantially longer than the length of the inner skin 648a. The ends of the inner and outer skins 648a, 650a freely project beyond the end of the core member 646a so as to leave an open area between the inner and outer skins 648a, 650a at each end of the first panel 642a.

The second panel 642b is similarly constructed to the first panel 642a. At each end of the second panel 642b, the outer skin 650b has a length that is substantially longer than the length of the inner skin 648b. The ends of the inner and outer skins 648b, 650b freely project beyond the end of the core member 646b so as to leave an open area between the inner and outer

skins 648b, 650b at each end of the second panel 642b.

The logistics plate 652 is identical in construction to that described with respect to the fourth embodiment. Thus, a repetition of the construction of the logistics plate 652 is not repeated herein.

To assemble the logistics plate 652 with the first and second panels 642a, 642b, the flat end portions 670 of the logistics plate 652 are inserted between the inner and outer skins 648a, 650a; 648b, 650b of the first and second panels 642a, 642b such that the ends of the end portions 670 generally abut against the ends of the core members 646a, 646b. The ends of the inner skins 648a, 648b sit adjacent to the junction between the respective end portions 670 and the bulging intermediate portion 672 of the logistics plate 652. The outer skin 650b of the second panel 642b extends behind the logistics plate 652 and lays against the outer skin 650a of the first panel 642a. The outer skin 650a of the first panel 642a extends behind the logistics plate 652 and lies against the outer skin 650b of the second panel 642b. The outer skin 650a may lie against outer skin 650b on the inside or the outside of outer skin 650b. An air pocket 658 is formed between the bulging intermediate portion 672 of the logistics plate 652 and the outer skin 650a of the first panel 642a. The openings or slots 672 align with the air pocket 658 so that clips or the like can be attached thereto for attaching equipment to the logistics plate 652. Rivets 668 are engaged through the respective inner skins 648a, 648b, the respective end portions 670

of the logistics plate 652 and the respective outer skins 650a, 650b and the extensions of the outer skins 650a, 650b.

Because the outer skin 650a of the first panel 642a overlays the outer skin 650b of the second panel 642b, a bend 678 is provided in the outer skin 650a of the first panel 642a so that the outer skins 650a, 650b lie against each other. This forms a double thickness behind the intermediate portion 672 of the logistics plate 652 to provide more strength and rigidity than when a single thickness is used, such as that shown in the fourth and fifth embodiments. The extension of the outer skins 650a, 650b of the first and second panels 642a, 642b eliminates the need for the separate splicing member as shown in the previous embodiments. If desired, inserts, like those provided in the fifth embodiment, may be provided. The extensions of the outer skins 650a, 650b seal the junction between the panels 642a, 642b on the exterior of the trailer 20 so as to seal the interior from moisture.

In the fourth, fifth and sixth embodiments of the novel composite joint configurations 444, 544, 644, the rivets 468, 568, 668 are engaged by using the method and apparatus disclosed in co-pending United States Patent Application Serial No. 08/620,999, which disclosure has been herein incorporated by reference. If desired, holes can be provided through the logistic panel 452, 552, 652 and the panels 442a, 442b; 542a, 542b; 642a, 642b.

Attention is now directed to the seventh embodiment

of the novel joint configuration 744, shown in FIGURE 11, which has first and second composite panels 742a, 742b. One of the panels 742b is shown in FIGURE 10. It is to be understood that the other panels used to construct the trailer sidewall are identical in construction. At one end of the panel 742b, as shown in FIGURE 10, the inner and outer skins 748b, 750b are longer than its associated core member 746b so as to freely project beyond the end of the core member 746b. At the opposite end of the panel 742b, the inner and outer skins 748b, 750b are stepped down or coined so as to provide an end portion 780b which has a thickness that is less than the thickness of the remainder of the panel 742b. The edge of the core member 746b is generally flush with the end of the coined end portion 780b of the panel 742b, however, when the skins 748b, 750b are coined, some core material may extrude outwardly therefrom.

As shown in FIGURE 11, to connect the panels 742a, 742b together to form a sidewall 24 of the trailer 20, the coined end portion 780b of one panel 742b is inserted between the freely projecting inner and outer skins 748a, 750a of the adjacent panel 742a. When interconnected together, the outer surface of the inner skin 748b of panel 742b lies against the inner surface of the inner skin 748a of panel 742a and the outer surface of the outer skin 750b of panel 742b lies against the inner surface of the outer skin 750a of panel 742a. When the panels 742a, 742b are joined together, because of the coined end portion 780b, the inner surfaces and outer

surfaces of the panels 742a, 742b are smooth and flush along the length thereof on the inside and outside of the trailer 20. An insert, like that disclosed in the fifth embodiment, may replace the core material between the skins in the coined end portion 780b, if desired. Rivets 768 are engaged through the freely projecting ends of the inner and outer skins 748a, 750a and the coined end portion 780b.

Attention is now directed to the eighth embodiment of the novel joint configuration 844, shown in FIGURE 13, which has first and second composite panels 842a, 842b. One of the panels 842a is shown in FIGURE 12. It is to be understood that the other panels used to construct the trailer sidewall 24 are identical in construction. At each end of the panel 842a, as shown in FIGURE 12, the inner and outer skins 848a, 850a are longer than its associated core member 846a so as to freely project beyond the ends of the core member 846a. The panel 842b tapers from one end to the other end such that the distance D1 between the inner and outer skins 848b, 850b at one end is greater than the distance D2 between the inner and outer skins 848b, 850b at the other end. Thus, the core member 846b tapers from one end of the panel 842b to the other end of the panel 842b.

As shown in this embodiment, an insert 876, like the insert 576 in the fifth embodiment, is provided between the freely projecting skins 848b, 850b at the end of the panel 842b which has the lesser thickness. The insert 876 completely fills the space between the inner and

outer skins 848b, 850b and is made of high density plastic, metal or the like. When the rivets 868 are inserted through the panels 842a, 842b, the insert 876 substantially prevents compression of the panels 842a, 842b, which can occur during the insertion of a rivet because the core member 846a, 846b is made of a compressible material. Alternatively, the insert 876 could be eliminated and the core member 846b extended to fill the space.

To connect the panels together to form a sidewall 24 the trailer 20, the smaller end of one panel 842b is inserted into the larger end of the adjacent panel 842a. When interconnected together, the outer surface of the inner skin 848b of panel 842b lies against the inner surface of the inner skin 848a of panel 842a and the outer surface of outer skin 850b of panel 842b lies against the inner surface of the outer skin 850a of panel 842a.

In the seventh and eighth embodiments of the novel joint configuration 744, 844, each rivet 768, 868 is engaged with the panels by using the method and apparatus disclosed in co-pending United States Patent Application Serial No. 08/620,999 which disclosure has been herein incorporated by reference. During this punching process, the core material may extrude and fill any gaps between the end of the panel and the core member of the other panel. If desired, holes can be provided through the skins of the one panel and the reduced portion of the other panel through which the rivets are engaged.

While preferred embodiments of the present invention are shown and described, it is envisioned that those skilled in the art may devise various modifications of the present invention without departing from the spirit and scope of the appended claims. For example, in any of the embodiments which uses a logistics plate, the logistics plate may be flat or bulge inwardly. Also, in any of the embodiments which uses a splicing member, the splicing member may be flat or bulge outwardly. An insert could be provided in any of the embodiments or eliminated in the embodiments where it is shown.

THE INVENTION CLAIMED IS:

1. A sidewall for use in a trailer body and the like comprising: at least a pair of panels having opposite ends, each said panel comprising an inner metal skin, an outer metal skin and a plastic core member sandwiched between said inner skin and said outer skin, at least one of said inner and outer skins having at least one end being coined to as to compress said core member between said inner and outer skins and to define a coined end section of said skin, and joining means for joining said panels together along said coined end section.

2. A sidewall as defined in claim 1, wherein said joining means comprises a logistics plate member attached against said inner skins of said panels and a splicing member attached against said outer skins of said panels.

3. A sidewall as defined in claim 2, wherein at least one end of said inner skins of said panels is coined to define inner coined end sections and said logistics plate sits against said inner coined end sections.

4. A sidewall as defined in claim 3, wherein said logistics plate is flat and has a plurality of apertures therethrough, said logistics plate sitting against said inner coined end sections to define a surface which is flush with an inner surface of said inner skins.

5. A sidewall as defined in claim 3, wherein said logistics plate has generally flat end portions and an intermediate portion between said end portions which bulges outwardly from said flat end portions, said bulging intermediate portion having a plurality of apertures therethrough, said end portions sitting against said inner coined end sections to define a surface which is flush with an inner surface of said inner skins with said intermediate portion bulging outwardly from said flush surface.

6. A sidewall as defined in claim 3, wherein the ends of said outer skins of said panels are coined to define outer coined end sections and said splicing member sits against said outer coined end sections.

7. A sidewall as defined in claim 2, wherein at least one end of said outer skins of said panels is coined to define outer coined end sections and said splicing member sits against said outer coined end sections.

8. A sidewall as defined in claim 7, wherein said splicing member is flat such that a flush outer surface is provided.

9. A sidewall as defined in claim 1, wherein one end of said panels is coined to compress said core member therebetween and to define a coined end section and the opposite end of said panels has inner outer and skins which project beyond an end of said core member, said coined end section of one of said panels being inserted between said projecting skins of another one of said panels, and said joining means comprises at least one rivet through said projecting skins and said coined end section.

10. A sidewall for use in a trailer body and the like comprising: at least a pair of panels having opposite ends, each said panel comprising an inner skin, an outer skin and a core member sandwiched between said inner skin and said outer skin, and a logistics plate member attached to said panels ends for joining said panels together and for spacing said panels apart from each other a predetermined distance.

11. A sidewall as defined in claim 10, wherein at least one end of said inner and outer skins of each said panel projects beyond an end of said core member and said logistics plate member is attached along an inner surface of said projecting inner skins of said panels.

12. A sidewall as defined in claim 11, further including an insert formed of hard plastic or metal between said logistics plate and each said outer skin.

13. A sidewall as defined in claim 10, wherein said outer skin of one of said panels projects beyond the end of said inner skin of said one panel and lies against said outer skin of said other panel.

14. A sidewall as defined in claim 13, wherein said outer skin of at least one of said panels projects beyond the end of said inner skin and lies against said outer skin of said other panel.

15. A sidewall for use in a trailer body and the like comprising: at least a pair of panels having first and second opposite ends, each said panel comprising an inner skin, an outer skin and a core member sandwiched between said inner skin and said outer skin, said first end of each said panel having a thickness which is less than said second end of each said panel, said first end of one of said panels being inserted between said skins and secured to said skins at said second end of another of said panels.

16. A sidewall as defined in claim 15, wherein said first end of each said panel is coined to define said lesser thickness.

17. A sidewall as defined in claim 15, wherein each said panel tapers from said second end to said first end to define said lesser thickness.

18. A sidewall as defined in claim 15, wherein said inner and outer skins at said first end of each said panel project beyond an end of said core member and further including an insert member placed between said skins at said first end of each said panel.

19. A sidewall as defined in claim 18, wherein said insert member is formed from hard plastic or metal.

FIG. 1

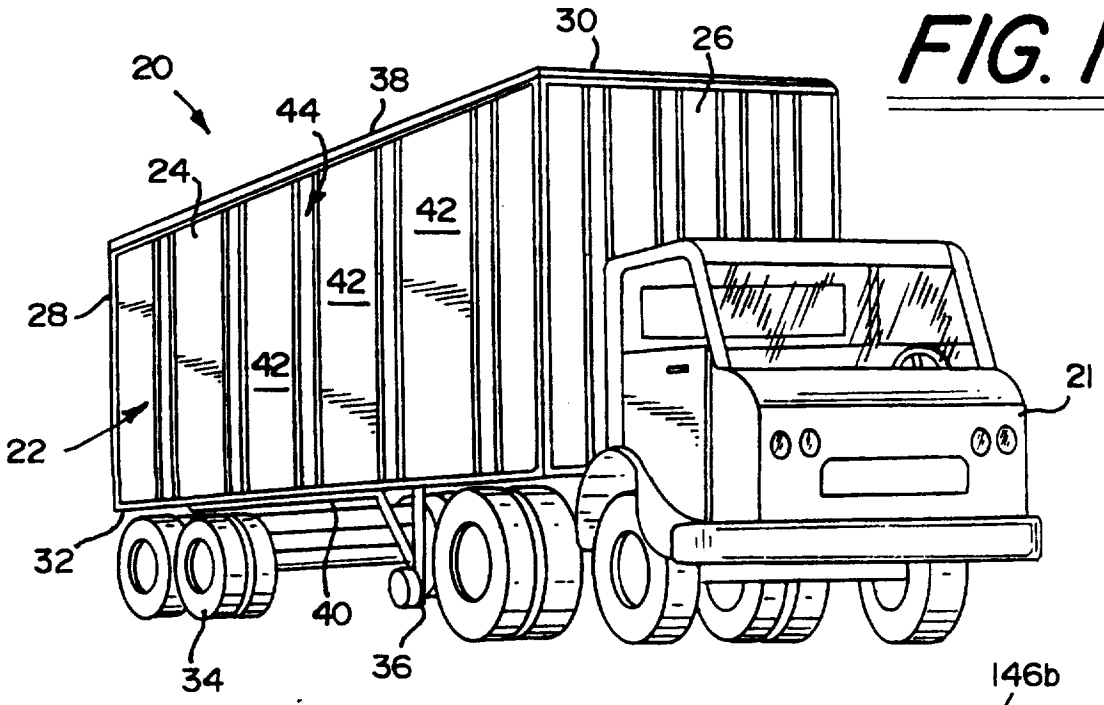

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FIG. 2

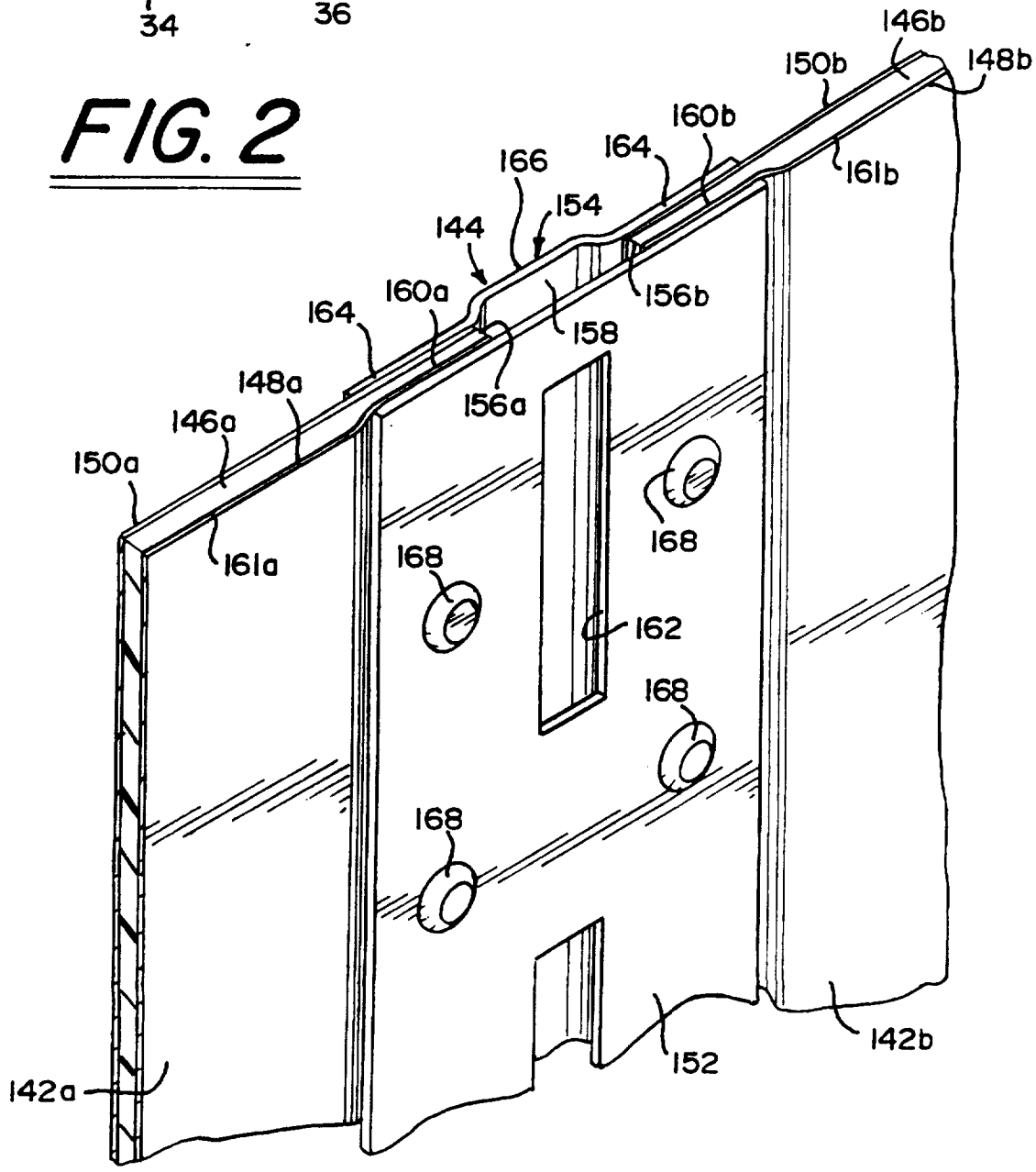

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FIG. 3

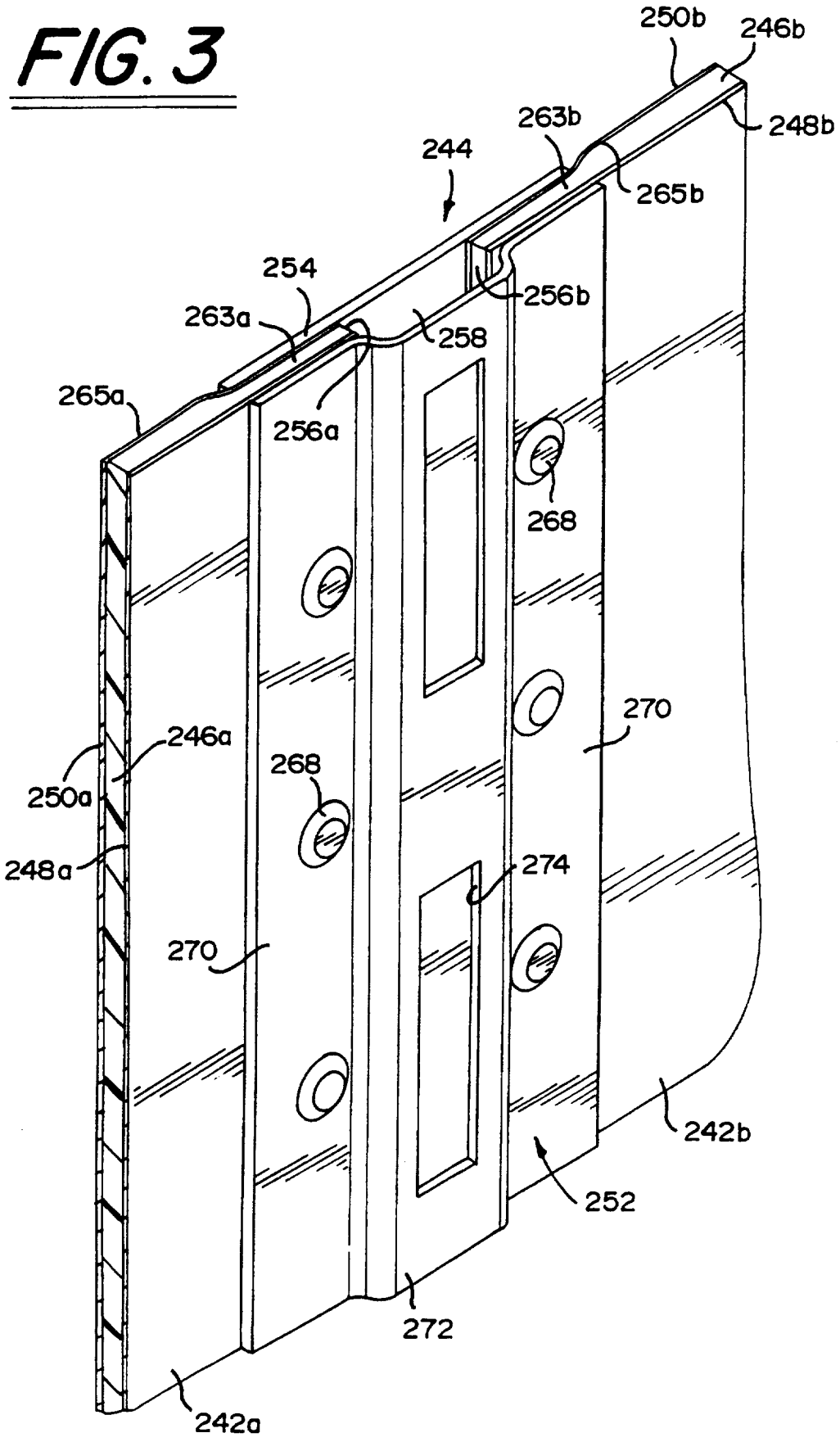

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FIG. 4

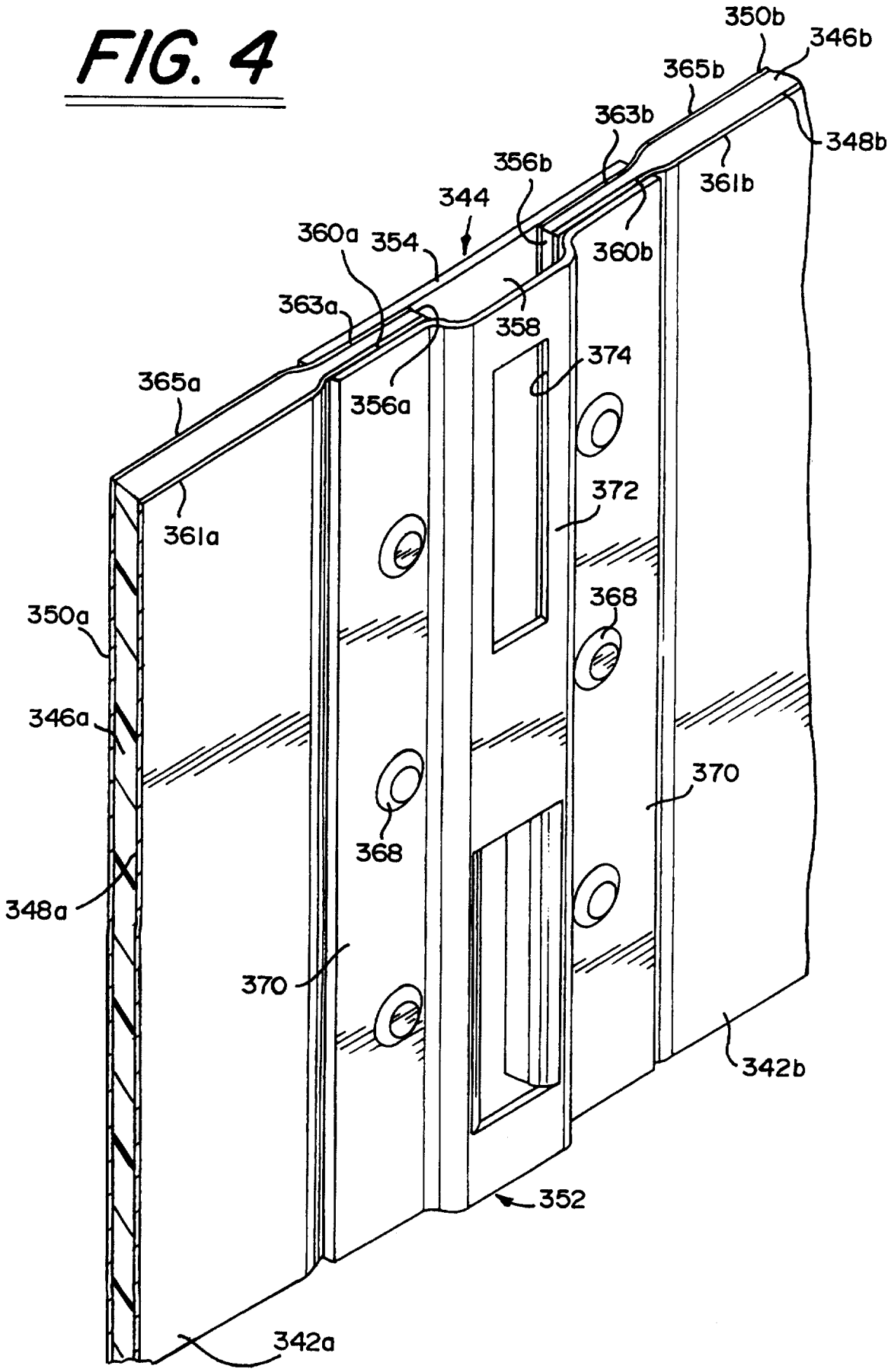

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FIG. 5

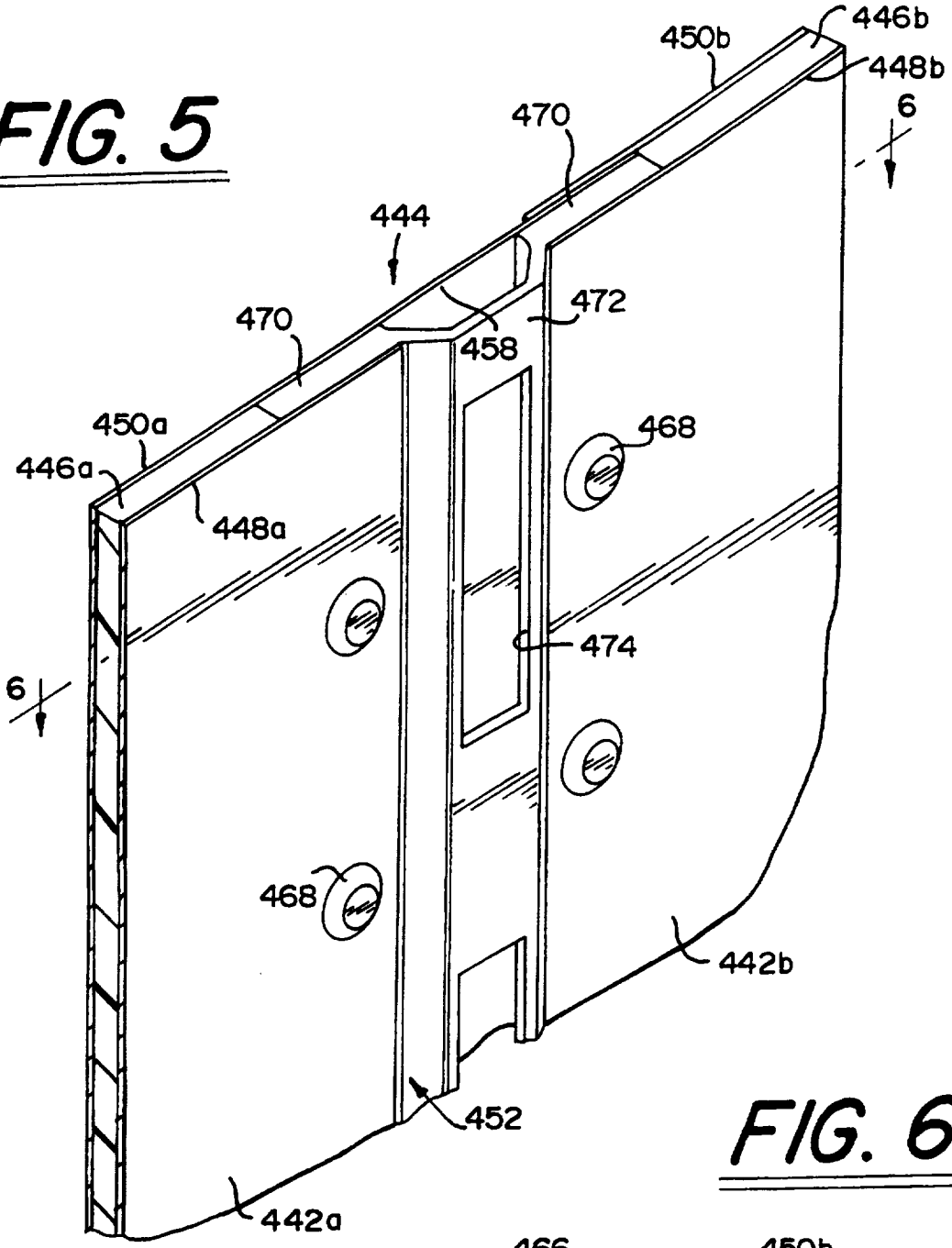


FIG. 6

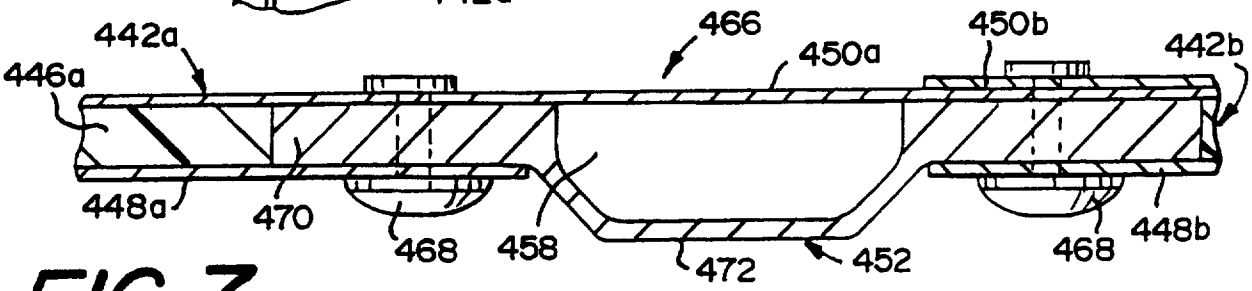


FIG. 7

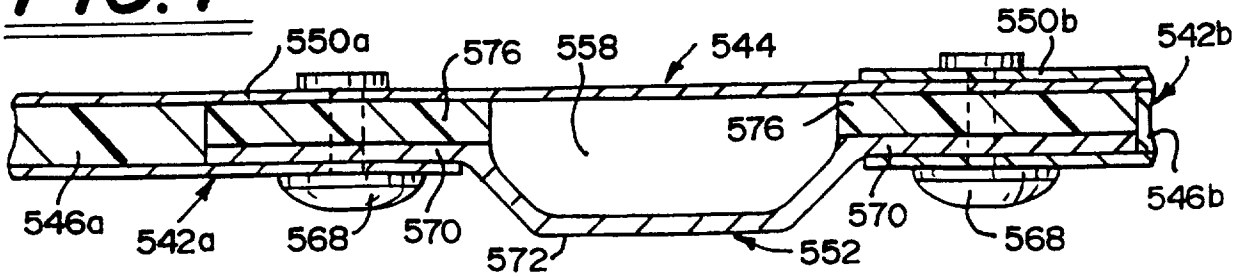


FIG. 8

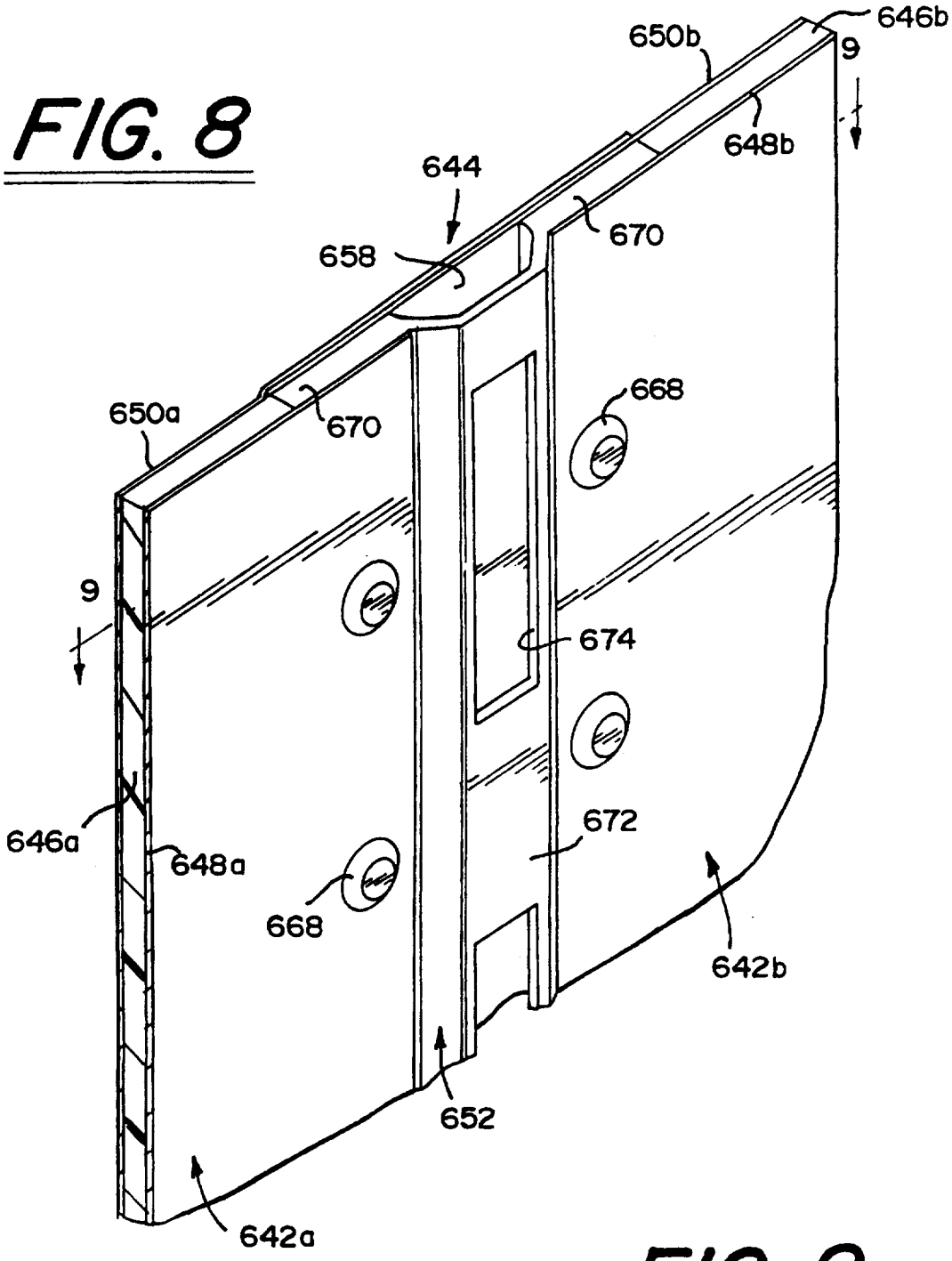

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FIG. 9

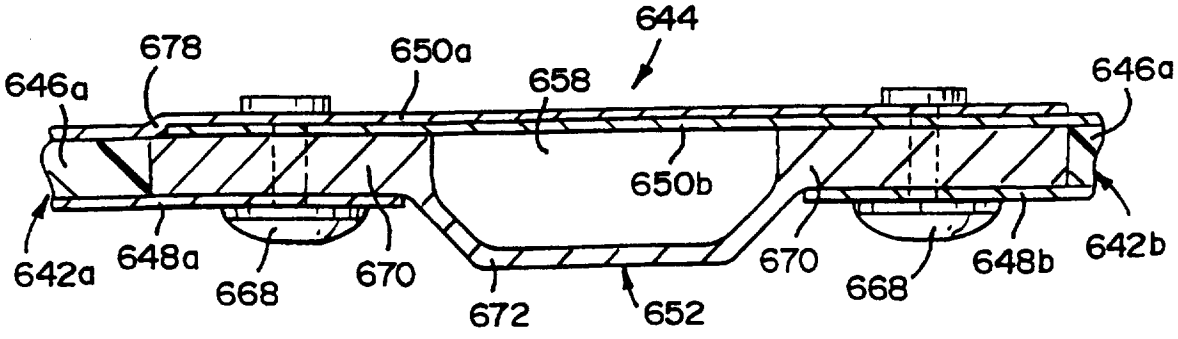

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FIG. 10

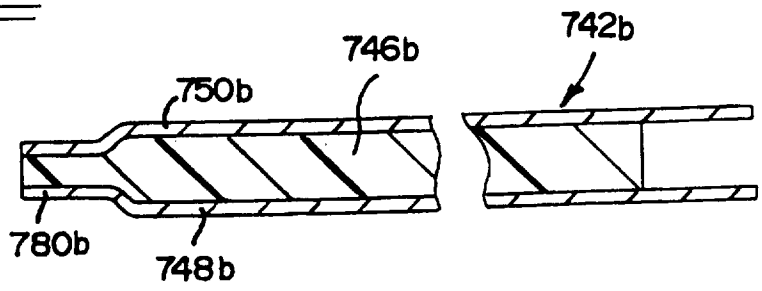


FIG. 11

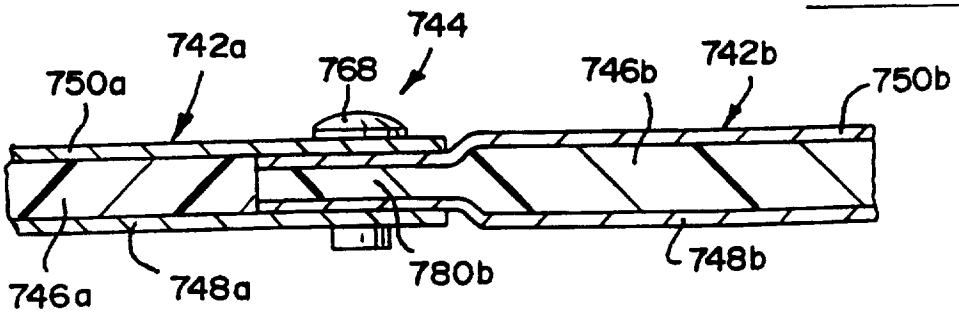


FIG. 12

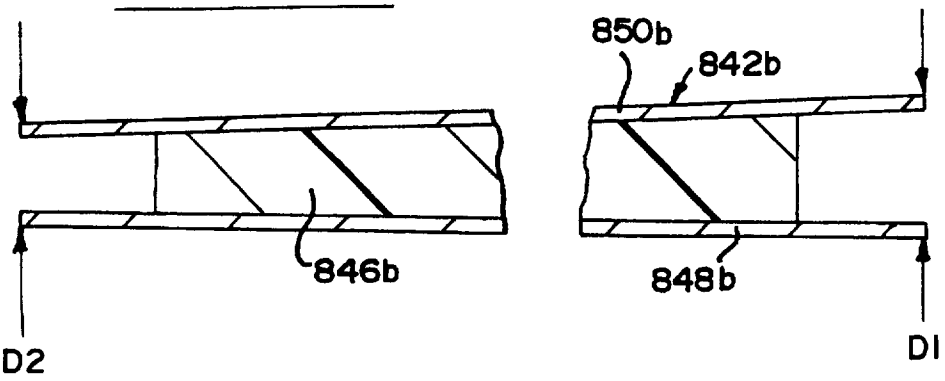
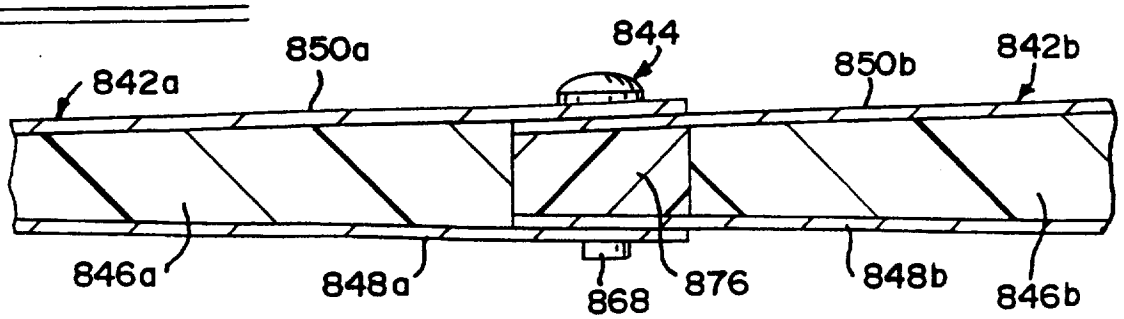


FIG. 13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/15917

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B62D 25/02
US CL : 296/191
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 296/191,181, 183; 52/309.1, 309.2, 309.4, 584.1, 586.1, 588.1, 589.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 4,104,840 A (Heintz et al.) 08 August 1978, see entire document	15, 17 -------- 16, 18-19
X --- Y	US 4,958,472 A (Ehrlich) 25 June 1990, see entire document	10-12 -------- 13-14, 18-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 17 NOVEMBER 1997	Date of mailing of the international search report 11 DEC 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer DENNIS H. PEDDER Telephone No. (703) 308-2178

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/15917

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/15917

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack Unity of Invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one species to be searched, the appropriate additional search fees must be paid. The species are as follows:

FIGURES 2-4, 5-9, 10-13

The claims are deemed to correspond to the species listed above in the following manner:

CLAIMS 1, 9, AND 15-19- FIGURES 10-13;
CLAIMS 1-8- FIGURES 2-4;
CLAIMS 10-14- FIGURES 5-9

The following claims are generic: NONE

The species listed above do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: The technical feature of figures 2-4, and 10-11 the coined ends and compressed core is not present in the species of figures 5-9. The technical feature of figures 5-9, the logistics plate, is not present in figures 10-13. The technical feature of figures 10-13, the inserted end, is not present in figures 2-4 or 5-9. Thus no technical feature is common.