A panel assembly is provided for providing a seal between a vehicle, such as a delivery truck, and a fixed structure, such as a loading dock of an office building or warehouse. The panel assembly includes one or more panels that include a foam core and a layer positioned adjacent to the foam core. The layer may include laminated polymer sheets or any of a variety of rigid materials, such as steel, fiberglass, wood and aluminum.
VEHICLE AND DOCKING BAY SEALING METHOD AND APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation-in-part of U.S. patent application Ser. No. 10/615,296, filed Jul. 9, 2003, which in turn claims the benefit of priority to U.S. Provisional Patent Application No. 60/471,728, filed May 20, 2003. The entire contents of both of these applications is hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to devices and methods for providing a seal between a vehicle and a structure. More particularly, the present invention relates to dock seals and shelters that engage trucks at loading docks.

BACKGROUND OF THE INVENTION

[0003] Structures, such as the loading docks of warehouses and office buildings, typically accommodate the loading and unloading of items from delivery trucks. When a delivery or pick-up is made, a delivery truck is usually backed up to a loading dock and the rear doors of the truck are opened. Then, workers are able to travel back and forth between the loading dock and the truck's storage compartment as the workers load items into or unload items from the truck.

[0004] Unfortunately, when weather conditions are adverse, rain, snow, sleet, wind, cold air or warm air enters the loading dock through gaps that are present between the loading dock and the rear of the delivery truck being loaded or unloaded. Further, when the rear doors of the truck are opened and folded back against the sides of the truck, unconditioned air and moisture can enter through gaps between the doors and the sides of the truck (i.e., "hinge gaps"). This leaves items in the truck and the workers who are loading or unloading the truck exposed to the unfavorable weather conditions. This also makes efficient heating or cooling of the loading dock difficult.

[0005] In addition, if items in the truck are perishable (e.g., foodstuffs), exposing the items to the unfavorable weather conditions could lead to spoilage. Even further, when there are gaps between the loading dock and the truck, unscrupulous workers may steal items from the truck by passing the items through the gaps to cohorts standing outside of the truck.

[0006] Accordingly, it would desirable to provide apparatuses for providing seals between vehicles, such as delivery trucks, and structures, such as loading docks, that would prevent the structures from being exposed to adverse weather conditions. It would also be desirable to provide methods for forming such seals between such vehicles and structures.

SUMMARY OF THE INVENTION

[0007] The foregoing needs are met, to a great extent, by certain embodiments of the present wherein, in one aspect thereof a panel assembly is provided. The panel assembly includes a first panel that itself includes a first foam core having a first side and a first layer adjacent to the first side. The panel assembly also includes a second panel and a connector that is connected to the first panel and to the second panel. The connector is configured to allow for the first panel to move relative to the second panel.

[0008] According to another aspect of the present invention, a method of manufacturing a panel assembly is provided. The method includes forming a first panel having a first foam core and a first layer adjacent to a first side of the first foam core. The method also includes attaching the first layer to the first side of the first foam core. The method further includes attaching a second panel to the first panel using a first connector.

[0009] According to yet another aspect of the present invention, another panel assembly is provided. The panel assembly includes first engaging means for engaging a first portion of a vehicle. The first engaging means itself includes filling means for filling an interior portion of the first engaging means, wherein the filling means includes a first side. The first engaging means also includes covering means for covering the filling means, wherein the covering means is positioned adjacent to the first side of the filling means.

[0010] There has thus been outlined, rather broadly, certain embodiments of the invention in order that the detailed description thereof herein may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional embodiments of the invention that will be described below and which will form the subject matter of the claims appended hereto.

[0011] In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

[0012] As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a side view of a portion of a vehicle positioned adjacent to a fixed structure and partially positioned within an engaging mechanism according to an embodiment of the present invention;

[0014] FIG. 2 is a top view of a portion of the engaging mechanism illustrated in FIG. 1;
FIG. 3 is a cross-sectional view of a receiving member and resilient member that are both formed from a single component;

FIG. 4 is a top view of the engaging mechanism illustrated in FIGS. 1 and 2 wherein the engaging mechanism is illustrated in an engaged position and in an unengaged position; and

FIG. 5 is a top view of an engaging mechanism according to another embodiment of the present invention.

FIG. 6 is an exploded view of components of a shelter according to certain embodiments of the present invention.

FIG. 7 is a perspective view of another shelter according to certain embodiments of the present invention.

FIG. 8 is a front view of yet another shelter according to certain embodiments of the present invention.

DETAILED DESCRIPTION

Certain embodiments of the present invention will now be described with reference to the drawing figures, in which like reference numerals refer to like parts throughout. The attached figures and following description will explain in detail embodiments of the invention. Some of these embodiments will provide a method and apparatus that will allow a cargo vehicle to be connected to a loading dock in a manner that will reduce air loss form the interior of the loading dock and vehicle to the outside.

FIG. 1 is a side view of a portion of a vehicle 10 positioned adjacent to a fixed structure 14 and partially positioned within an engaging mechanism 16. In FIG. 1, the vehicle 10 is a delivery truck and the fixed structure 14 is a loading dock. However, other vehicles and structures are also within the scope of the present invention. As illustrated in FIG. 1, the rear door 12 of the vehicle 10 is open and is folded back into a position that is parallel to the side 17 of the vehicle 10.

The engaging mechanism 16 illustrated in FIG. 1 extends between the vehicle 10 and the fixed structure 14. As will be explained below, when a portion of the vehicle 10 is fully engaged with the engaging mechanism 16, either a partial or a complete seal is formed between the vehicle 10 and the engaging mechanism 16. Such a seal either prevents or hinders adverse weather conditions (e.g., rain, snow, sleet, wind, cold air or warm air) from entering the structure 14 through gaps between the structure 14 and the vehicle 10 while the vehicle 10 is being loaded or unloaded. In other words, the engaging mechanism 16 hinders conditioned air (whether it is cold or warm) from being lost to the outside.

FIG. 2 is a top view of a portion of the engaging mechanism 16 illustrated in FIG. 1. The portion of the engaging mechanism 16 illustrated in FIG. 2 includes a receiving member 18, a resilient member 24 having a free end 25 and a fixed end 27, a belt 26 having a resilient-member-proximate end 29 and a receiving-member-proximate end 31, a receiving-member-adjacent deformable medium 28, a plurality of fasteners 30, 32, 34, 37, a spring 35 and an engaging mechanism support 36.

As illustrated in FIG. 2, the receiving member 18 is configured to accommodate insertion of a portion of the vehicle 10 therein. More specifically, the receiving member 18, which takes the form of a hook in FIG. 2, can accommodate the insertion of a portion of the door 12 of the vehicle 10 and a portion of a sidewalk 20 that is located on the side 17 of the vehicle 10. Also, the receiving member 18 is configured to accommodate the insertion of a hinge 22 that allows for the door 12 to swing open relative to the sidewalk 20 as the door 12 is opened.

Although the receiving member 18 in FIG. 2 takes the form of a hook, other geometries may be used to implement the receiving member 18. For example, the receiving member 18 may take the form of a semicircle or may have one or more distinct sides, as opposed to being a smooth arc.

The resilient member 24 is illustrated in FIG. 2 as being connected to the receiving member 18. According to certain embodiments of the present invention, the resilient member 24 takes the form of a spring that is in a neutral position in FIG. 2. The resilient member 24 may be made from or may include portions that are made from any material that exhibits elastic properties. For example, polymers (e.g., rubbers and elastomers) or metals may be used.

According to certain embodiments of the present invention, the resilient member 24 is pliable and can bend either towards the sidewalk 20 illustrated in FIG. 2 or away from the sidewalk 20 (i.e., towards the top of FIG. 2). When the door 12, hinge 22 and sidewalk 20 of a vehicle 10 are positioned relative to the engaging mechanism 16 as illustrated in FIG. 2, the vehicle 10 is aligned with the engaging mechanism 16. Movement of the vehicle 10 toward the belt 26 and then engagement with the belt 26 causes the end of the belt 26 to pull the resilient member 24 and causes the resilient member 24 to bend toward the sidewalk 20, thereby engaging the free end 25 of the resilient member 24 with the sidewalk 20 of the vehicle. As the vehicle 10 continues to move, the belt 26, vehicle sidewalk 20, door 12 and hinge 22 will engage the receiving-member-adjacent deformable member 28 and deform it to create a seal of hinge gaps between the sidewalk 20 and the door 12.

For the sake of simplicity in describing operation and interaction between the belt 26 and the vehicle 10, the belt 26 is described in the singular. However, as shown in FIG. 7, a plurality of belts 26 may be located along the engaging mechanism 16. In some embodiments of the invention, there may be only one belt 26 located on the engaging mechanism 16 and this belt 26 would typically be as wide as or substantially as wide as the engaging mechanism 16 is high. Of course, if the belt 26 extends along the entire height of the vehicle 10, then the belt 26 may also help seal the hinge gaps.

Once the vehicle 10 is sealed to the fixed structure 14, large items (e.g., pallets loaded with freight) are often transported between the interior of the vehicle 10 and the fixed structure 14 during loading and unloading of the vehicle 10 in many cases, fork trucks are used to transport the large items and the fork trucks are often driven at least partially into the interior of the vehicle 10.

As a fork truck backs away from the interior of the vehicle 10, the interior of the sidewalk 20 of the vehicle is sometimes bumped and the resilient member 24 is sometimes inadvertently snagged or hooked by the fork truck.
Therefore, according to certain embodiments of the present invention, the resilient member 24 is configured to bend away from the sidewalk 20 without breaking. Also, according to these embodiments, the spring 35 is configured to bend away from the support 36. Therefore, in these embodiments, when the fork truck stops snagging or hooking the resilient member 24, the spring 35 moves back against the support 36, the resilient member 24 snaps back against the interior of the sidewalk 20 and neither the spring 35, the resilient member 24 nor any other portion of the engaging mechanism 16 is broken.

[0032] According to certain embodiments of the present invention, the resilient member 24 has a non-uniform composition and/or geometry. For example, the resilient member 24 may be thinner at the free end 25 thereof than at the fixed end 27. As another example, the resilient member 24 may be made from a polymer whose composition changes gradually between the free end 25 and the fixed end 27.

[0033] When the resilient member 24 has a non-uniform geometry or composition and is pushed against by a fork truck backing out of a vehicle 10, the resilient member 24 typically exerts a restorative force against the fork truck. As one would expect, the amount of restorative force exerted is typically dependent upon where on resilient member 24 the fork truck pushes (i.e., where the fork truck applies a distortive force to the resilient member 24). For example, if the resilient member 24 is thinner at the free end 25 thereof, the receiving member 24 will exert a lesser restorative force upon a portion of a fork truck that pushes against the free end 25 of the resilient member 24 than if the portion of the fork truck were to push closer to the fixed end 27. Thus, according to certain embodiments of the present invention, when a portion of the fork truck pushes against the resilient member 24 and pulls it away from the sidewalk 20 of the vehicle 10, the resilient member 24 can readily bend backwards and allow the fork truck to travel past the engaging mechanism 16.

[0034] As illustrated in FIG. 2, a resilient-member-proximate end 29 of the belt 26 is connected to the resilient member 24. With reference to FIG. 1, the belt 26 may be positioned at any location along the height of the engaging mechanism 16 or may extend across the entire height of the engaging mechanism 16. According to certain embodiments of the present invention, more than one belt 26 may be included in the engaging mechanism 16. When more than one belt 16 is used, the plurality of belts 26 are typically staggered along the height of the engaging member 16, either at regular intervals or at locations that are most likely to be engaged by portions of the vehicle 10 as the vehicle 10 moves toward the fixed structure 14.

[0035] In FIG. 2, a receiving-member-proximate end 31 of the belt 26 is directly connected to the receiving member 18. However, one or more of the skill in the art will appreciate that the receiving-member-proximate end 31 of the belt 26 need not be directly connected to the receiving member 18. Rather, according to certain embodiments of the present invention, the receiving-member-proximate end 31 may be connected to other portions of the engaging mechanism 16. For example, the receiving-member-proximate end 31 may be connected to the spring 35 or the engaging mechanism support 36 illustrated in FIG. 2.

[0036] According to certain embodiments of the present invention, the belt 26 includes one or more webbed portions (i.e., portions that include porous webbing). Typically, such webbed portions allow for air to circulate through the engaging mechanism 16. Also, since porous webbing is often relatively inexpensive, the use of porous webbing may lower the overall cost of the engaging mechanism 16. However, solid belts and belts with alternate geometries are also within the scope of the present invention.

[0037] The receiving-member-adjacent deformable medium 28 illustrated in FIG. 2 is connected to the receiving member 18 and typically includes a foam material (i.e., a light, porous, semi-rigid and/or spongy material). However, other materials (e.g., gels and polymers such as elastomers and rubbers) may also be included in the receiving-member-adjacent deformable medium 28. Usually, the receiving-member-adjacent deformable medium 28 includes a material that is elastic in nature. Thus, pursuant to being deformed by a force applied by a portion of a vehicle 10, removal of the force typically allows the receiving-member-adjacent deformable medium 28 to regain its original geometry. However, the inclusion of plastic materials in the receiving-member-adjacent deformable medium 28 is also within the scope of the present invention.

[0038] In some embodiments of the present invention, the receiving member 18 deforms as the hinge 22, sidewalk 20 and door 12 of the vehicle 10 back into it along with the belt 26. This deformation of the receiving member 18 aids in creating a seal around a gap between the sidewalk 20 and the door 12.

[0039] According to certain embodiments of the present invention, the receiving-member-adjacent deformable medium 28 and the belt 26 are completely separate components and are completely detached from each other. However, according to other embodiments of the present invention, the belt 26 and the receiving-member-adjacent deformable medium 28 abut each other. In such embodiments, the receiving-member-adjacent deformable medium 28 can also fill up all of the space between the receiving member 18 and the belt 26.

[0040] The first fastener 30 illustrated in FIG. 2 directly connects the resilient member 24 to the receiving member 18, the second fastener 32 directly connects the belt 26 to the resilient member 24 and the third fastener 34 directly connects the receiving member 18 and the belt 26 to the spring 35, which itself is connected to the engaging mechanism support 36 with the fourth fastener 37. In some embodiments of the invention, such as shown in the figures, the fasteners 30, 32, 34, 37 can be bolts, screws, staples, hook and loop devices or any other suitable fastener. Also, alternate connections between the receiving member 18, the resilient member 24, the belt 26, the spring 35 and/or the engaging mechanism support 36 are within the scope of the present invention. For example, the belt 26 may be sewn to resilient member 24 and/or to the engaging mechanism support 36.

[0041] The receiving member 18 and the resilient member 24 are illustrated in FIG. 2 as distinct components. However, according to certain embodiments of the present invention, the receiving member 18 and the resilient member 24 are formed from a single component. For example, the receiving member 18 and the resilient member 24 may both be formed from a sheet or an extruded shape.

[0042] When the receiving member 18 and the resilient member 24 are both formed from a single component 50 as
illustrated in FIG. 3, a notch 52, indentation or other cross-sectional thickness change typically indicates which portion of the single component 50 makes up the receiving member 18 and which portion makes up the resilient member 24. The change in cross-sectional thickness 52 is typically abrupt and facilitates movement of the resilient member 24 relative to the receiving member 18. However, gradual cross-sectional thickness changes that facilitate such movement are also within the scope of certain embodiments of the present invention. In FIG. 3, the dashed lines represent the position of the resilient member 24 after being moved relative to the receiving member 18.

FIG. 4 is a top view of the engaging mechanism 16 illustrated in FIGS. 1 and 2 wherein the engaging mechanism 16 is illustrated in an engaged position A and in an unengaged position B. In the engaged position A, the engaging mechanism 16 is in contact with (i.e., engaged) with a door 12, hinge 22 and sidewall 20 of a vehicle 10. In the unengaged position B, the engaging mechanism 16 is not in contact with any portion of a vehicle 10.

As illustrated in FIG. 4, the engaging mechanism support 36 illustrated in FIG. 2 is connected to a wall support 38 using an inter-support connector 40. According to certain embodiments of the present invention, the inter-support connector 40 allows for the engaging mechanism support 36 to move (i.e., rotate or swing) relative to the wall support 38 when the engaging mechanism 16 is being pushed by a portion of a vehicle adjacent thereto. The inter-support connector 40 may take the form, for example, of a hinge or swivel. According to certain embodiments of the present invention, the inter-support connector 40 includes a piece of fiberglass that is sufficiently thin to flex and act as a hinge.

No particular restrictions are made on the geometries or materials used in either of the engaging mechanism support 36 or the wall support 38. Any structure capable of supporting the components of the engaging mechanism 16 illustrated in FIG 2 may be used. For example, one or both of the supports 36, 38 may take the form of substantially flat panels made of galvanized steel or aluminum.

As illustrated in FIG. 4, a structurally-affixed connector 42 connects the wall support 38 to a fixed structure 14. As also illustrated in FIG. 4, the structurally-affixed connector 42 allows the wall support 38 to move relative to the structure 14. Like the inter-support connector 40, the structurally-affixed connector 42 may include, for example, a hinge, metal bracket, elastomer, leaf spring, swivel, piece of fiberglass or any other suitable connecting device.

FIG. 5 is a top view of an engaging mechanism 54 according to another embodiment of the present invention. The engaging mechanism 54 illustrated in FIG. 5 includes the receiving member 18, resilient member 24, belt 26 and deformable medium 28 described above. As illustrated in FIG. 5, the engaging mechanism 54 also includes an engaging mechanism support 56 and a wall support 58, each of which may, for example, take the form of a substantially flat panel.

The wall support 58 has a first flexible hinge 60 connected to a first end thereof and a second flexible hinge 62 located at a second end thereof. According to certain embodiments of the present invention, the first hinge 60 and the second hinge 62 are each made from fiberglass. However, including a metal, an elastomer or any other suitable material in the first hinge 60 and second hinge 62 is also within the scope of the present invention.

Unlike the engaging mechanism support 36 and wall support 38 illustrated in FIG. 4, which may be made entirely from, for example, galvanized steel, plastic (e.g., vinyl or polyethylene), fabric, foam covered in fabric, fiberglass, wood, or aluminum, the engaging mechanism support 56 and wall support 58 illustrated in FIG. 5 each have a core 64, 65 made from a first material and a layer 66, 67 positioned adjacent to the core 64, 65 and made from a second material which is typically different from the first material.

According to certain embodiments of the present invention, the layers 66, 67 include one or more laminate sheets positioned on one or more faces of the core 64, 65. According to some of these embodiments, each core 64, 65 includes a foam material and each of the laminate sheets in the layers 66, 67 includes a polymer material (e.g., acrylonitrile butadiene styrene or another plastic). The layers 66, 67 may extend around the perimeters of the cores 64, 65 and often completely encase the cores 64, 65, thereby protecting the cores 64, 65 from ambient conditions. However, according to certain embodiments of the present invention, one or more laminate sheets are positioned adjacent to each side of each core 64, 65, thereby “sandwiching” each of the cores 64, 65 between two separate portions of the layers 66, 67.

The layers 66, 67 may, according to other embodiments of the present invention, take the form of a non-polymeric material. For example, the layers 66, 67 may include steel (e.g., galvanized steel), fiberglass, wood or aluminum. According to these embodiments, the layers 66, 67 often take the form of casings (e.g., rectangular boxes) into which foam that solidifies into the cores 64, 65 is injected into.

A variety of methods are available to manufacture panel assemblies such as the one illustrated in FIG. 5 that includes the engaging mechanism support 56 and the wall support 58. According to one such method, a first panel (e.g., engaging mechanism support 56) is formed to have a first foam core (e.g., core 64) at the center thereof and a first layer (e.g., layer 66) positioned adjacent to a first side of the first foam core. Then, the first layer (e.g., layer 66) is attached to the first side of the first foam core (e.g., core 64).

The above steps may be implemented, for example, by laminating one or more polymer sheets onto the first side of the first panel (e.g., engaging mechanism support 56) to form the first layer (e.g., layer 66). If the first layer includes two separate portions on opposite sides of the first core, one or more polymer sheets may be adhered to each side of the first foam core.

An adhesive or thermal method may be used, for example, to adhere one or more laminated sheets to the first core (e.g., core 64) to form the first layer (e.g., layer 66). As an alternative to using laminated sheets, a foam may be injected into a first casing to form the first foam core. When injecting the foam into the casing, a side of the casing into which the foam is injected typically includes the above-discussed first layer.

Once the first panel (e.g., engaging mechanism support 56) has been formed and the first layer (e.g., layer
66) has been attached to the first foam core, a second panel (e.g., wall support 58) is typically attached to the first panel using a first connector (e.g., a flexible hinge such as the flexible hinge 62 illustrated in FIG. 5). The second panel (e.g., wall support 58) is typically formed to have a second foam core (e.g., core 65) and a second layer (e.g., layer 67) positioned adjacent to a first side of the second foam core. The second layer is typically attached to the first side of the second foam core in a manner analogous to how the first layer (e.g., layer 66) is attached to the first foam core (e.g., core 64). More specifically, the second panel (e.g., wall support 58) may be formed by laminating one or more polymer sheet onto one or more sides of the second panel to form either a second layer (e.g., layer 67) either on one or both sides of the second foam core or if the foam may be injected into a second casing that includes the second layer to form the second foam core (e.g., core 65).

[0056] In addition to attaching the second panel to the first panel, an engaging mechanism (e.g., engaging mechanism 16) may be attached to the first panel. Typically, the engaging mechanism is formed to include a receiving member (e.g., receiving member 18) configured to accommodate insertion of a portion of a vehicle therein. The engaging member is also commonly formed to include a resilient member (e.g., resilient member 24) that is connected to the receiving member. Further, the engaging member is typically formed to include a belt (e.g., belt 26) that is connected to the resilient member. In addition, the engaging member is commonly formed to include a deformable member (e.g., deformable member 28) that is connected to the receiving member. Then, the engaging mechanism to usually attached at an end of the first panel that is opposite to where the second panel is attached.

[0057] FIG. 6 is an exploded view of components of a shelter 68 according to certain embodiments of the present invention. The shelter 68 includes a right side frame 70 and a left side frame 72 positioned opposite thereto. In operation, the shelter 68 also includes a head frame 74 connected to and positioned on top of and between the right side frame 70 and the left side frame 72.

[0058] Attached to the right side frame 70 is a right side curtain 76 and attached to the left side frame 72 is a left side curtain 78. The curtains 76, 78 extend substantially perpendicularly to the sides frames 70, 72 when no vehicle is engaged in the shelter 68. As illustrated in FIG. 6, each of the side curtains 76, 78 has an engaging mechanism 16 attached thereto. Inside each of the side curtains 76, 78, there are a plurality of stays 80. When a vehicle backs up to the shelter 68, engages the engaging mechanisms 16 and pushes against curtains 76, 78, the stays 80 act like springs, bend and push back against the vehicle.

[0059] According to certain embodiments of the present invention, the right side frame 70, the left side frame 72 and/or the head frame 74 are made from galvanized steel and are fixedly attached to or a loading dock or other fixed structure. According to these embodiments, the right side curtain 76 and the left side curtain 78 are typically made of vinyl fabric and the stays 80 are typically made of fiberglass.

[0060] According to other embodiments of the present invention, the right side frame 70 and the left side frame 72 can each include a foam pad 71 inside of a fabric cover 73. According to some of these embodiments, the head frame 74 is made from galvanized steel contained within a fiberglass cover 75. In these embodiments, the right side frame 70, the left side frame 72 and/or the head frame 74 are typically also fixedly attached to a loading dock or other fixed structure and the curtains 76, 78 are sewn to the side frames 70, 72.

[0061] FIG. 7 is a perspective view of another shelter 82 according to certain embodiments of the present invention. As illustrated in FIG. 7, the shelter 82 includes resilient members 24, a plurality of belts 26, engaging mechanism supports 36 and wall supports 38. The resilient member 24 illustrated in FIG. 7 includes a fringe portion 84 that includes a plurality of slats 86 and belts 26 connected to each of the slats 86. When a vehicle having a relatively low height backs up against the shelter 82 illustrated in FIG. 7, the vehicle does not engage all of the belts 26 but only those belts 26 that correspond to the vehicle’s height and therefore does not cause all of the slats 86 in the fringe region 84 to be pulled toward the interior surface of the sidewall of the vehicle. In other words, each of the slats 86 is individually movable relative to other slats 86, such a configuration allows for a better seal because the resilient member 24 is not pushed away by the vehicle’s roof.

[0062] FIG. 8 is a front view of yet another shelter 83 according to certain embodiments of the present invention. As illustrated in FIG. 8, the shelter 83 is connected to a fixed structure 14 and includes a right side curtain 76, a left side curtain 78 and a top curtain 88. Each of the curtains 76, 78, 88 includes a plurality of stays 80 that allow the curtains 76, 78, 88 to bend when pushed against by a vehicle. Each of the curtains 76, 78, 88 also has an engaging mechanism 16 connected thereto. As such, when a vehicle approaches the fixed structure 14 illustrated in FIG. 8, engaging mechanisms 16 may form seals with the right, left and top sides of the vehicle’s interior.

[0063] According to other embodiments of the present invention, a method of sealing a vehicle to a structure is provided. Such a method is particularly applicable to sealing the rear portion of a delivery truck to a loading dock of a warehouse or office building. However, seals may be formed between other vehicles and structures according to the present invention. It should be noted that methods according to the present invention allow for partial or complete seals to be formed between vehicles and structures.

[0064] According to certain embodiments of the present invention, the method of sealing includes pushing a first deformable medium into a distinct second deformable medium with a vehicle, thereby deforming the first deformable medium and the second deformable medium. The first deformable medium may, for example, take the form of the belt 26 illustrated in FIG. 2 while the second deformable medium may, for example, take the form of a foam material. According to these embodiments, the above-discussed door 12, hinge 22 and/or sidewalk 20 of the vehicle 10 may be movable to push the belt 26 into the receiving member adjacent deformable medium 28 to deform both.

[0065] The above-described pushing step of the method may also include moving a first support relative to a fixed structure, wherein the first support is connected to the first deformable medium and to the fixed structure. In implementing the pushing step, the vehicle 10 illustrated in FIG. 1 may be used to push the belt 26 into the receiving member 18 as discussed above and may additionally push with enough force to move the receiving member 18 from position B illustrated in FIG. 4 to position A. The wall support 38 is thereby moved relative to the fixed structure 14 when the structurally-attached connector 42 allows for such motion.

[0066] The above pushing step may also include moving a second support relative to the first support, wherein the
second support is connected between the first support and the first deformable medium. As illustrated in FIG. 4, the pushing step may be implemented by moving the engaging mechanism 16 from the position A to position B, thereby moving the engaging mechanism support 36 relative to the wall support 38.

[0067] According to certain embodiments of the present invention, the method of sealing a vehicle to a structure also includes pulling a resilient member connected to the first deformable medium towards a side of a vehicle using the first deformable medium as the first deformable medium is deformed. This pulling step may be implemented, for example, by deforming the belt 26 illustrated in FIG. 2 with the door 12, sidewall 20 and/or hinge 22 of the vehicle 10. As the belt 26 gets deformed, the resilient member 24 connected to the belt 26 is pulled towards the sidewall 20 by the belt 26. As the resilient member 24 gets closer to the sidewall 20, a seal is formed between the resilient member 24 and the sidewall.

[0068] The above-described pulling step typically forms a seal between the resilient member and the side of the vehicle and may also seal the hinge gap. As illustrated in FIG. 4, in position A, the resilient member 24 and the inside of the sidewall 20 are in close enough proximity to each other to seal off the outside environment. Additional sealing of the hinge gap is provided between the receiving-member-adja
cent deformable medium 28 and the top surface of the vehicle 10 illustrated in FIG. 4.

[0069] It should be noted that, according to certain embodiments of the present invention, the above-discussed sealing methods and seals are not limited to those that provide hermetic sealing. More specifically, one of skill in the art will appreciate that, since delivery truck and loading dock geometries can fluctuate, not all engaging mechanisms and methods of sealing according to the present invention will fully prevent conditioned air from being lost to the outside. Rather, according to the present invention, a seal and/or a method of sealing hinders at least some, and sometimes all, of the conditioned air from being lost to the outside. In other words, for the purposes of this document, sealing means hindering air movement.

[0070] The many features and advantages of the invention are apparent from the detailed specification, and thus, it is intended by the appended claims to cover all such features and advantages of the invention which fall within the true spirit and scope of the invention. Further, since numerous modifications and variations will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation illustrated and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed is:

1. A panel assembly, comprising:
   a first panel that includes
   a first foam core having a first side, and
   a first layer adjacent to the first side;
   a second panel; and
   a first connector connected to the first panel and to the second panel and configured to allow for the first panel to move relative to the second panel.

2. The panel assembly of claim 1, wherein the first layer comprises a polymer.

3. The panel assembly of claim 2, wherein the first layer comprises a plurality of plastic sheets.

4. The panel assembly of claim 1, wherein the first layer extends around a perimeter of the first foam core.

5. The panel assembly of claim 4, wherein the first layer comprises at least one of steel, fiberglass, wood or aluminum.

6. The panel assembly of claim 1, wherein the second panel comprises:
   a second foam core having a second side; and
   a second layer adjacent to the second side.

7. The panel assembly of claim 6, wherein the second layer comprises a polymer.

8. The panel assembly of claim 7, wherein the second layer comprises a plurality of plastic sheets.

9. The panel assembly of claim 6, wherein the second layer comprises at least one of steel, fiberglass, wood or aluminum.

10. The panel assembly of claim 1, further comprising:
    an engaging mechanism attached to the first panel, the engaging mechanism including:
    a receiving member configured to accommodate insertion of a portion of a vehicle therein,
    a resilient member connected to the receiving member,
    a belt connected to the resilient member, and
    a deformable member connected to the receiving member.

11. A method of manufacturing a panel assembly, the method comprising:
    forming a first panel having a first foam core and a first layer adjacent to a first side of the first foam core;
    attaching the first layer to the first side of the first foam core; and
    attaching a second panel to the first panel using a first connector.

12. The method of claim 11, wherein the forming the first panel step comprises:
    laminating a first polymer sheet onto the first side of the first panel to form the first layer.

13. The method of claim 11, wherein the forming the first panel step comprises:
    injecting a foam into a first casing to form the first foam core, wherein the first casing includes the first layer.

14. The method of claim 11, further comprising:
    forming the second panel to have a second foam core and a second layer adjacent to a first side of the second foam core; and
    attaching the second layer to the first side of the second foam core.

15. The method of claim 14, wherein the forming the second panel step comprises:
    laminating a second polymer sheet onto the first side of the second panel to form the second layer.
16. The method of claim 14, wherein the forming the second panel step comprises:
injecting a foam into a second casing to form the second foam core, wherein the second casing includes the second layer.
17. The method of claim 11, further comprising:
attaching an engaging mechanism to the first panel.
18. The method of claim 17, further comprising:
forming the engaging mechanism to include a receiving member configured to accommodate insertion of a portion of a vehicle therein, a resilient member connected to the receiving member, a belt connected to the resilient member and a deformable member connected to the receiving member.
19. A panel assembly, comprising:
first engaging means for engaging a first portion of a vehicle, the first engaging means including:
filling means for filling an interior portion of the first engaging means, wherein the filling means includes a first side, and
covering means for covering the filling means, wherein the covering means is positioned adjacent to the first side of the filling means; and
second engaging means for engaging the first portion of the vehicle; and
connecting means for connecting the first engaging means and the second engaging means, wherein the connecting means is configured to allow for the first engaging means to move relative to the second engaging means.
20. The panel assembly of claim 19, further comprising:
third engaging means for engaging a second portion of the vehicle, wherein the third engaging means is connected to the first engaging means, the third engaging model including:
receiving means for receiving the second portion of the vehicle therein;
first sealing means for creating a seal against a first surface of the vehicle;
second sealing means for creating a seal against a second surface of the vehicle; and
pulling means, detached from the second aligning means, for pulling the first sealing means toward the first surface of the vehicle when the portion of the vehicle is received within the receiving means.