REINFORCED BULKHEADS AND METHODS
OF MAKING SAME

Inventor: Fred Jevaney, Elmhurst, IL (US)

Correspondence Address:
BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610 (US)

Appl. No.: 12/176,926
File: Jul. 21, 2008

Publication Classification

Int. Cl.
B61D 45/00 (2006.01)
B21D 53/88 (2006.01)

U.S. Cl. 410/129; 29/897.2

ABSTRACT

A reinforced bulkhead and method of manufacturing a reinforced bulkhead are disclosed. The bulkhead includes at least one rod that increases the strength and rigidity of the bulkhead. The rod is inserted during the manufacturing process. The size and shape of the bulkhead may be customized after the rod is inserted into the bulkhead core, allowing a manufacturer to prefabricate a large number of bulkhead cores and then customize the prefabricated cores on an as-needed basis.
REINFORCED BULKHEADS AND METHODS OF MAKING SAME

FIELD OF THE INVENTION

[0001] The present invention relates to bulkheads and methods of manufacturing bulkheads.

BACKGROUND OF THE INVENTION

[0002] Bulkheads are used in trailers and the like to divide the trailer into separate storage compartments and, sometimes, to maintain each compartment at a temperature necessary to preserve the goods during transport. Frequently, the bulkheads are movable to allow a trucker to adjust the size or configuration of the individual compartments.

[0003] Movable bulkheads must be sufficiently strong to withstand the rigors of routine daily use, shifting loads during transit and potentially damaging lifts and trolleys that are used to load and unload products from the trailer.

SUMMARY OF THE INVENTION

[0004] A method of manufacturing a bulkhead is provided. The method includes the steps of forming a bulkhead core, creating a cavity in the bulkhead core and inserting a rod into the cavity.

[0005] A reinforced bulkhead is also provided. The bulkhead includes a bulkhead core that is made of a material that is flexible and a rod that is located inside the bulkhead core. The rod is less flexible than the bulkhead core and helps reinforce the finished bulkhead.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1. is a front elevational view of a bulkhead of the present invention.

[0007] FIG. 2. is a horizontal cross-section view of a bulkhead of the present invention taken across line 2-2 shown in FIG. 1.

[0008] FIG. 3. shows the pre-assembled layers of a bulkhead of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0009] A preferred bulkhead 1 is shown in FIG. 1. The bulkhead 1 has front and back sides and four edges. The bulkhead has a vertical length and a horizontal width.

[0010] The preferred bulkhead 1 includes bumpers 5 around the periphery of the bulkhead. The bumpers 5 provide a resilient and deformable seal between the edge of the bulkhead and the structure adjoining the bulkhead, such as the floor, ceiling, walls or another bulkhead. The bulkhead 1 also includes a kick plate 6. Kick plate 6 is a rugged plate that protects the bulkhead 1 from damage in the course of ordinary use, such as damage caused by carts or trolleys when loading and unloading goods from the trailer. In a preferred embodiment, the kick plate 6 is made of an ultra high molecular weight polyethylene. The kick plate may be attached to the bulkhead 1 using any known fastening system, including screws or adhesive.

[0011] The bulkhead 1 may also include straps 13. The straps 13 provide a handhold for raising or lowering the bulkhead between the closed (vertical) position and the open (horizontal) position. The straps 13 may be attached to the bulkhead using any acceptable means of attachment, such as a bolt through the strap and bulkhead that is secured with a nut.

[0012] FIG. 2. shows a cross-section of the finished bulkhead of FIG. 1 and shows the construction of the preferred bulkhead 1 in greater detail. FIG. 3. shows a cross-section of the pre-assembled layers of a preferred bulkhead. The bulkhead 1 includes a bulkhead core 14. The preferred bulkhead core 14 includes a central layer 7 and outer layers 8. While a three layer core is shown in FIG. 2., any number of layers may be used in the present invention. In a preferred embodiment, the bulkhead core is approximately 48 inches wide, 108 inches long, and 3 inches thick.

[0013] Materials that are suitable for the layers of the bulkhead core are well known in the art. Any such material is acceptable for use in the present invention. For bulkheads that may be used to divide refrigerated compartments, it is desirable that the material for the bulkhead core have good insulating properties so that the finished bulkhead provides an effective thermal barrier between compartments. By way of example, preferred materials for the bulkhead core include closed or open cell foams that are made from a polymeric material such as polysyrene, polyurethane, polyethylene, polypropylene, or expandable rubber.

[0014] In a preferred embodiment, the central layer 7 is made of a closed cell foam made of expandable polystyrene and it has a thickness of approximately two and one-half inches.

[0015] The outer layers 8 are preferably made from a different material than the central layer 7 and are thinner than the center layer 7. It is also desirable that the outer layers have a hardness that is lower than the hardness of the central layer 7. In a preferred embodiment, the outer layers 8 are made of a polyethylene foam.

[0016] The outer layers 8 may be attached to the center layer 7 with a sheet of hot melt adhesive 16, as shown in FIG. 3. Such hot melt adhesives are well known in the art. An exemplary hot melt adhesive is commercially available from BOSTIK under the tradename 2571B.

[0017] The preferred bulkhead 1 shown in FIGS. 1 and 2 also includes a protective skin 9. Like the bulkhead core, materials for the protective skin 9 are well known in the art and any one of the materials known in the art is acceptable for use in the present invention, including acrylonitrile butadiene styrene, reinforced vinyl, a composite mesh of fiberglass and polyethylene or polypropylene and woven polyethylene. The protective skin 9 may be a woven polymeric material. In a preferred embodiment, the protective skin 9 is made of 18 ounce vinyl.

[0018] The protective skin 9 may be attached to the bulkhead core 14 using any acceptable means of attachment, including adhesive or hot melt technology. Preferably, the protective skin 9 and the outer layers 8 are made of the same or similar material (i.e., both are polyethylene or both are vinyl) and the two structures are bonded together using hot melt technology. Alternatively, film adhesive polyethylene 17 may be used, as shown in FIG. 3. A preferred film adhesive is a 2 mil film that is commercially available from DOW CHEMICAL under the tradename INTEGRAL 801.

[0019] The preferred bulkhead 1 shown in FIGS. 1 and 2 also includes bumpers 5. The bumpers 5 provide a resilient, deformable seal between the bulkhead and the walls, floor, ceiling and/or adjacent bulkheads. Bumper constructions are well known in the art and any one of the constructions is
acceptable for use in the present invention. In the preferred embodiment shown in FIG. 2, the bumper 5 includes bumper material 10 that may be made of any acceptable material, such as a synthetic, loose-fill material such as flexible polyethylene or urethane foam. The bumper material 10 may be attached to the edges of the bulkhead core with pressure sensitive glue.

[0020] The bulkhead 1 shown in FIGS. 1 and 2 also include a protective wrap 11. The protective wrap 11 is applied to the edges of the bulkhead 1 and protects the bulkhead 1 from abrasive wear and tear during the ordinary use of the bulkhead 1. The protective wrap preferably consists of a durable, wear-resistant material, such as vinyl, polyethylene and nylon. The protective wrap is preferably heat sealed to the bulkhead, but alternatively may be attached with an adhesive or any other suitable means of attachment. If the protective wrap 11 is to be heat sealed to the bulkhead, it is preferable that the protective wrap 11 and the skin 9 be made of the same or similar material (i.e., both are polyethylene or both are vinyl).

[0021] The bulkheads of the present invention include rods 12. The rods 12 may be made of any acceptable material. Preferably, the rods are made of any acceptable material. The rods strengthen and/or stiffen the finished bulkhead 1. By way of example, the rods 12 may be constructed of fiberglass, carbon fiber, wood, metal (e.g., steel or aluminum) or plastic (e.g., polyvinylchloride, polycarbonate). In a preferred embodiment, the rods 12 are constructed of fiberglass. The rods 12 may be hollow or solid. Preferably, the rods 12 are hollow. The rods 12 may have a circular, square or any other shape cross-section. Preferably, the rods 12 have a circular cross-section and have an outer diameter of approximately one inch and an inner diameter of approximately 0.855 inch.

[0022] The rods 12 are located inside the bulkhead core 14. Preferably, the rods 12 span the length of the bulkhead core and are spaced equally across the width of the bulkhead core. Alternatively, the rods 12 may span the width of the bulkhead core and be spaced equally across the length of the bulkhead core. It should be understood that the rods 12 need not span the entire width or the entire length of the bulkhead core from edge to edge. Instead, the ends of the rods 12 may be recessed from the edges of the bulkhead core. As yet another alternative, the ends of the rods may protrude slightly from the bulkhead core 14.

[0023] The bulkheads of the present invention may be used in any number of well-known bulkhead systems. Exemplary systems include, for example, the trolley and rail system shown in U.S. Pat. No. 4,659,831 or U.S. Pat. No. 2,866,419. In order to be used in such a system, the bulkhead must be capable of being attached to the rail system. Accordingly, the side of the bulkhead that is attached to the rail system may have a slightly different shape with cut-outs for accommodating the mounting equipment. The bulkhead may also have equipment attached to, or integrally molded with, the bulkhead in order to attach the bulkhead to the rail system.

[0024] A preferred method of manufacturing the bulkheads of the present invention will now be described. The method described below relates to the preferred bulkhead described above, however, it should be understood that the method may be adapted for use in manufacturing other bulkhead embodiments. The center layer of the bulkhead core is cut to the desired shape. The outer layers of the bulkhead core are then attached to the center layer with sheets of hot melt adhesive.

[0025] One or more cavities are then formed in the bulkhead core to accommodate the rods. The cavities may be formed using a hot knife or by boring a hole in the bulkhead core with a drill or coring machine. A rod is then inserted into each cavity after it is formed. The rods may be secured in the cavity using an adhesive, such as a synthetic rubber adhesive. In a preferred embodiment, if a hollow tube is used, a plug is placed in each end of the tube.

[0026] Alternatively, the cavity may be formed and the rod may be inserted into the bulkhead at the same time in a single step. This is accomplished by using the rod to form the cavity. This may be done by sharpening the ends of the rod and then pushing the sharpened end of the rod, preferably with rotation, through the bulkhead core. Alternatively, a drill bit-like plug may be inserted into one end of the rod. The rod with the drill bit-like plug is then rotated and advanced into the bulkhead core so that the rod acts like a drill bit and the cavity is created as the rod is advanced into the bulkhead core.

[0027] After the bulkhead core is formed and the rods are inserted into the core, the bulkhead may be trimmed to a particular size and shape. The bulkhead may have to be trimmed because bulkheads do not come in a standard size and shape; rather, the size and shape of the bulkhead varies according to the particular trailer and bulkhead configuration for each customer. The bulkhead may be trimmed using any acceptable means, such as a band saw.

[0028] After the bulkhead core 14 is trimmed to the desired size and shape, the skin 9 is applied to the front and back sides of the bulkhead core. The skin 9 may be attached using a sheet of adhesive film. Alternatively, the skin 9 may be attached to the bulkhead core by applying sufficient temperature and pressure to the skin so that the skin 9 and outer layers 8 of the bulkhead core partially melt and form a fusion bond. The skin 9 that is applied to the front and back sides of the bulkhead core 14 is preferably longer and wider than the dimensions of the bulkhead core 14 so that there is extra material that can be folded around the bumper material, as described below.

[0029] After the skin 9 is attached to the bulkhead core, the bumper material 10 is placed around the periphery of the bulkhead core and secured to the edges of the core with pressure sensitive glue. The extra skin 9 that extends beyond the edges of the bulkhead core 14 is then folded around the bumper material 10.

[0030] The protective wrap 11 is then applied to the edges and wrapped around the bumper material 10. The protective wrap 11 is attached to the bulkhead using adhesive, such as a synthetic rubber adhesive, to form the finished bulkhead.

[0031] Finally, extra features and structures, including the kick plate 6 and straps 13, may be attached to the bulkhead using bolts, screws, adhesives or any other anchor that provides a strong connection between the structure and the bulkhead.

[0032] The described bulkhead design and manufacturing process enables improvements in manufacturing efficiency. Bulkheads are needed in a large variety of shapes and sizes depending on the type of tractor trailer and the type of bulkhead system.

[0033] The bulkheads of the present invention may be easily customized during the manufacturing process. The finished bulkhead cores with inserted rods may be mass produced and placed in a storage area for finishing when necessary. When an order comes in, prefabricated bulkhead cores with inserted rods may be pulled out of the storage area, cut to size and then finished with the skin and bumpers. This process enables the manufacturer to prefabricate a large num-
ber of bulkhead cores and then quickly finish the bulkheads according to customized dimensions in a faster, more efficient manner.

[0034] It is intended that the foregoing detailed description be regarded as illustrative rather than limiting, and that it be understood that it is the following claims, including all equivalents, that are intended to define the spirit and scope of this invention.

1. A method of manufacturing a bulkhead comprising the steps of:
   a. forming a bulkhead core;
   b. creating a cavity in the bulkhead core; and
   c. inserting a rod into the cavity.

2. The method of claim 1, further comprising the step of trimming the bulkhead to a desired size.

3. The method of claim 1, further comprising the step of attaching a bumper to the bulkhead core.

4. The method of claim 1, wherein the cavity runs longitudinally down the length of the core.

5. The method of claim 1, wherein the cavity is formed with a hot knife.

6. The method of claim 1, wherein steps (b) and (c) are done simultaneously.

7. The method of claim 1, wherein the bulkhead core comprises a closed cell foam.

8. A method of manufacturing a bulkhead comprising the steps of:
   a. forming a bulkhead core, wherein the bulkhead core has first and second sides that are substantially parallel to each other and third and forth sides that are substantially perpendicular to the first and second sides, the first side being capable of attachment to a mounting system;
   b. creating a plurality of cavities in the bulkhead core, wherein the cavities are substantially parallel to the second and third sides;
   c. inserting a plurality of rods into the cavities;
   d. placing the bulkhead core with rods into a storage area;
   e. retrieving the bulkhead core with rods from the storage area;
   f. cutting the bulkhead core to a desired length and width;
   g. attaching a bulkhead skin to the bulkhead core;
   h. attaching a bumper to the bulkhead core; and
   i. attaching a protective wrap to the bulkhead core.

9. The method of claim 8, further comprising the steps of:
   a. a bulkhead core, wherein the bulkhead core comprises a material that is flexible;
   b. a rod that is located inside the core, wherein the rod is less flexible than the bulkhead core.

10. The bulkhead of claim 10, wherein the bulkhead includes more than one rod.

11. The bulkhead of claim 10, wherein the rod runs longitudinally along the length of the bulkhead core.

12. The bulkhead of claim 10, wherein the rod comprises a hollow fiberglass tube.

13. The bulkhead of claim 10, wherein the material is a closed cell foam.

14. The bulkhead of claim 10, wherein the bulkhead core comprises at least three layers, each of which comprises a material that is a closed cell foam.

* * * * *