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(54) **DEPLOYMENT STRUCTURE FOR AN INFLATABLE VEHICLE OCCUPANT PROTECTION DEVICE**

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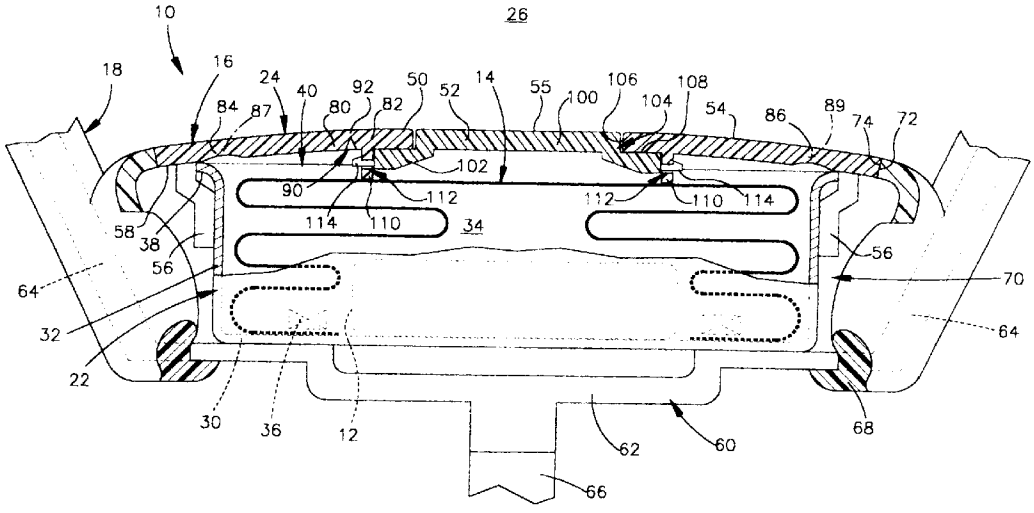
(57) **ABSTRACT**

A vehicle occupant protection apparatus **(10)** includes a pivotal deployment door **(82)** and a decorative emblem structure **(52)** having an installed position on the deployment door **(82)**. The deployment door **(82)** is configured to open under the influence of inflation fluid pressure forces applied by an inflatable vehicle occupant protection device **(14)**. The apparatus **(10)** further includes a first fastener structure **(110)** on the deployment door **(82)** and a second fastener structure **(114)** on the emblem structure **(52)**. The fastener structures **(110, 114)** are configured to snap together to establish a mechanical interlock between the deployment door **(82)** and the emblem structure **(52)** upon movement of the emblem structure **(52)** to the installed position on the deployment door **(82)**.



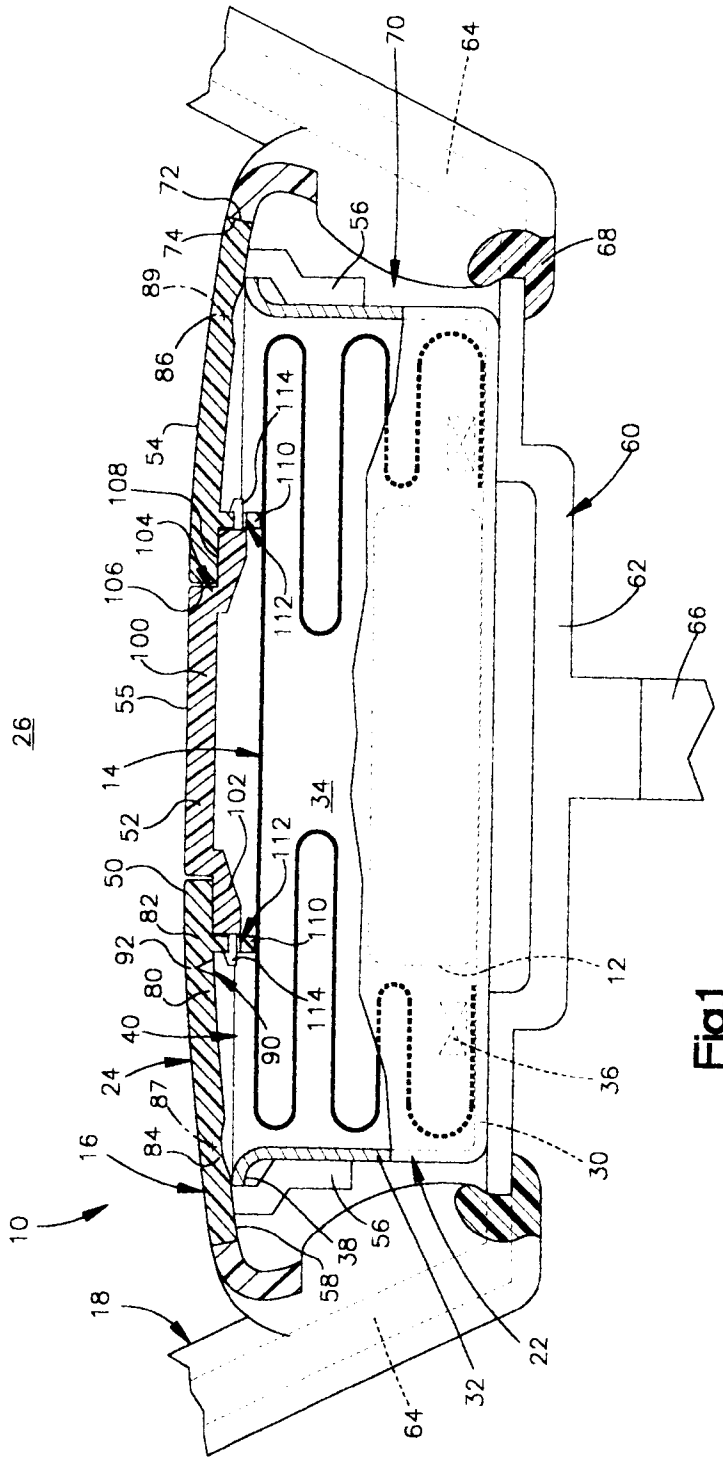

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Fig.1

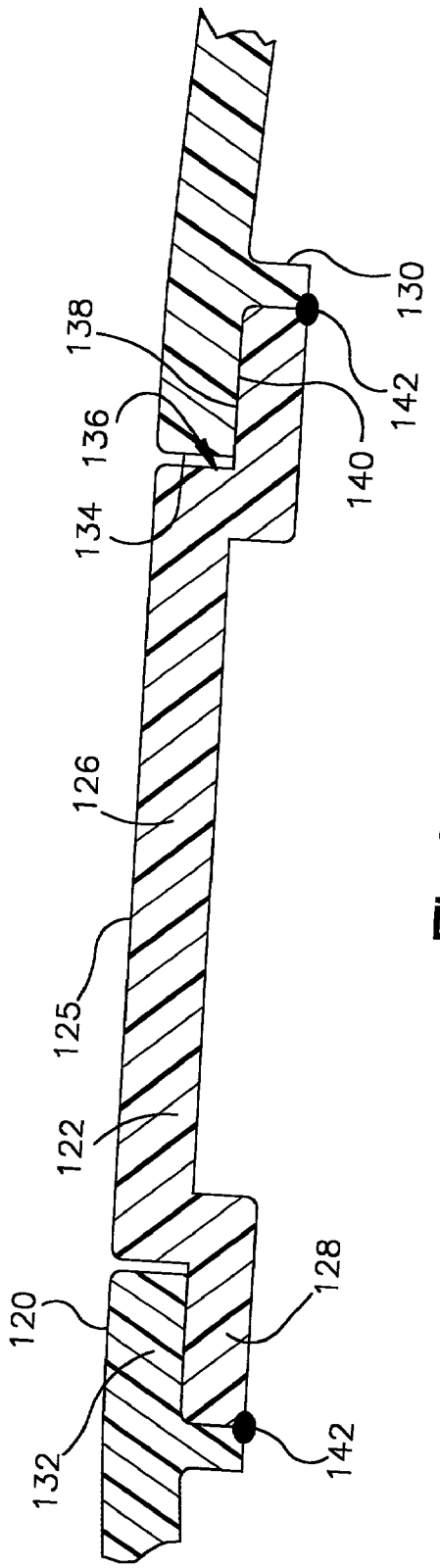

Fig.2

DEPLOYMENT STRUCTURE FOR AN INFLATABLE VEHICLE OCCUPANT PROTECTION DEVICE

FIELD OF THE INVENTION

[0001] The present invention relates to an inflatable vehicle occupant protection device, and particularly relates to a deployment structure for covering the protection device in a vehicle.

BACKGROUND OF THE INVENTION

[0002] An inflatable vehicle occupant protection device, such as an air bag, is inflated when a vehicle experiences a crash. Inflation fluid is directed to flow from an inflator into the air bag to inflate the air bag. When the air bag is inflated, it extends into the vehicle occupant compartment to help protect an occupant of the vehicle from a forceful impact with parts of the vehicle as a result of the crash.

[0003] A deployment structure conceals the air bag and the inflator from view in the vehicle occupant compartment. The deployment structure includes one or more pivotal deployment doors which extend over the air bag. As the inflation fluid begins to flow from the inflator into the air bag, it moves the air bag against the deployment structure. The deployment doors are opened by the air bag as the inflation fluid continues to inflate the air bag into the vehicle occupant compartment. A decorative emblem may be mounted on one of the deployment doors.

SUMMARY OF THE INVENTION

[0004] In accordance with the present invention, an apparatus comprises a pivotal deployment door and a decorative emblem structure having an installed position on the deployment door. The deployment door is configured to open under the influence of inflation fluid pressure forces applied by an inflatable vehicle occupant protection device. The apparatus further comprises a first fastener structure on the deployment door and a second fastener structure on the emblem structure. The fastener structures are configured to snap together to establish a mechanical interlock between the deployment door and the emblem structure upon movement of the emblem structure to the installed position on the deployment door.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The foregoing and other features of the present invention will become apparent to one skilled in the art to which the present invention relates upon reading the following description of the invention with reference to the accompanying drawings, wherein:

[0006] **FIG. 1** is a side view, partly in section, of an apparatus comprising a first embodiment of the present invention; and

[0007] **FIG. 2** is a side view, partly in section, of parts of an apparatus comprising a second embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] An apparatus **10** comprising a first embodiment of the present invention is shown in **FIG. 1**. The apparatus **10** includes an inflator **12** and an inflatable vehicle occupant protection device **14** which is commonly referred to as an air bag. In the first embodiment of the invention, air bag **14** and the inflator **12** are parts of an air bag module **16** which is mounted on a vehicle steering wheel **18**.

[0009] The module **16** is an assembly of parts that are interconnected separately from the steering wheel **18**. In addition to the air bag **14** and the inflator **12**, such parts include a reaction structure **22** which contains the air bag **14** and the inflator **12**, and a deployment structure **24** which conceals the air bag **14** and the other parts of the module **16** from view in the vehicle occupant compartment **26**. When the air bag **14** is inflated, it extends into the vehicle occupant compartment **26** between the steering wheel **18** and the driver of the vehicle to help restrain movement of the driver toward the steering wheel **18**.

[0010] The inflator **12** is a known device containing a source of inflation fluid for inflating the air bag **14**. The inflator **12** may thus contain pressurized inflation fluid, a body of ignitable gas-generating material, or a combination of pressurized inflation fluid and ignitable material for heating the inflation fluid. The ignitable material may comprise a fuel gas or a combustible mixture of gases, as known in the art. As further known in the art, the inflator **12** is actuated upon the occurrence of a vehicle crash having at least a specified threshold level of severity for which inflation of the air bag **14** is desired to help restrain the driver. The inflation fluid then flows rapidly from the inflator **12** into the air bag **14** to inflate and deploy the air bag **14** outward from the steering wheel **18** toward the driver.

[0011] The air bag **14** may be constructed of one or more panels of any suitable material known in the art, including woven materials and plastic films. The panels of air bag material are interconnected along seams that are formed by stitches, ultrasonic welds, adhesives, heat staking, or the like, depending on the particular air bag material of which the panels are formed. Preferably, the air bag **14** is constructed of panels formed of a nylon fabric which is coated with silicone. Any suitable arrangement of folds can be used to place the air bag **14** in the folded, uninflated condition in which it is shown schematically in **FIG. 1**.

[0012] The reaction structure **22** includes a reaction plate **30** and a frame **32**. The frame **32** extends about the periphery of the reaction plate **30**, and projects upward (as viewed in **FIG. 1**) to define the depth and peripheral boundaries of a storage compartment **34** in which the inflator **12** and the folded air bag **14** are received. A retainer assembly **36** (shown schematically) interconnects the inflator **12**, the air bag **14**, and the reaction plate **30** in a known manner. A rim portion **38** of the frame **32** defines a deployment opening **40** through which the air bag **14** emerges from the storage compartment **34** upon being inflated into the vehicle occupant compartment **26**.

[0013] The deployment structure **24** in the first embodiment of the present invention includes a panel structure **50** and a decorative emblem structure **52**. The panel structure **50** extends across the deployment opening **40** and projects beyond the rim **38** of the frame **32** fully about the periphery of the frame **32**. An outer side surface **54** of the panel structure **50** is a Class-A surface, i.e., a trim surface that is visible in the vehicle occupant compartment **26**. An outer side surface **55** of the emblem structure **52** also is a Class-A

surface. A pair of mounting portions **56** of the deployment structure **24** project from an inner side surface **58** of the panel structure **50**. The mounting portions **56** are interconnected with the reaction structure **22** in a known manner, such as by the use of fasteners (not shown).

[**0014**] As shown by way of example, the steering wheel **18** has an armature **60** with distinct portions including a hub **62**, a circular rim (not shown), and a plurality of spokes **64** projecting from the hub **62** to the rim. The hub **62** is mounted on an input shaft **66** in a vehicle steering column. A molded plastic cover **68** on the armature **60** encapsulates the spokes **64** and the rim. The module **16** is received within a cavity **70** defined by the cover **68**, and is fixed to the armature **60** in a known manner. A peripheral edge surface **72** of the panel structure **50** fits closely against a surrounding inner edge surface **74** of the cover **68**.

[**0015**] The panel structure **50** includes first and second deployment doors **80** and **82**. A corresponding pair of relatively thin portions **84** and **86** of the panel structure **50** are configured as hinges. The hinges **84** and **86** define pivotal axes **87** and **89** for the deployment doors **80** and **82**, respectively.

[**0016**] A notch **90** at the inner side surface **58** of the panel structure **50** is elongated in a generally H-shaped configuration. The notch **90** thus extends along three sides of the first deployment door **80** between opposite ends of the first hinge **84**. The notch **90** further extends along three sides of the second deployment door **82** between opposite ends of the second hinge **86**. A thinned section **92** of the panel structure **50** is located between the notch **90** and the outer side surface **54**. The thinned section **92** is elongated coextensively with the notch **92** so as to define a stress riser which likewise extends along three sides of each of the deployment doors **80** and **82**.

[**0017**] As inflation fluid begins to flow from the inflator **12** into the air bag **14**, it causes the air bag **14** to apply fluid pressure forces outwardly against the deployment doors **80** and **82**. The stress riser **92** ruptures under the stress induced by the fluid pressure forces. The deployment doors **80** and **82** are then moved pivotally open by the air bag **14** as the inflation fluid continues to inflate and deploy the air bag **14** outward from the storage chamber **34** and into the vehicle occupant compartment **26**.

[**0018**] In accordance with the present invention, the deployment structure **24** is configured to prevent the emblem structure **52** from being dislodged under the influence of the inflation fluid pressure forces applied by the inflating air bag **14**. Specifically, the Class-A surface **55** on the emblem structure **52** is defined by a decorative portion **100** of the emblem structure **52**. The decorative portion **100** of the emblem structure **52** projects from a base portion **102**, and is received through an opening **104** defined by an inner edge surface **106** of the second deployment door **82**. The base portion **102** of the emblem structure **52** is configured as a flange projecting from the decorative portion **100** fully about the periphery of the decorative portion **100**. An outer side surface **108** of the base portion **102** abuts the inner side surface **58** of the panel structure **56** fully about the periphery of the opening **104** in the second deployment door **82**.

[**0019**] A plurality of mounting bosses **110**, two of which are shown in **FIG. 1**, project from the inner side surface **58** of the panel structure **50** at the second deployment door **82**. Each mounting boss **110** has at least one slot **112**. A plurality of locking tabs **114** on the emblem structure **52** project laterally from the periphery of the base portion **102**. The locking tabs **114** extend through the slots **112**. The locking tabs **114** are configured to snap into interlocked engagement with the mounting bosses **110**, and thereby to interlock the emblem structure **52** with the second deployment door **82**, upon being received through the slots **112**. In accordance with this feature of the present invention, the panel structure **50** and/or the emblem structure **52** is formed of a molded plastic material. The plastic material is flexible enough to enable the locking tabs **114** to be received through the slots **112** upon movement of the emblem structure **52** to the installed position in which it is shown in **FIG. 1**.

[**0020**] Parts of a second embodiment of the present invention are shown in **FIG. 2**. The second embodiment includes a panel structure **120** and an emblem structure **122** in place of the panel structure **50** and the emblem structure **52** in the first embodiment.

[**0021**] The emblem structure **122** in the second embodiment does not have locking tabs, but is otherwise substantially the same as the emblem structure **52** in the first embodiment. The emblem structure **122** thus has a Class-A surface **125** on a decorative portion **126** which projects from a flange-like base portion **128**.

[**0022**] The panel structure **120** in the second embodiment has only a single mounting boss **130**, but is otherwise substantially the same as the panel structure **50** in the first embodiment. The panel structure **120** thus includes a deployment door **132** with an inner edge surface **134** defining an opening **136** for the decorative portion **126** of the emblem structure **122**. An outer side surface **138** of the base portion **128** abuts an inner side surface **140** of the deployment door **132** entirely around the opening **136**.

[**0023**] Preferably, the mounting boss **130** adjoins the emblem structure **122** continuously and fully about the periphery of the base portion **128** of the emblem structure **122**. The mounting boss **130** and the emblem structure **122** are interconnected by heat-staking at the juncture of the mounting boss **130** and the base portion **128**. Such heat-staking could be provided at locations **142** that are spaced apart about the periphery of the base portion **128**, as shown in **FIG. 2**, or continuously and fully about the periphery of the base portion **128**.

[**0024**] From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

Having described the invention, the following is claimed:

1. Apparatus comprising:

a pivotal deployment door configured to open under the influence of inflation fluid pressure forces applied by an inflatable vehicle occupant protection device;

a decorative emblem structure having an installed position on said deployment door;

a first fastener structure on said deployment door; and

a second fastener structure on said emblem structure;

said fastener structures being configured to snap together to establish a mechanical interlock between said deployment door and said emblem structure upon movement of said emblem structure to said installed position.

2. Apparatus as defined in claim 1 wherein said emblem structure has a decorative portion with a Class-A surface, said deployment door having an inner edge surface defining an opening through which said decorative portion is receivable upon said movement of said emblem structure to said installed position.

3. Apparatus as defined in claim 2 wherein said deployment door has an inner side surface surrounding said opening, said emblem structure having a base with an outer side surface movable into abutment with said inner side surface upon said movement of said emblem structure to said installed position.

4. Apparatus as defined in claim 1 wherein one of said fastener structures comprises a locking tab receivable through a corresponding slot in the other of said fastener structures upon said movement of said emblem structure to said installed position.

5. Apparatus comprising:

a pivotal deployment door which is configured to open under the influence of inflation fluid pressure forces applied by an inflatable vehicle occupant protection device, said deployment door having an inner edge surface defining an opening extending through said deployment door; and

a decorative emblem structure having a base and a decorative portion projecting from said base, said decorative portion extending through said opening and having a Class-A surface, said base having an outer side surface abutting an inner side surface of said deployment door at the periphery of said opening;

said deployment door and said emblem structure having portions that are heat-staked together.

6. Apparatus as defined in claim 5 wherein said deployment door has a rim projecting from said inner side surface, said rim surrounding said base of said emblem structure, said heat-staked portions of said deployment door and said emblem structure comprising adjoining portions of said rim and said base.

7. Apparatus as defined in claim 6 wherein said rim and said base are heat-staked together continuously around said rim.

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