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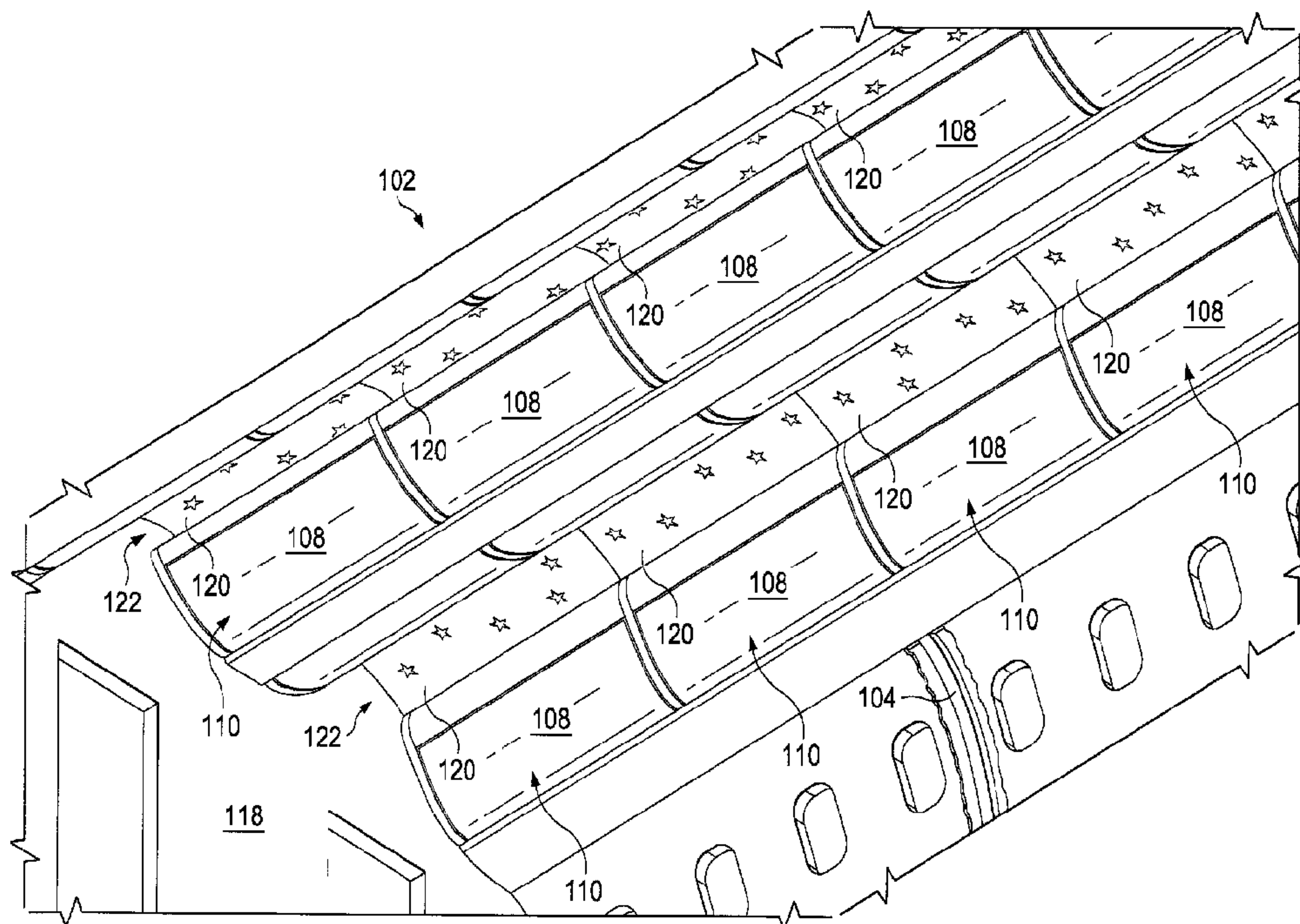
(71) Demandeur/Applicant:
THE BOEING COMPANY, US

(72) Inventeurs/Inventors:
IBRAHIM, YAKENTIM, US;
CALLAHAN, KEVIN S., US;
FEINBERG, MICHAEL ALAN, US

(74) Agent: SMART & BIGGAR

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(54) Title: APPARATUSES AND METHODS FOR ACOUSTICALLY EXCITING A FACE PANEL OF A STOWAGE BIN INSIDE A VEHICLE



(57) Abrégé/Abstract:

A media system for vehicle having chassis comprises electroacoustic transducer, integrated into face panel of stowage bin inside vehicle. Stowage bin comprises mounting structure that is stationary relative to chassis of vehicle. Interior of stowage bin is accessible via face panel. Face panel is movably coupled to mounting structure.

ABSTRACT

A media system for vehicle having chassis comprises electroacoustic transducer, integrated into face panel of stowage bin inside vehicle. Stowage
5 bin comprises mounting structure that is stationary relative to chassis of vehicle. Interior of stowage bin is accessible via face panel. Face panel is movably coupled to mounting structure.

APPARATUSES AND METHODS FOR ACOUSTICALLY EXCITING A FACE PANEL OF A STOWAGE BIN INSIDE A VEHICLE

TECHNICAL FIELD

The present disclosure relates to media systems for vehicles.

5 BACKGROUND

Flat panel speaker technology is often used to provide audio for environments in which a premium is placed on physical space and component weight, such as in an aircraft. However, vibration of surfaces that have been traditionally utilized for flat panel speaker technology often render those surfaces
10 incompatible with the incorporation of other systems that may be sensitive to vibration.

SUMMARY

Accordingly, apparatuses and methods, intended to address at least the above-identified concerns, would find utility.

15 The following is a non-exhaustive list of examples, which may or may not be claimed, of the subject matter according to the disclosure.

One example of the subject matter according to the disclosure relates to a media system for a vehicle having a chassis. The media system comprises an electroacoustic transducer, integrated into a face panel of a stowage bin
20 inside the vehicle. The stowage bin comprises a mounting structure that is stationary relative to the chassis of the vehicle. An interior of the stowage bin is accessible via the face panel. The face panel is movably coupled to the mounting structure.

Use of the media system that includes the electroacoustic transducer, as set
25 forth above, enables positioning the electroacoustic transducer in the face panel of the stowage bin inside a vehicle, such as an airplane. Positioning the electroacoustic transducer in the face panel of the stowage bin enables other surfaces inside the vehicle to be utilized for other functionalities. The face

panel is movably coupled to the mounting structure and provides access to the interior of the stowage bin.

Another example of the subject matter according to the disclosure relates to a vehicle, comprising a chassis and a passenger compartment. The passenger compartment comprises ceiling panels. The vehicle also comprises a stowage bin in the passenger compartment. The stowage bin comprises a mounting structure that is stationary relative to the chassis. The stowage bin also comprises a face panel, movably coupled to the mounting structure. The stowage bin additionally comprises an interior, accessible via the face panel.

The vehicle further comprises a media system. The media system comprises a high-definition display system, integrated into the ceiling panels. The media system also comprises an audio source, operatively coupled with the high-definition display system. The media system additionally comprises an electroacoustic transducer, integrated into the face panel of the stowage bin.

Use of the media system that includes the electroacoustic transducer, as set forth above, in a vehicle, such as an airplane, enables positioning the electroacoustic transducer in the face panel of the stowage bin inside the vehicle. Positioning the electroacoustic transducer in the face panel of the stowage bin enables other surfaces inside the vehicle, such as the ceiling panels of the passenger compartment of the vehicle, to be utilized for other functionalities, such as the high-definition display system, integrated into the ceiling panels of the passenger compartment.

Yet another example of the subject matter according to the disclosure relates to a method of acoustically exciting a face panel of a stowage bin inside a vehicle. The method comprises exciting the face panel with an electroacoustic transducer, integrated into the face panel of the stowage bin. The stowage bin further comprises a mounting structure that is stationary relative to a chassis of the vehicle. The stowage bin also comprises an interior, accessible via the face panel.

The method enables acoustic excitation of the face panel of the stowage bin via the electroacoustic transducer positioned therein. Implementing the method enables utilization of other surfaces inside the vehicle for other functionalities.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Having thus described examples of the present disclosure in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein like reference characters designate the same or similar parts throughout the several views, and
10 wherein:

FIG. 1 is a block diagram of a vehicle having a media system, according to one or more examples of the present disclosure;

FIG. 2 is a perspective view of a vehicle having a media system, according to one or more examples of the present disclosure;

15 **FIG. 3** is a cross-sectional view of an electroacoustic transducer, according to one or more examples of the present disclosure;

FIG. 4 is a cross-sectional view of an electroacoustic transducer integrated into a face panel of a stowage bin inside vehicle, according to one or more examples of the present disclosure;

20 **FIG. 5** is a perspective view of a mounting structure for a stowage bin, according to one or more examples of the present disclosure;

FIG. 6 is a perspective view of a stowage bin having a face panel shown in a first position with respect to the mounting structure, according to one or more of the present disclosure;

25 **FIG. 7** is a perspective view of a stowage bin having a face panel shown in a second position with respect to the mounting structure, according to one or more examples of the present disclosure;

FIG. 8 is a cross-sectional view of a stowage bin having an accelerometer coupled to the electroacoustic transducer and integrated into a face panel, according to one or more examples of the present disclosure;

FIG. 9 is a cross-sectional view of a stowage bin having an item
5 therein, according to one or more examples of the present disclosure;

FIG. 10 is a perspective view of a cover plate for a stowage bin having a retainer configured to locate the electroacoustic transducer along the cover plate, according to one or more examples of the present disclosure;

FIG. 11 is a cross-sectional view of a retainer shown according to an
10 illustrative embodiment and configured to locate the electroacoustic transducer along the cover plate, according to one or more examples of the present disclosure;

FIG. 12 is a cross-sectional view of a retainer shown according to an illustrative embodiment and configured to locate the electroacoustic
15 transducer along the cover plate, according to one or more examples of the present disclosure;

FIG. 13 is a perspective view of a cover plate having locally tailored physical characteristics, according to one or more examples of the present disclosure;

FIGS. 14A, 14B, and 14C are a block diagram of a method of utilizing
20 the media system of **FIG. 1**, according to one or more examples of the present disclosure;

FIG. 15 is a block diagram of aircraft production and service methodology; and

FIG. 16 is a schematic illustration of an aircraft.
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DETAILED DESCRIPTION

In **FIG. 1**, referred to above, solid lines, if any, connecting various elements and/or components may represent mechanical, electrical, fluid, optical, electromagnetic and other couplings and/or combinations thereof. As used
5 herein, “coupled” means associated directly as well as indirectly. For example, a member A may be directly associated with a member B, or may be indirectly associated therewith, e.g., via another member C. It will be understood that not all relationships among the various disclosed elements are necessarily represented. Accordingly, couplings other than those
10 depicted in the block diagrams may also exist. Dashed lines, if any, connecting blocks designating the various elements and/or components represent couplings similar in function and purpose to those represented by solid lines; however, couplings represented by the dashed lines may either be selectively provided or may relate to alternative examples of the present
15 disclosure. Likewise, elements and/or components, if any, represented with dashed lines, indicate alternative examples of the present disclosure. One or more elements shown in solid and/or dashed lines may be omitted from a particular example without departing from the scope of the present disclosure. Environmental elements, if any, are represented with dotted lines. Virtual
20 imaginary elements may also be shown for clarity. Those skilled in the art will appreciate that some of the features illustrated in **FIG. 1** may be combined in various ways without the need to include other features described in **FIG. 1**, other drawing figures, and/or the accompanying disclosure, even though such combination or combinations are not explicitly illustrated herein. Similarly,
25 additional features not limited to the examples presented, may be combined with some or all of the features shown and described herein.

In **FIGs. 15** and **16**, referred to above, the blocks may represent operations and/or portions thereof and lines connecting the various blocks do not imply any particular order or dependency of the operations or portions thereof.
30 Blocks represented by dashed lines indicate alternative operations and/or portions thereof. Dashed lines, if any, connecting the various blocks represent alternative dependencies of the operations or portions thereof. It

will be understood that not all dependencies among the various disclosed operations are necessarily represented. **FIGs. 15** and **16** and the accompanying disclosure describing the operations of the methods set forth herein should not be interpreted as necessarily determining a sequence in
5 which the operations are to be performed. Rather, although one illustrative order is indicated, it is to be understood that the sequence of the operations may be modified when appropriate. Accordingly, certain operations may be performed in a different order or simultaneously. Additionally, those skilled in the art will appreciate that not all operations described need be performed.

10 In the following description, numerous specific details are set forth to provide a thorough understanding of the disclosed concepts, which may be practiced without some or all of these particulars. In other instances, details of known devices and/or processes have been omitted to avoid unnecessarily obscuring the disclosure. While some concepts will be described in
15 conjunction with specific examples, it will be understood that these examples are not intended to be limiting.

Unless otherwise indicated, the terms "first," "second," etc. are used herein merely as labels, and are not intended to impose ordinal, positional, or hierarchical requirements on the items to which these terms refer. Moreover,
20 reference to, e.g., a "second" item does not require or preclude the existence of, e.g., a "first" or lower-numbered item, and/or, e.g., a "third" or higher-numbered item.

Reference herein to "one example" means that one or more feature, structure, or characteristic described in connection with the example is included in at
25 least one implementation. The phrase "one example" in various places in the specification may or may not be referring to the same example.

As used herein, a system, apparatus, structure, article, element, component, or hardware "configured to" perform a specified function is indeed capable of performing the specified function without any alteration, rather than merely
30 having potential to perform the specified function after further modification. In

other words, the system, apparatus, structure, article, element, component, or hardware “configured to” perform a specified function is specifically selected, created, implemented, utilized, programmed, and/or designed for the purpose of performing the specified function. As used herein, “configured to” denotes
5 existing characteristics of a system, apparatus, structure, article, element, component, or hardware which enable the system, apparatus, structure, article, element, component, or hardware to perform the specified function without further modification. For purposes of this disclosure, a system, apparatus, structure, article, element, component, or hardware described as
10 being “configured to” perform a particular function may additionally or alternatively be described as being “adapted to” and/or as being “operative to” perform that function.

Illustrative, non-exhaustive examples, which may or may not be claimed, of the subject matter according the present disclosure are provided below.

15 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 2-7**, media system **100** for vehicle **102** having chassis **104** is disclosed. Media system **100** comprises electroacoustic transducer **114**, integrated into face panel **108** of stowage bin **110** inside vehicle **102**. Stowage bin **110** comprises mounting structure **112** that is stationary relative to chassis **104** of
20 vehicle **102**. Interior **130** of stowage bin **110** is accessible via face panel **108**. Face panel **108** is movably coupled to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 1 of the present disclosure.

Use of media system **100** that includes electroacoustic transducer **114**, as set
25 forth above, enables positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110** inside vehicle **102**, such as an airplane. Positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110** enables other surfaces inside vehicle **102** to be utilized for other functionalities. Face panel **108** is movably coupled to mounting structure **112**
30 and provides access to interior **130** of stowage bin **110**.

For example, electroacoustic transducer **114** integrated in face panel **108** allows surfaces previously utilized for flat-panel speaker technology to be repurposed for other functions, such as providing a high-definition display inside vehicle **102**. By positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110**, media system **100** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-7**, face panel **108** of stowage bin **110** is capable of being moved between, inclusively, a first position relative to mounting structure **112** of stowage bin **110** and a second position relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 2 of the present disclosure, wherein example 2 also includes the subject matter according to example 1, above.

Allowing face panel **108** of stowage bin **110** to move between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**. Electroacoustic transducer **114** integrated in face panel **108** of stowage bin **110** while retaining the item-securing functionality of face panel **108** of retaining items within stowage bin **110** when face panel **108** is moved between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **8**, media system **100** further comprises attenuator **126**, operatively coupled to electroacoustic transducer **114**. Media system **100** also comprises audio source **124**, operatively coupled to attenuator **126**. Media system **100** additionally comprises accelerometer **116**, integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. Audio source **124** is configured to provide a first electrical signal to attenuator **126**. Attenuator **126** is configured to provide a second electrical signal to

electroacoustic transducer **114**. The preceding subject matter of this paragraph characterizes example 3 of the present disclosure, wherein example 3 also includes the subject matter according to example 2, above.

5 Use of media systems, such as media system **100** including attenuator **126**, allows for a second electrical signal, that may be different from a first electrical signal provided by audio source **124** to attenuator **126**, to be provided to electroacoustic transducer **114**. For example, when audio source **124** provides a first electrical signal to attenuator **126**, attenuator **126** provides a second electrical signal to electroacoustic transducer **114**. Use of
10 attenuator **126** allows attenuated electrical signals, different from the first electrical signal sent from audio source **124**, to drive electroacoustic transducer **114**.

Accelerometer **116** is integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. When coupled with attenuator **126**,
15 accelerometer **116** allows attenuated electrical signals to drive electroacoustic transducer **114** based on output from accelerometer **116** to attenuator **126**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, accelerometer **116** is configured to generate output responsive to a location of face panel **108** of stowage bin **110** between, inclusively, the first position of
20 face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 4 of the present disclosure, wherein example 4 also includes the subject matter according to example 3, above.

25 By configuring accelerometer **116** to generate output responsive to a location of face panel **108** of stowage bin **110**, attenuator **126** can provide an electrical signal to electroacoustic transducer **114** based on a location of face panel **108** relative to mounting structure **112**. When coupled with attenuator **126**, accelerometer **116** allows different electrical signals to drive electroacoustic

transducer **114** based a location of face panel **108** relative to mounting structure **112**.

In one illustrative example, accelerometer **116** may be a multiaxis accelerometer, capable of measuring acceleration in multiple directions. In this manner, accelerometer **116** detects acceleration as a vector quantity, and can be used to sense orientation of accelerometer **116**. When integrated into face panel **108** of stowage bin **110**, accelerometer **116** allows for the determination of a position of face panel **108**, including, inclusively, the first position of face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, when face panel **108** is in the first position relative to mounting structure **112**, attenuator **126** provides electroacoustic transducer **114** with the second electrical signal that is not attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, based on the location of face panel **108** relative to mounting structure **112**. When face panel **108** is in the second position relative to mounting structure **112**, attenuator **126** provides electroacoustic transducer **114** with the second electrical signal that is attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, at least based on the location of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 5 of the present disclosure, wherein example 5 also includes the subject matter according to example 4, above.

Use of accelerometer **116** integrated into face panel **108** of stowage bin **110** allows attenuator **126** to provide different electrical signals based on position of face panel **108** relative to mounting structure **112**. In one illustrative example, when face panel **108** is in the first position relative to mounting structure **112**, attenuator **126** provides an electrical signal that is not attenuated relative to the first electrical signal from audio source **124** based on the location of face panel **108**. In another illustrative example, when face

panel **108** is in the second position relative to mounting structure **112**, attenuator **126** provides an electrical signal that is attenuated relative to the first signal from audio source **124** based on the location of face panel **108**. In this manner, accelerometer **116** allows media system **100** to provide
5 attenuated audio to vehicle **102** based on a position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, responsive to face panel **108** of stowage bin **110** being moved with respect to mounting structure **112** of stowage bin **110** between, exclusively, the first
10 position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**, the second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, is linearly attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding
15 subject matter of this paragraph characterizes example 6 of the present disclosure, wherein example 6 also includes the subject matter according to example 5, above.

In one illustrative example, attenuator **126** linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of
20 stowage bin **110** is moved between the first position and the second position. A linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, responsive to face panel **108** of stowage bin **110** being moved with respect to mounting structure **112** of stowage bin **110** between, exclusively, the first
25 position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**, the second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, is non-linearly attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding
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subject matter of this paragraph characterizes example 7 of the present disclosure, wherein example 7 also includes the subject matter according to example 5, above.

5 In one illustrative example, attenuator **126** non-linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position. A non-linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

10 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, electroacoustic transducer **114** is configured to excite face panel **108** of stowage bin **110** based on the second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**. The preceding subject matter of this paragraph characterizes example 8 of the present disclosure,
15 wherein example 8 also includes the subject matter according to any one of examples **5** to **7**, above.

Exciting face panel **108** of stowage bin **110** based on the second electrical signal provides for selective excitement of face panel **108** by electroacoustic transducer **114** relative to the electrical signal received from attenuator **126**. In
20 this manner, a media system, such as media system **100**, can provide different excitation of face panel **108** of stowage bin **110** based on the position of face panel **108**. For example, electroacoustic transducer **114** can selectively excite face panel **108** according to a second electrical signal when face panel **108** is in second position relative to mounting structure **112**.

25 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-9**, face panel **108** of stowage bin **110** is configured to retain items **131** within interior **130** of stowage bin **110** when face panel **108** is in the first position. Face panel **108** is configured to provide access to interior **130** of stowage bin **110** when face panel **108** is in the second position. The preceding subject
30 matter of this paragraph characterizes example 9 of the present disclosure,

wherein example 9 also includes the subject matter according to example 8, above.

When in the first position, face panel **108** of stowage bin **110** is configured to retain items **131** within interior **130** of stowage bin **110**. When in the second
5 position, face panel **108** of stowage bin **110** is configured to provide access to interior **130** of stowage bin **110**. Allowing face panel **108** of stowage bin **110** to move between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also
10 providing access to interior **130** of stowage bin **110**. Electroacoustic transducer **114** integrated in face panel **108** of stowage bin **110** while retaining the item-securing functionality of face panel **108** of retaining items within stowage bin **110** when face panel **108** is moved between a first position relative to mounting structure **112** of stowage bin and second position relative
15 to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-9**, stowage bin **110** further comprises item detector **132**, operatively coupled to attenuator **126**. Item detector **132** is configured to provide an input to attenuator **126**, indicating whether items **131** are present within interior **130** of
20 stowage bin **110**. The preceding subject matter of this paragraph characterizes example 10 of the present disclosure, wherein example 10 also includes the subject matter according to example 9, above.

Item detectors, such as item detector **132**, may be incorporated into stowage bin **110**. Item detector **132** indicates to attenuator **126** whether items **131** are
25 present within interior **130** of stowage and **110**. By configuring item detector **132** to generate output responsive to the presence of items **131** which in interior **130** of stowage bin **110**, attenuator **126** can provide an electrical signal to electroacoustic transducer **114** based on the presence of items **131** within interior **130** of stowage bin **110**. When coupled with
30 attenuator **126**, item detector **132** allows different electrical signals to drive

electroacoustic transducer **114** based the presence of items **131** within interior **130** of stowage bin **110**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-9**, when items **131** are present within interior **130** of stowage bin **110**, the input from
5 item detector **132** causes attenuator **126** to provide electroacoustic transducer **114** with the second electrical signal that is not attenuated, at least based on the input from item detector **132** to attenuator **126**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. When items **131** are absent from interior **130** of stowage bin **110**,
10 attenuator **126** provides electroacoustic transducer **114** with the second electrical signal that is attenuated, based on the input from item detector **132** to attenuator **126**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding subject matter of this paragraph characterizes example 11 of the present disclosure, wherein
15 example 11 also includes the subject matter according to example 10, above.

Use of item detector **132** in stowage bin **110** allows attenuator **126** to provide different electrical signals based on the presence of items **131** within interior **130** of stowage bin **110**. In one illustrative example, when items **131** are absent from interior **130** of stowage bin **110**, attenuator **126** provides an
20 electrical signal that is attenuated relative to the first electrical signal from audio source **124** based on the location of face panel **108**. In another illustrative example, when items **131** are present within interior **130** of stowage bin **110**, attenuator **126** provides an electrical signal that is not attenuated relative to the first signal from audio source **124** based on the
25 location of face panel **108**. In this manner, accelerometer **116** allows media system **100** to provide attenuated audio to vehicle **102** based on a position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4**, media system **100** further comprises low-pass filter **128**, operatively coupled to
30 accelerometer **116**. Low-pass filter **128** is configured to adjust the output of accelerometer **116** based on acceleration of vehicle **102**. The preceding

subject matter of this paragraph characterizes example 12 of the present disclosure, wherein example 12 also includes the subject matter according to any one of examples 4 to 11, above.

When operatively coupled to accelerometer 116, low-pass filter 128 allows
5 media system 100 to adjust the output of accelerometer 116 based on acceleration of vehicle 102. In this manner, low-pass filter 128 prevents inadvertent attenuation or non-attenuation of the first electrical signal based due to accelerometer 116 detecting acceleration of vehicle 102.

Referring generally to FIG. 1 and particularly to, e.g., FIG. 3, cover plate 134
10 is secured to interior surface 135 of face panel 108 of stowage bin 110. Torque tube 140 is retained between cover plate 134 and face panel 108. Electroacoustic transducer 114 is retained between cover plate 134 and face panel 108. The preceding subject matter of this paragraph characterizes example 13 of the present disclosure, wherein example 13 also includes the
15 subject matter according to any one of examples 1 to 12, above.

Torque tube 140 is retained between cover plate 134 and face panel 108, and is provided to secure face panel 108 in first position relative to mounting structure 112. Cover plate 134 is secured to interior surface 135 of face panel 108 of stowage bin 110. By retaining electroacoustic transducer 114
20 between cover plate 134 and face panel 108, existing structures of stowage bin 110 are used to protect and conceal electroacoustic transducer 114 within face panel 108 without adding additional parts or weight to vehicle 102.

Referring generally to FIG. 1 and particularly to, e.g., FIGS. 3, and 10-12, cover plate 134 further comprises retainer 138. Retainer 138 is configured to
25 locate electroacoustic transducer 114 along cover plate 134. The preceding subject matter of this paragraph characterizes example 14 of the present disclosure, wherein example 14 also includes the subject matter according to example 13, above.

When cover plate **134** includes retainer **138**, electroacoustic transducer **114** can be easily located along cover plate **134** in a position selected to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **10-12**,
5 retainer **138** comprises one of locating post **152**, recessed seat **154**, resilient finger **156**, or any combination thereof. The preceding subject matter of this paragraph characterizes example 15 of the present disclosure, wherein example 15 also includes the subject matter according to example 14, above.

When retainer **138** is one of locating post **152**, recessed seat **154**, resilient
10 finger **156**, or any combination thereof, electroacoustic transducer **114** can be easily located along cover plate **134** in a position selected to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**, electroacoustic transducer **114** further comprises permanent magnet **142**, located relative to
15 cover plate **134** by retainer **138**. Additionally, electroacoustic transducer **114** comprises electromagnet **144**, connected to interior surface **135** of face panel **108** and in contact with permanent magnet **142**. The preceding subject matter of this paragraph characterizes example 16 of the present disclosure, wherein example 16 also includes the subject matter according to any one of
20 examples **14** to **15**, above.

In one illustrative example, electroacoustic transducer **114** comprises permanent magnet **142**, located relative to cover plate **134** by retainer **138** and electromagnet **144**, connected to interior surface **135** of face panel **108** and in contact with permanent magnet **142**. Permanent magnet **142**, located
25 relative to cover plate **134** and electromagnet **144**, connected to interior surface **135** of face panel **108**, allows electroacoustic transducer **114** to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**, electromagnet **144** is a voice coil wire. The preceding subject matter of this

paragraph characterizes example 17 of the present disclosure, wherein example 17 also includes the subject matter according to example 16, above.

In one illustrative example, electromagnet **144** is a voice coil wire. When electromagnet **144** is a voice coil, electroacoustic transducer **114** provides a
5 desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**, electromagnet **144** is connected to interior surface **135** of face panel **108** using a flexible adhesive. The preceding subject matter of this paragraph characterizes example 18 of the present disclosure, wherein example 18
10 also includes the subject matter according to any one of examples **16** to **17**, above.

When electromagnet **144** is connected to interior surface **135** of face panel **108** using a flexible adhesive, electroacoustic transducer **114** can be easily secured to interior surface **135** of face panel **108** in a position selected
15 to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3**, and **13**, cover plate **134** further comprises first area **158**, proximately located to electroacoustic transducer **114**. First area **158** has a first locally tailored
20 physical characteristic selected to provide an acoustic property. Additionally, cover plate **134** comprises second area **160**, distally located from electroacoustic transducer **114**. A second physical characteristic of second area **160** is different from the first locally tailored physical characteristic of first area **158**. The preceding subject matter of this paragraph characterizes
25 example 19 of the present disclosure, wherein example 19 also includes the subject matter according to any one of examples **13** to **18**, above.

By tailoring characteristics of different areas of cover plate **134**, each area can be specifically designed to impart desired physical properties that may be more pertinent to that particular area. For example, when cover plate **134**
30 further comprises first area **158** proximately located to electroacoustic

transducer **114**, a first physical characteristic of first area **158** may be locally tailored to provide an acoustic property. Additionally, second area **160** of cover plate **134**, distally located from electroacoustic transducer **114**, may have a second physical characteristic that different from the first locally tailored physical characteristic of first area **158**. For example, first area **158** may have a first physical characteristic, such as a stiffness, designed to optimize acoustic performance of electroacoustic transducer **114**. Second area **160** may have a second physical characteristic, such as a stiffness, designed to optimize impact resistance or durability of cover plate **134**.

10 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **9**, media system **100** further comprises sound-insulation layer **146**, positioned over at least a portion of cover plate **134** to acoustically isolate electroacoustic transducer **114** from interior **130** of stowage bin **110**. The preceding subject matter of this paragraph characterizes example 20 of the present disclosure, wherein example 20 also includes the subject matter according to any one of examples **13** to **19**, above.

When sound-insulation layer **146** is positioned over at least a portion of cover plate **134**, electroacoustic transducer **114** can be acoustically isolated from interior **130** of stowage bin **110** to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **9**, sound-insulation layer **146** comprises closed-cell foam material **162**. The preceding subject matter of this paragraph characterizes example 21 of the present disclosure, wherein example 21 also includes the subject matter according to example 20, above.

When sound-insulation layer **146** comprises closed-cell foam material **162**, electroacoustic transducer **114** can be acoustically isolated from interior **130** of stowage bin **110** to provide a desired level of acoustic performance when exciting face panel **108**. In one illustrative example, closed-cell foam material **162** is a viscoelastic polyurethane foam.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 2**, media system **100** further comprises high-definition display system **122**, integrated into ceiling panels **120** of passenger compartment **118** of vehicle **102**. High-definition display system **122** is operatively coupled with audio source **124**.

5 The preceding subject matter of this paragraph characterizes example 22 of the present disclosure, wherein example 22 also includes the subject matter according to any one of examples **3** to **21**, above.

Use of media systems, such as media system **100** including electroacoustic transducer **114** as set forth above, allows for positioning of electroacoustic
10 transducer **114** in face panel **108** of stowage bin **110** inside vehicle **102**, such as an airplane. By positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110**, media system **100** allows other surfaces inside vehicle **102**, such as ceiling panels **120** of passenger compartment **118** of vehicle **102**, to be utilized for other functionalities, such as high-definition
15 display system **122**, integrated into ceiling panels **120** of passenger compartment **118**.

For example, electroacoustic transducer **114** integrated in face panel **108** allows ceiling panels **120** of passenger compartment **118** of vehicle **102**, previously utilized for flat-panel speaker technology, to be repurposed for
20 other high-definition display system **122**, integrated into ceiling panels **120** of passenger compartment **118**. By positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110**, media system **100** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also allowing the integration of high-definition display system **122** into ceiling panels **120** of
25 passenger compartment **118**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 2-7**, vehicle **102** is disclosed. Vehicle **102** comprises chassis **104** and passenger compartment **118**. Passenger compartment **118** comprises ceiling panels **120**. Vehicle **102** additionally comprises stowage bin **110** in passenger
30 compartment **118**. Stowage bin **110** comprises mounting structure **112** that is stationary relative to chassis **104**. Stowage bin **110** also comprises face

panel **108**, movably coupled to mounting structure **112**. Additionally, stowage bin **110** comprises interior **130**, accessible via face panel **108**. Vehicle **102** further comprises media system **100**. Media system **100** comprises high-definition display system **122**, integrated into ceiling panels **120**. Media system **100** also comprises audio source **124**, operatively coupled with high-definition display system **122**. Media system **100** additionally comprises electroacoustic transducer **114**, integrated into face panel **108** of stowage bin **110**. The preceding subject matter of this paragraph characterizes example 23 of the present disclosure.

10 Use of media system **100** that includes electroacoustic transducer **114** as set forth above, in vehicle **102**, such as an airplane, enables positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110** inside vehicle **102**. Positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110** enables other surfaces inside vehicle **102**, such as ceiling panels **120** of passenger compartment **118** of vehicle **102**, to be utilized for other functionalities, such as high-definition display system **122**, integrated into ceiling panels **120** of passenger compartment **118**.

For example, electroacoustic transducer **114** integrated in face panel **108** enables ceiling panels **120** of passenger compartment **118** of vehicle **102**, previously utilized for flat-panel speaker technology, to be repurposed for other high-definition display system **122**, integrated into ceiling panels **120** of passenger compartment **118**. By positioning electroacoustic transducer **114** in face panel **108** of stowage bin **110**, media system **100** enables face panel **108** of stowage bin **110** to function as a flat-panel speaker while also enabling the integration of high-definition display system **122** into ceiling panels **120** of passenger compartment **118**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-7**, face panel **108** of stowage bin **110** is capable of being moved between, inclusively, a first position relative to mounting structure **112** of stowage bin **110** and a second position relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 24 of the present disclosure,

wherein example 24 also includes the subject matter according to example 23, above.

Allowing face panel **108** of stowage bin **110** to move between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**. Electroacoustic transducer **114** integrated in face panel **108** of stowage bin **110** while retaining the item-securing functionality of face panel **108** of retaining items within stowage bin **110** when face panel **108** is moved between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **8**, media system **100** of vehicle **102** further comprises attenuator **126**, operatively coupled to electroacoustic transducer **114**, and accelerometer **116**, integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. Audio source **124** is configured to provide a first electrical signal to attenuator **126**. Attenuator **126** is configured to provide a second electrical signal to electroacoustic transducer **114**. The preceding subject matter of this paragraph characterizes example 25 of the present disclosure, wherein example 25 also includes the subject matter according to example 24, above.

Use of media system **100** including attenuator **126**, in vehicle **102** allows for a second electrical signal, that may be different from a first electrical signal provided by audio source **124** to attenuator **126**, to be provided to electroacoustic transducer **114**. For example, when audio source **124** provides a first electrical signal to attenuator **126**, attenuator **126** provides a second electrical signal to electroacoustic transducer **114**. Use of attenuator **126** allows attenuated electrical signals, different from the first electrical signal sent from audio source **124**, to drive electroacoustic transducer **114**.

Accelerometer **116** is integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. When coupled with attenuator **126**, accelerometer **116** allows attenuated electrical signals to drive electroacoustic transducer **114** based on output from accelerometer **116** to attenuator **126**.

5 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, accelerometer **116** is configured to generate output responsive to a location of face panel **108** of stowage bin **110** between, inclusively, the first position of face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**. The preceding subject
10 matter of this paragraph characterizes example 26 of the present disclosure, wherein example 26 also includes the subject matter according to example 25, above.

By configuring accelerometer **116** to generate output responsive to a location of face panel **108** of stowage bin **110**, attenuator **126** can provide an electrical
15 signal to electroacoustic transducer **114** based on a location of face panel **108** relative to mounting structure **112**. When coupled with attenuator **126**, accelerometer **116** allows different electrical signals to drive electroacoustic transducer **114** based a location of face panel **108** relative to mounting structure **112**.

20 In one illustrative example, accelerometer **116** may be a multiaxis accelerometer, capable of measuring acceleration in multiple directions. In this manner, accelerometer **116** detects acceleration as a vector quantity, and can be used to sense orientation of accelerometer **116**. When integrated into face panel **108** of stowage bin **110**, accelerometer **116** allows for the
25 determination of a position of face panel **108**, including, inclusively, the first position of face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, when face panel **108** is in the first position relative to mounting structure **112**,
30 attenuator **126** provides electroacoustic transducer **114** with the second

electrical signal that is not attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, based on the location of face panel **108** relative to mounting structure **112**. When face panel **108** is in the second position relative to mounting structure **112**,
5 attenuator **126** provides electroacoustic transducer **114** with the second electrical signal that is attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, based on the location of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 27 of the present
10 disclosure, wherein example 27 also includes the subject matter according to example 26, above.

Use of accelerometer **116** integrated into face panel **108** of stowage bin **110** allows attenuator **126** to provide different electrical signals based on position of face panel **108** relative to mounting structure **112**. In one illustrative
15 example, when face panel **108** is in the first position relative to mounting structure **112**, attenuator **126** provides an electrical signal that is not attenuated relative to the first electrical signal from audio source **124** based on the location of face panel **108**. In another illustrative example, when face panel **108** is in the second position relative to mounting structure **112**,
20 attenuator **126** provides an electrical signal that is attenuated relative to the first signal from audio source **124** based on the location of face panel **108**. In this manner, accelerometer **116** allows media system **100** to provide attenuated audio to vehicle **102** based on a position of face panel **108** relative to mounting structure **112**.

25 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, responsive to face panel **108** of stowage bin **110** being moved with respect to mounting structure **112** of stowage bin **110** between, exclusively, the first position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**, the
30 second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, is linearly attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding

subject matter of this paragraph characterizes example 28 of the present disclosure, wherein example 28 also includes the subject matter according to any one of examples **26** to **27**, above.

5 In one illustrative example, attenuator **126** linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position. A linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

10 Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, responsive to face panel **108** of stowage bin **110** being moved with respect to mounting structure **112** of stowage bin **110** between, exclusively, the first position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**, the
15 second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, is non-linearly attenuated relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding subject matter of this paragraph characterizes example 29 of the present disclosure, wherein example 29 also includes the subject matter according to
20 any one of examples **26** to **27**, above. In one illustrative example, attenuator **126** non-linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position. A non-linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation
25 of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-8**, electroacoustic transducer **114** is configured to excite face panel **108** of stowage bin **110** based on the second electrical signal, communicated from
30 attenuator **126** to electroacoustic transducer **114**. The preceding subject matter of this paragraph characterizes example 30 of the present disclosure,

wherein example 30 also includes the subject matter according to any one of examples **26** to **29**, above.

Exciting face panel **108** of stowage bin **110** based on the second electrical signal provides for selective excitement of face panel **108** by electroacoustic transducer **114** relative to the electrical signal received from attenuator **126**. In this manner, a media system, such as media system **100**, can provide different excitation of face panel **108** of stowage bin **110** based on the position of face panel **108**. For example, electroacoustic transducer **114** can selectively excite face panel **108** according to a second electrical signal when face panel **108** is in second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-9**, face panel **108** of stowage bin **110** is configured to retain items **131** within interior **130** of stowage bin **110** when face panel **108** is in the first position. Face panel **108** is configured to provide access to interior **130** of stowage bin **110** when face panel **108** is in the second position. The preceding subject matter of this paragraph characterizes example 31 of the present disclosure, wherein example 31 also includes the subject matter according to example 30, above.

When in the first position, face panel **108** of stowage bin **110** is configured to retain items **131** within interior **130** of stowage bin **110**. When in the second position, face panel **108** of stowage bin **110** is configured to provide access to interior **130** of stowage bin **110**. Allowing face panel **108** of stowage bin **110** to move between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**. Electroacoustic transducer **114** integrated in face panel **108** of stowage bin **110** while retaining the item-securing functionality of face panel **108** of retaining items within stowage bin **110** when face panel **108** is moved between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 6-9**, stowage bin **110** further comprises item detector **132**, operatively coupled to attenuator **126**. Item detector **132** is configured to provide an input to attenuator **126**, indicating whether items **131** are present within interior **130** of stowage bin **110**. The preceding subject matter of this paragraph characterizes example 32 of the present disclosure, wherein example 32 also includes the subject matter according to example 31, above.

Item detectors, such as item detector **132**, may be incorporated into stowage bin **110**. Item detector **132** indicates to attenuator **126** whether items **131** are present within interior **130** of stowage and **110**. By configuring item detector **132** to generate output responsive to the presence of items **131** which in interior **130** of stowage bin **110**, attenuator **126** can provide an electrical signal to electroacoustic transducer **114** based on the presence of items **131** within interior **130** of stowage bin **110**. When coupled with attenuator **126**, item detector **132** allows different electrical signals to drive electroacoustic transducer **114** based the presence of items **131** within interior **130** of stowage bin **110**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4** and **6-9**, when items **131** are present within interior **130** of stowage bin **110**, the input from item detector **132** causes attenuator **126** to provide electroacoustic transducer **114** with the second electrical signal that is not attenuated, at least based on the input from item detector **132** to attenuator **126**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. When items **131** are absent from interior **130** of stowage bin **110**, attenuator **126** provides electroacoustic transducer **114** with the second electrical signal that is attenuated, based on the input from item detector **132** to attenuator **126**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**. The preceding subject matter of this paragraph characterizes example 33 of the present disclosure, wherein example 33 also includes the subject matter according to example 32, above.

Use of item detector **132** in stowage bin **110** allows attenuator **126** to provide different electrical signals based on the presence of items **131** within interior **130** of stowage bin **110**. In one illustrative example, when items **131** are absent from interior **130** of stowage bin **110**, attenuator **126** provides an electrical signal that is attenuated relative to the first electrical signal from audio source **124** based on the location of face panel **108**. In another illustrative example, when items **131** are not present within interior **130** of stowage bin **110**, attenuator **126** provides an electrical signal that is attenuated relative to the first signal from audio source **124** based on the location of face panel **108**. In this manner, accelerometer **116** allows media system **100** to provide attenuated audio to vehicle **102** based on a position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3-4**, vehicle **102** further comprises low-pass filter **128**, operatively coupled to accelerometer **116**. Low-pass filter **128** is configured to adjust the output of accelerometer **116** based on acceleration of vehicle **102**. The preceding subject matter of this paragraph characterizes example 34 of the present disclosure, wherein example 34 also includes the subject matter according to any one of examples **26** to **33**, above.

When operatively coupled to accelerometer **116**, low-pass filter **128** allows media system **100** to adjust the output of accelerometer **116** based on acceleration of vehicle **102**. In this manner, low-pass filter **128** prevents inadvertent attenuation or non-attenuation of the first electrical signal based due to accelerometer **116** detecting acceleration of vehicle **102**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**, cover plate **134** is secured to interior surface **135** of face panel **108** of stowage bin **110**. Torque tube **140** is retained between cover plate **134** and face panel **108**. Electroacoustic transducer **114** is retained between cover plate **134** and face panel **108**. The preceding subject matter of this paragraph characterizes example 35 of the present disclosure, wherein example 35 also includes the subject matter according to any one of examples **23** to **34**, above.

Torque tube **140** is retained between cover plate **134** and face panel **108**, and is provided to secure face panel **108** in first position relative to mounting structure **112**. Cover plate **134** is secured to interior surface **135** of face panel **108** of stowage bin **110**. By retaining electroacoustic transducer **114**
5 between cover plate **134** and face panel **108**, existing structures of stowage bin **110** are used to protect and conceal electroacoustic transducer **114** within face panel **108** without adding additional parts or weight to vehicle **102**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3**, and **10-12**, cover plate **134** further comprises retainer **138**. Retainer **138** is configured to
10 locate electroacoustic transducer **114** along cover plate **134**. The preceding subject matter of this paragraph characterizes example 36 of the present disclosure, wherein example 36 also includes the subject matter according to example 35, above.

When cover plate **134** includes retainer **138**, electroacoustic transducer **114**
15 can be easily located along cover plate **134** in a position selected to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3**, and **10-12**, retainer **138** comprises one of locating post **152**, recessed seat **154**, resilient finger **156**, or any combination thereof. The preceding subject matter of this
20 paragraph characterizes example 37 of the present disclosure, wherein example 37 also includes the subject matter according to example 36, above.

When retainer **138** is one of locating post **152**, recessed seat **154**, resilient finger **156**, or any combination thereof, electroacoustic transducer **114** can be easily located along cover plate **134** in a position selected to provide a desired
25 level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**, electroacoustic transducer **114** further comprises permanent magnet **142**, located relative to cover plate **134** by retainer **138**. Additionally, electroacoustic transducer **114** comprises electromagnet **144**, connected to interior surface **135** of face
30 panel **108** and in contact with permanent magnet **142**. The preceding subject

matter of this paragraph characterizes example 38 of the present disclosure, wherein example 38 also includes the subject matter according to any one of examples **36** to **37**, above.

In one illustrative example, electroacoustic transducer **114** comprises
5 permanent magnet **142**, located relative to cover plate **134** by retainer **138**
and electromagnet **144**, connected to interior surface **135** of face panel **108**
and in contact with permanent magnet **142**. Permanent magnet **142**, located
relative to cover plate **134** and electromagnet **144**, connected to interior
10 surface **135** of face panel **108**, allows electroacoustic transducer **114** to
provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**,
electromagnet **144** is a voice coil wire. The preceding subject matter of this
paragraph characterizes example 39 of the present disclosure, wherein
example 39 also includes the subject matter according to example 38, above.

15 In one illustrative example, electromagnet **144** is a voice coil wire. When
electromagnet **144** is a voice coil, electroacoustic transducer **114** provides a
desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIG. 3**,
electromagnet **144** is connected to interior surface **135** of face panel **108**
20 using a flexible adhesive. The preceding subject matter of this paragraph
characterizes example 40 of the present disclosure, wherein example 40 also
includes the subject matter according to any one of examples **38** to **39**, above.

When electromagnet **144** is connected to interior surface **135** of face
panel **108** using a flexible adhesive, electroacoustic transducer **114** can be
25 easily secured to interior surface **135** of face panel **108** in a position selected
to provide a desired level of acoustic performance when exciting face
panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3**, and **13**, cover
plate **134** further comprises first area **158**, proximately located to

electroacoustic transducer **114**. First area **158** has a first locally tailored physical characteristic, selected to provide an acoustic property. Additionally, cover plate **134** comprises second area **160**, distally located from electroacoustic transducer **114**. A second physical characteristic of second
5 area **160** is different from the first locally tailored physical characteristic of first area **158**. The preceding subject matter of this paragraph characterizes example 41 of the present disclosure, wherein example 41 also includes the subject matter according to any one of examples **35** to **40**, above.

By tailoring characteristics of different areas of cover plate **134**, each area can
10 be specifically designed to impart desired physical properties that may be more pertinent to that particular area. For example, when cover plate **134** further comprises first area **158** proximately located to electroacoustic transducer **114**, a first physical characteristic of first area **158** may be locally tailored to provide an acoustic property. Additionally, second area **160** of
15 cover plate **134**, distally located from electroacoustic transducer **114**, may have a second physical characteristic that different from the first locally tailored physical characteristic of first area **158**. For example, first area **158** may have a first physical characteristic, such as a stiffness, designed to optimize acoustic performance of electroacoustic transducer **114**. Second
20 area **160** may have a second physical characteristic, such as a stiffness, designed to optimize impact resistance or durability of cover plate **134**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **9**, vehicle **102** further comprises sound-insulation layer **146**, positioned over at least a portion of cover plate **134** to acoustically isolate electroacoustic
25 transducer **114** from interior **130** of stowage bin **110**. The preceding subject matter of this paragraph characterizes example 42 of the present disclosure, wherein example 42 also includes the subject matter according to any one of examples **35** to **41**, above.

When sound-insulation layer **146** is positioned over at least a portion of cover
30 plate **134**, electroacoustic transducer **114** can be acoustically isolated

electroacoustic transducer **114** from interior **130** of stowage bin **110** to provide a desired level of acoustic performance when exciting face panel **108**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 3** and **9**, sound-insulation layer **146** comprises closed-cell foam material **162**. The preceding
5 subject matter of this paragraph characterizes example 43 of the present disclosure, wherein example 43 also includes the subject matter according to example 42, above.

When sound-insulation layer **146** comprises closed-cell foam material **162**, electroacoustic transducer **114** can be acoustically isolated electroacoustic
10 transducer **114** from interior **130** of stowage bin **110** to provide a desired level of acoustic performance when exciting face panel **108**. In one illustrative example, closed-cell foam material **162** is a viscoelastic polyurethane foam.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, method **1400** of acoustically exciting face panel **108** of stowage bin **110** inside
15 vehicle **102** is disclosed. Method **1400** comprises (block **1402**) exciting face panel **108** with electroacoustic transducer **114**, integrated into face panel **108** of stowage bin **110**. Stowage bin **110** further comprises mounting structure **112** that is stationary relative to chassis **104** of vehicle **102**. Stowage bin **110** also comprises interior **130**, accessible via face panel **108**. The
20 preceding subject matter of this paragraph characterizes example 44 of the present disclosure.

Method **1400** enables acoustic excitation of face panel **108** of stowage bin **110** via electroacoustic transducer **114**, positioned therein. Implementing method **1500** enables utilization of other surfaces inside vehicle **102** for other
25 functionalities. Face panel **108** is movably coupled to mounting structure **112**, allowing for access to interior **130** of stowage bin **110**.

For example, electroacoustic transducer **114** integrated in face panel **108** allows surfaces previously utilized for flat-panel speaker technology to be repurposed for other functions, such as providing a high-definition display
30 inside vehicle **102**. By positioning electroacoustic transducer **114** in face

panel **108** of stowage bin **110**, media system **100** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**,
5 method **1400** further comprises (block **1404**) moving face panel **108** of stowage bin **110** between, inclusively, a first position relative to mounting structure **112** of stowage bin **110** and a second position relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 45 of the present disclosure, wherein example 45 also includes the
10 subject matter according to example 44, above.

When in the first position, face panel **108** of stowage bin **110** is configured to retain items **131** within interior **130** of stowage bin **110**. When in the second position, face panel **108** of stowage bin **110** is configured to provide access to interior **130** of stowage bin **110**. Allowing face panel **108** of stowage bin **110** to
15 move between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112** allows face panel **108** of stowage bin **110** to function as a flat-panel speaker while also providing access to interior **130** of stowage bin **110**. Electroacoustic transducer **114** integrated in face panel **108** of stowage bin **110** allows face
20 panel **108** to retain the item-securing functionality of stowage bin **110** when face panel **108** is moved between a first position relative to mounting structure **112** of stowage bin and second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**,
25 method **1400** further comprises (block **1406**) providing a first electrical signal to attenuator **126** from audio source **124**, operatively coupled to attenuator **126**. Method **1500** also comprises (block **1408**) providing a second electrical signal to electroacoustic transducer **114** from attenuator **126**, operatively coupled to electroacoustic transducer **114**. The preceding subject
30 matter of this paragraph characterizes example 46 of the present disclosure,

wherein example 46 also includes the subject matter according to example 45, above.

Use of media systems, such as media system **100** including attenuator **126**, allows for a second electrical signal, that may be different from a first electrical signal provided by audio source **124** to attenuator **126**, to be provided to electroacoustic transducer **114**. For example, when audio source **124** provides a first electrical signal to attenuator **126**, attenuator **126** provides a second electrical signal to electroacoustic transducer **114**. Use of attenuator **126** allows attenuated electrical signals, different from the first electrical signal sent from audio source **124**, to drive electroacoustic transducer **114**.

Accelerometer **116** is integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. When coupled with attenuator **126**, accelerometer **116** allows attenuated electrical signals to drive electroacoustic transducer **114** based on output from accelerometer **116** to attenuator **126**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, method **1400** further comprises (block **1410**) responsive to a location of face panel **108** between, inclusively, the first position of face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**, generating output by accelerometer **116**, integrated into face panel **108** of stowage bin **110** and operatively coupled to attenuator **126**. The preceding subject matter of this paragraph characterizes example 47 of the present disclosure, wherein example 47 also includes the subject matter according to example 46, above.

By configuring accelerometer **116** to generate output responsive to a location of face panel **108** of stowage bin **110**, attenuator **126** can provide an electrical signal to electroacoustic transducer **114** based on a location of face panel **108** relative to mounting structure **112**. When coupled with attenuator **126**, accelerometer **116** allows different electrical signals to drive electroacoustic

transducer **114** based a location of face panel **108** relative to mounting structure **112**.

In one illustrative example, accelerometer **116** may be a multiaxis accelerometer, capable of measuring acceleration in multiple directions. In this manner, accelerometer **116** detects acceleration as a vector quantity, and can be used to sense orientation of accelerometer **116**. When integrated into face panel **108** of stowage bin **110**, accelerometer **116** allows for the determination of a position of face panel **108**, including, inclusively, the first position of face panel **108** relative to mounting structure **112** and the second position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, according to method **1400**, providing the second electrical signal to electroacoustic transducer **114** from attenuator **126**, operatively coupled to electroacoustic transducer **114** comprises, (block **1412**) when face panel **108** is in the first position relative to mounting structure **112**, providing electroacoustic transducer **114** with the second electrical signal that is not attenuated relative to the first electrical signal based on the location of face panel **108** relative to mounting structure **112**. Providing the second electrical signal to electroacoustic transducer **114** from attenuator **126** also comprises, (block **1414**) when face panel **108** is in the second position relative to mounting structure **112**, providing electroacoustic transducer **114** with the second electrical signal that is attenuated relative to the first electrical signal based at least on the location of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 48 of the present disclosure, wherein example 48 also includes the subject matter according to example 47, above.

Use of accelerometer **116** integrated into face panel **108** of stowage bin **110** allows attenuator **126** to provide different electrical signals based on position of face panel **108** relative to mounting structure **112**. In one illustrative example, when face panel **108** is in the first position relative to mounting structure **112**, attenuator **126** provides an electrical signal that is not

attenuated relative to the first electrical signal from audio source **124** based on the location of face panel **108**. In another illustrative example, when face panel **108** is in the second position relative to mounting structure **112**, attenuator **126** provides an electrical signal that is attenuated relative to the first signal from audio source **124** based on the location of face panel **108**. In this manner, accelerometer **116** allows media system **100** to provide attenuated audio to vehicle **102** based on a position of face panel **108** relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, method **1400** further comprises (block **1416**) linearly attenuating the second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, as face panel **108** of stowage bin **110** is moved with respect to mounting structure **112** of stowage bin **110** between, exclusively, the first position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 49 of the present disclosure, wherein example 49 also includes the subject matter according to example 48, above.

In one illustrative example, attenuator **126** linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position. A linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, method **1400** further comprises (block **1418**) non-linearly attenuating the second electrical signal, communicated from attenuator **126** to electroacoustic transducer **114**, relative to the first electrical signal, communicated from audio source **124** to attenuator **126**, as face panel **108** of stowage bin **110** is moved with respect to mounting structure **112** of stowage bin **110** between,

exclusively, the first position of face panel **108** relative to mounting structure **112** and, inclusively, the second position of face panel **108** relative to mounting structure **112**. The preceding subject matter of this paragraph characterizes example 50 of the present disclosure, wherein example 50 also
5 includes the subject matter according to example 48, above.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, exciting face panel **108** according to block **1402** of method **1400** further comprises (block **1420**) using electroacoustic transducer **114** to excite face panel **108** based on the second electrical signal, communicated from attenuator **126** to
10 electroacoustic transducer **114**. Face panel **108** is configured to retain items **131** within interior **130** of stowage bin **110** when face panel **108** of stowage bin **110** is in the first position relative to mounting structure **112**. Face panel **108** is configured to provide access to interior **130** of stowage bin **110** when face panel **108** is in the second position relative to mounting
15 structure **112**. The preceding subject matter of this paragraph characterizes example 51 of the present disclosure, wherein example 51 also includes the subject matter according to any one of examples **48** to **50**, above.

In one illustrative example, attenuator **126** non-linearly attenuates the second electrical signal relative to the first electrical signal as face panel **108** of
20 stowage bin **110** is moved between the first position and the second position. A non-linear attenuation of the second electrical signal provides a gradual adjustment to the attenuation of the electrical signal as face panel **108** of stowage bin **110** is moved between the first position and the second position.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**,
25 method **1400** further comprises (block **1422**) providing an input to attenuator **126** from item detector **132**, operatively coupled to attenuator **126**, indicating whether items **131** are present within interior **130** of stowage bin **110**. The preceding subject matter of this paragraph characterizes example 52 of the present disclosure, wherein example 52 also includes the
30 subject matter according to example 51, above.

Exciting face panel **108** of stowage bin **110** based on the second electrical signal provides for selective excitement of face panel **108** by electroacoustic transducer **114** relative to the electrical signal received from attenuator **126**. In this manner, a media system, such as media system **100**, can provide
5 different excitation of face panel **108** of stowage bin **110** based on the position of face panel **108**. For example, electroacoustic transducer **114** can selectively excite face panel **108** according to a second electrical signal when face panel **108** is in second position relative to mounting structure **112**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**,
10 according to method **1400**, (block **1424**) when items **131** are present within interior **130** of stowage bin **110**, the second electrical signal, not attenuated relative to the first electrical signal based at least in part on items **131** being present within interior **130** of stowage bin **110**, is communicated from attenuator **126** to electroacoustic transducer **114**. Additionally, (block **1426**)
15 when items **131** are absent from interior **130** of stowage bin **110**, the second electrical signal, attenuated relative to the first electrical signal based on items **131** being present within interior **130** of stowage bin **110**, is communicated from attenuator **126** to electroacoustic transducer **114**. The preceding subject matter of this paragraph characterizes example 53 of the
20 present disclosure, wherein example 53 also includes the subject matter according to example 52, above.

Item detectors, such as item detector **132**, may be incorporated into stowage bin **110**. Item detector **132** indicates to attenuator **126** whether items **131** are present within interior **130** of stowage and **110**. By configuring item
25 detector **132** to generate output responsive to the presence of items **131** which in interior **130** of stowage bin **110**, attenuator **126** can provide an electrical signal to electroacoustic transducer **114** based on the presence of items **131** within interior **130** of stowage bin **110**. When coupled with attenuator **126**, item detector **132** allows different electrical signals to drive
30 electroacoustic transducer **114** based the presence of items **131** within interior **130** of stowage bin **110**.

Referring generally to **FIG. 1** and particularly to, e.g., **FIGS. 14A-14C**, method **1400** further comprises (block **1428**) adjusting the output of accelerometer **116** with low-pass filter **128**, operatively coupled to accelerometer **116**. Low-pass filter **128** is configured to adjust the output of
5 accelerometer **116** based on acceleration of vehicle **102**. The preceding subject matter of this paragraph characterizes example 54 of the present disclosure, wherein example 54 also includes the subject matter according to any one of examples **47** to **53**, above.

When operatively coupled to accelerometer **116**, low-pass filter **128** allows
10 media system **100** to adjust the output of accelerometer **116** based on acceleration of vehicle **102**. In this manner, low-pass filter **128** prevents inadvertent attenuation or non-attenuation of the first electrical signal based due to accelerometer **116** detecting acceleration of vehicle **102**.

Examples of the present disclosure may be described in the context of aircraft
15 manufacturing and service method **1500** as shown in **FIG. 15** and aircraft **1600** as shown in **FIG. 16**. During pre-production, illustrative method **1500** may include specification and design block **1502** of aircraft **1600** and material procurement block **1504**. During production, component and subassembly manufacturing block **1506** and system integration block **1508** of
20 aircraft **1600** may take place. Thereafter, aircraft **1600** may go through certification and delivery block **1510** to be placed in in service block **1512**. While in service, aircraft **1600** may be scheduled for routine maintenance and service block **1514**. Routine maintenance and service may include modification, reconfiguration, refurbishment, etc. of one or more systems of
25 aircraft **1600**.

Each of the processes of illustrative method **1500** may be performed or carried out by a system integrator, a third party, and/or an operator e.g., a customer. For the purposes of this description, a system integrator may include, without limitation, any number of aircraft manufacturers and major-
30 system subcontractors; a third party may include, without limitation, any

number of vendors, subcontractors, and suppliers; and an operator may be an airline, leasing company, military entity, service organization, and so on.

As shown in **FIG. 16**, aircraft **1600** produced by illustrative method **1500** of **FIG. 15** may include airframe **1602** with a plurality of high-level systems **1604** and interior **1606**. Examples of high-level systems **1604** include one or more of propulsion system **1608**, electrical system **1610**, hydraulic system **1612**, and environmental system **1614**. Any number of other systems may be included. Although an aerospace example is shown, the principles disclosed herein may be applied to other industries, such as the automotive industry. Accordingly, in addition to aircraft **1600**, the principles disclosed herein may apply to other vehicles, e.g., land vehicles, marine vehicles, space vehicles, etc.

Apparatuses and methods shown or described herein may be employed during any one or more of the stages of the manufacturing and service method **1500**. For example, components or subassemblies corresponding to component and subassembly manufacturing block **1506** may be fabricated or manufactured in a manner similar to components or subassemblies produced while aircraft **1600** is in in service block **1512**. Also, one or more examples of the apparatuses, methods, or combination thereof may be utilized during production stages **1506** and **1508**, for example, by substantially expediting assembly of or reducing the cost of aircraft **1600**. Similarly, one or more examples of the apparatus or method realizations, or a combination thereof, may be utilized, for example and without limitation, while aircraft **1600** is in in service block **1512** and/or during maintenance and service block **1514**.

Different examples of the apparatuses and methods disclosed herein include a variety of components, features, and functionalities. It should be understood that the various examples of the apparatuses and methods disclosed herein may include any of the components, features, and functionalities of any of the other examples of the apparatuses and methods disclosed herein in any combination, and all of such possibilities are intended to be within the scope of the present disclosure.

Many modifications of examples set forth herein will come to mind to one skilled in the art to which the present disclosure pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings.

5 Therefore, it is to be understood that the present disclosure is not to be limited to the specific examples illustrated and that modifications and other examples are intended to be included within the scope of the appended claims. Moreover, although the foregoing description and the associated drawings describe examples of the present disclosure in the context of certain
10 illustrative combinations of elements and/or functions, it should be appreciated that different combinations of elements and/or functions may be provided by alternative implementations without departing from the scope of the appended claims. Accordingly, parenthetical reference numerals in the appended claims are presented for illustrative purposes only and are not
15 intended to limit the scope of the claimed subject matter to the specific examples provided in the present disclosure.

EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A media system for a vehicle having a chassis, the media system comprising an electroacoustic transducer, integrated into a face panel
5 of a stowage bin inside the vehicle, wherein:

the stowage bin comprises a mounting structure that is stationary relative to the chassis of the vehicle;

10 an interior of the stowage bin is accessible via the face panel; and

the face panel is movably coupled to the mounting structure.
2. The media system according to claim 1, wherein the face panel of the
15 stowage bin is capable of being moved between, inclusively, a first position relative to the mounting structure of the stowage bin and a second position relative to the mounting structure.
3. The media system according to claim 2, further comprising:
20
an attenuator, operatively coupled to the electroacoustic transducer;

an audio source, operatively coupled to the attenuator; and
25
an accelerometer, integrated into the face panel of the stowage bin and operatively coupled to the attenuator;
wherein:

30 the audio source is configured to provide a first electrical signal to the attenuator, and

the attenuator is configured to provide a second electrical signal to the electroacoustic transducer.

4. The media system according to claim 3, wherein the accelerometer is configured to generate output responsive to a location of the face panel of the stowage bin between, inclusively, the first position of the face panel relative to the mounting structure and the second position of the face panel relative to the mounting structure.
5. The media system according to claim 4, wherein:
- when the face panel is in the first position relative to the mounting structure, the attenuator provides the electroacoustic transducer with the second electrical signal that is not attenuated relative to the first electrical signal, communicated from the audio source to the attenuator, based on the location of the face panel relative to the mounting structure; and
- when the face panel is in the second position relative to the mounting structure, the attenuator provides the electroacoustic transducer with the second electrical signal that is attenuated relative to the first electrical signal, communicated from the audio source to the attenuator, at least based on the location of the face panel relative to the mounting structure.
6. The media system according to claim 5, wherein, responsive to the face panel of the stowage bin being moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure, the second electrical signal, communicated from the attenuator to the electroacoustic transducer, is linearly attenuated relative to the first electrical signal, communicated from the audio source to the attenuator.

7. The media system according to claim **5**, wherein, responsive to the face panel of the stowage bin being moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure, the second electrical signal, communicated from the attenuator to the electroacoustic transducer, is non-linearly attenuated relative to the first electrical signal, communicated from the audio source to the attenuator.
8. The media system according to any one of claims **5** to **7**, wherein the electroacoustic transducer is configured to excite the face panel of the stowage bin based on the second electrical signal, communicated from the attenuator to the electroacoustic transducer.
9. The media system according to claim **8**, wherein:
- the face panel of the stowage bin is configured to retain items within the interior of the stowage bin when the face panel is in the first position; and
- the face panel is configured to provide access to the interior of the stowage bin when the face panel is in the second position.
10. The media system according to claim **9**, wherein:
- the stowage bin further comprises an item detector, operatively coupled to the attenuator; and
- the item detector is configured to provide an input to the attenuator, indicating whether the items are present within the interior of the stowage bin.
11. The media system according to claim **10**, wherein:

when the items are present within the interior of the stowage bin,
the input from the item detector causes the attenuator to provide
the electroacoustic transducer with the second electrical signal that
5 is not attenuated, at least based on the input from the item detector
to the attenuator, relative to the first electrical signal,
communicated from the audio source to the attenuator; and

when the items are absent from the interior of the stowage bin, the
10 attenuator provides the electroacoustic transducer with the second
electrical signal that is attenuated, based on the input from the item
detector to the attenuator, relative to the first electrical signal,
communicated from the audio source to the attenuator.

15 **12.** The media system according to any one of claims **4** to **11**, further
comprising a low-pass filter, operatively coupled to the accelerometer,
wherein the low-pass filter is configured to adjust the output of the
accelerometer based on acceleration of the vehicle.

20 **13.** The media system according to any one of claims **1** to **12**, wherein:

a cover plate is secured to an interior surface of the face panel of
the stowage bin;

25 a torque tube is retained between the cover plate and the face
panel; and

the electroacoustic transducer is retained between the cover plate
and the face panel.

30

14. The media system according to claim **13**, wherein the cover plate further
comprises a retainer, configured to locate the electroacoustic transducer
along the cover plate.

15. The media system according to claim **14**, wherein the retainer comprises one of a locating post, a recessed seat, a resilient finger, or any combination thereof.

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16. The media system according to any one of claims **14** to **15**, wherein the electroacoustic transducer further comprises:

10 a permanent magnet, located relative the cover plate by the retainer; and

 an electromagnet, connected to the interior surface of the face panel and in contact with the permanent magnet.

15 **17.** The media system according to claim **16**, wherein the electromagnet is a voice coil wire.

20 **18.** The media system according to any one of claims **16** to **17**, wherein the electromagnet is connected to the interior surface of the face panel using a flexible adhesive.

19. The media system according to any one of claims **13** to **18**, wherein the cover plate further comprises:

25 a first area, proximately located to the electroacoustic transducer, wherein the first area has a first locally tailored physical characteristic selected to provide an acoustic property; and

30 a second area, distally located from the electroacoustic transducer, wherein a second physical characteristic of the second area is different from the first locally tailored physical characteristic of the first area.

20. The media system according to any one of claims **13** to **19**, further comprising a sound-insulation layer, positioned over at least a portion of the cover plate to acoustically isolate the electroacoustic transducer from the interior of the stowage bin.

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21. The media system according to claim **20**, wherein the sound-insulation layer comprises a closed-cell foam material.

22. The media system according to any one of claims **3** to **21**, further comprising a high-definition display system, integrated into ceiling panels of a passenger compartment of the vehicle, wherein the high-definition display system is operatively coupled with the audio source.

10

23. A vehicle comprising:

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a chassis;

a passenger compartment, comprising ceiling panels;

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a stowage bin in the passenger compartment, the stowage bin comprising:

a mounting structure that is stationary relative to the chassis;

25

a face panel, movably coupled to the mounting structure; and

an interior, accessible via the face panel; and

a media system, comprising:

30

a high-definition display system, integrated into the ceiling panels;

an audio source, operatively coupled with the high-definition display system; and

an electroacoustic transducer, integrated into the face panel of the stowage bin.

24. The vehicle according to claim **23**, wherein the face panel of the stowage bin is capable of being moved between, inclusively, a first position relative to the mounting structure of the stowage bin and a second position relative to the mounting structure.

25. The vehicle according to claim **24**, wherein the media system further comprises:

an attenuator, operatively coupled to the electroacoustic transducer; and

an accelerometer, integrated into the face panel of the stowage bin and operatively coupled to the attenuator;

wherein:

the audio source is configured to provide a first electrical signal to the attenuator, and

the attenuator is configured to provide a second electrical signal to the electroacoustic transducer.

26. The vehicle according to claim **25**, wherein the accelerometer is configured to generate output responsive to a location of the face panel of the stowage bin between, inclusively, the first position of the face panel relative to the mounting structure and the second position of the face panel relative to the mounting structure.

27. The vehicle according to claim **26**, wherein:

5 when the face panel is in the first position relative to the mounting structure, the attenuator provides the electroacoustic transducer with the second electrical signal that is not attenuated relative to the first electrical signal, communicated from the audio source to the attenuator, based on the location of the face panel relative to the mounting structure; and

10

when the face panel is in the second position relative to the mounting structure, the attenuator provides the electroacoustic transducer with the second electrical signal that is attenuated relative to the first electrical signal, communicated from the audio source to the attenuator, based on the location of the face panel relative to the mounting structure.

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28. The vehicle according to any one of claims **26** to **27**, wherein, responsive to the face panel of the stowage bin being moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure, the second electrical signal, communicated from the attenuator to the electroacoustic transducer, is linearly attenuated relative to the first electrical signal, communicated from the audio source to the attenuator.

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29. The vehicle according to any one of claims **26** to **27**, wherein, responsive to the face panel of the stowage bin being moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure, the second electrical signal, communicated from the attenuator

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to the electroacoustic transducer, is non-linearly attenuated relative to the first electrical signal, communicated from the audio source to the attenuator.

5 **30.** The vehicle according to any one of claims **26** to **29**, wherein the electroacoustic transducer is configured to excite the face panel of the stowage bin based on the second electrical signal, communicated from the attenuator to the electroacoustic transducer.

10 **31.** The vehicle according to claim **30**, wherein:

the face panel of the stowage bin is configured to retain items within the interior of the stowage bin when the face panel is in the first position; and

15

the face panel is configured to provide access to the interior of the stowage bin when the face panel is in the second position.

32. The vehicle according to claim **31**, wherein:

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the stowage bin further comprises an item detector, operatively coupled to the attenuator; and

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the item detector is configured to provide an input to the attenuator indicating whether the items are present within the interior of the stowage bin.

33. The vehicle according to claim **32**, wherein:

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when the items are present within the interior of the stowage bin, the input from the item detector causes the attenuator to provide the electroacoustic transducer with the second electrical signal that is not attenuated, at least based on the input from the item detector

to the attenuator, relative to the first electrical signal, communicated from the audio source to the attenuator; and

5 when the items are absent from the interior of the stowage bin, the attenuator provides the electroacoustic transducer with the second electrical signal that is attenuated, based on the input from the item detector to the attenuator, relative to the first electrical signal, communicated from the audio source to the attenuator.

10 **34.** The vehicle according to any one of claims **26** to **33**, further comprising a low-pass filter, operatively coupled to the accelerometer, wherein the low-pass filter is configured to adjust the output of the accelerometer based on acceleration of the vehicle.

15 **35.** The vehicle according to any one of claims **23** to **34**, wherein:

a cover plate is secured to an interior surface of the face panel of the stowage bin;

20 a torque tube is retained between the cover plate and the face panel; and

the electroacoustic transducer is retained between the cover plate and the face panel.

25

36. The vehicle according to claim **35**, wherein the cover plate further comprises a retainer, configured to locate the electroacoustic transducer along the cover plate.

30 **37.** The vehicle according to claim **36**, wherein the retainer comprises one of a locating post, a recessed seat, a resilient finger, or any combination thereof.

38. The vehicle according to any one of claims **36** to **37**, wherein the electroacoustic transducer further comprises:

5 a permanent magnet, located relative the cover plate by the retainer; and

 an electromagnet, connected to the interior surface of the face panel and in contact with the permanent magnet.

10 **39.** The vehicle according to claim **38**, wherein the electromagnet is a voice coil wire.

15 **40.** The vehicle according to any one of claims **38** to **39**, wherein the electromagnet is connected to the interior surface of the face panel using a flexible adhesive.

41. The vehicle according to any one of claims **35** to **40**, wherein the cover plate further comprises:

20 a first area, located proximally to the electroacoustic transducer, wherein the first area has a first locally tailored physical characteristic selected to provide an acoustic property; and

25 a second area, located distally from the electroacoustic transducer, wherein a second physical characteristic of the second area is different from the first locally tailored physical characteristic of the first area.

30 **42.** The vehicle according to any one of claims **35** to **41**, further comprising a sound-insulation layer, positioned over at least a portion of the cover plate to acoustically isolate the electroacoustic transducer from the interior of the stowage bin.

43. The vehicle according to claim **42**, wherein the sound-insulation layer comprises a closed-cell foam material.

44. A method of acoustically exciting a face panel of a stowage bin inside a vehicle, wherein the method comprises exciting the face panel with an electroacoustic transducer, integrated into the face panel of the stowage bin, wherein the stowage bin further comprises:

a mounting structure that is stationary relative to a chassis of the vehicle; and

an interior, accessible via the face panel.

45. The method according to claim **44**, further comprising:

moving the face panel of the stowage bin between, inclusively, a first position relative to the mounting structure of the stowage bin and a second position relative to the mounting structure.

46. The method according to claim **45**, further comprising:

providing a first electrical signal to an attenuator from an audio source, operatively coupled to the attenuator, and

providing a second electrical signal to an electroacoustic transducer from the attenuator, operatively coupled to the electroacoustic transducer.

47. The method according to claim **46**, further comprising:

responsive to a location of the face panel between, inclusively, the first position of the face panel relative to the mounting structure and the second position of the face panel relative to the mounting

structure, generating output by an accelerometer, integrated into the face panel of the stowage bin and operatively coupled to the attenuator.

- 5 **48.** The method according to claim **47**, wherein providing the second electrical signal to the electroacoustic transducer from the attenuator, operatively coupled to the electroacoustic transducer, comprises:

10 when the face panel is in the first position relative to the mounting structure, providing the electroacoustic transducer with the second electrical signal that is not attenuated relative to the first electrical signal based on the location of the face panel relative to the mounting structure; and

15 when the face panel is in the second position relative to the mounting structure, providing the electroacoustic transducer with the second electrical signal that is attenuated relative to the first electrical signal based at least on the location of the face panel relative to the mounting structure.

20

- 49.** The method according to claim **48**, further comprising:

25 linearly attenuating the second electrical signal, communicated from the attenuator to the electroacoustic transducer, relative to the first electrical signal, communicated from the audio source to the attenuator, as the face panel of the stowage bin is moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure.

30

- 50.** The method according to claim **48**, further comprising:

non-linearly attenuating the second electrical signal, communicated from the attenuator to the electroacoustic transducer, relative to the first electrical signal, communicated from the audio source to the attenuator, as the face panel of the stowage bin is moved with respect to the mounting structure of the stowage bin between, exclusively, the first position of the face panel relative to the mounting structure and, inclusively, the second position of the face panel relative to the mounting structure.

10 **51.** The method according to any one of claims **48** to **50**, wherein:

exciting the face panel further comprises using the electroacoustic transducer to excite the face panel based on the second electrical signal, communicated from the attenuator to the electroacoustic transducer;

the face panel is configured to retain items within the interior of the stowage bin when the face panel of the stowage bin is in the first position relative to the mounting structure; and

the face panel is configured to provide access to the interior of the stowage bin when the face panel is in the second position relative to the mounting structure.

25 **52.** The method according to claim **51**, further comprising providing an input to the attenuator from an item detector, operatively coupled to the attenuator, wherein the input indicates whether the items are present within the interior of the stowage bin.

30 **53.** The method according to claim **52**, wherein:

when the items are present within the interior of the stowage bin, the second electrical signal, attenuated relative to the first electrical

signal based at least in part on the items being present within the interior of the stowage bin, is communicated from the attenuator to the electroacoustic transducer; and

5 when the items are absent from the interior of the stowage bin, the second electrical signal, not attenuated relative to the first electrical signal based on the items being present within the interior of the stowage bin, is communicated from the attenuator to the electroacoustic transducer.

10

54. The method according to any one of claims **47** to **53**, further comprising:

adjusting the output of the accelerometer with a low-pass filter, operatively coupled to the accelerometer, based on acceleration of
15 the vehicle.

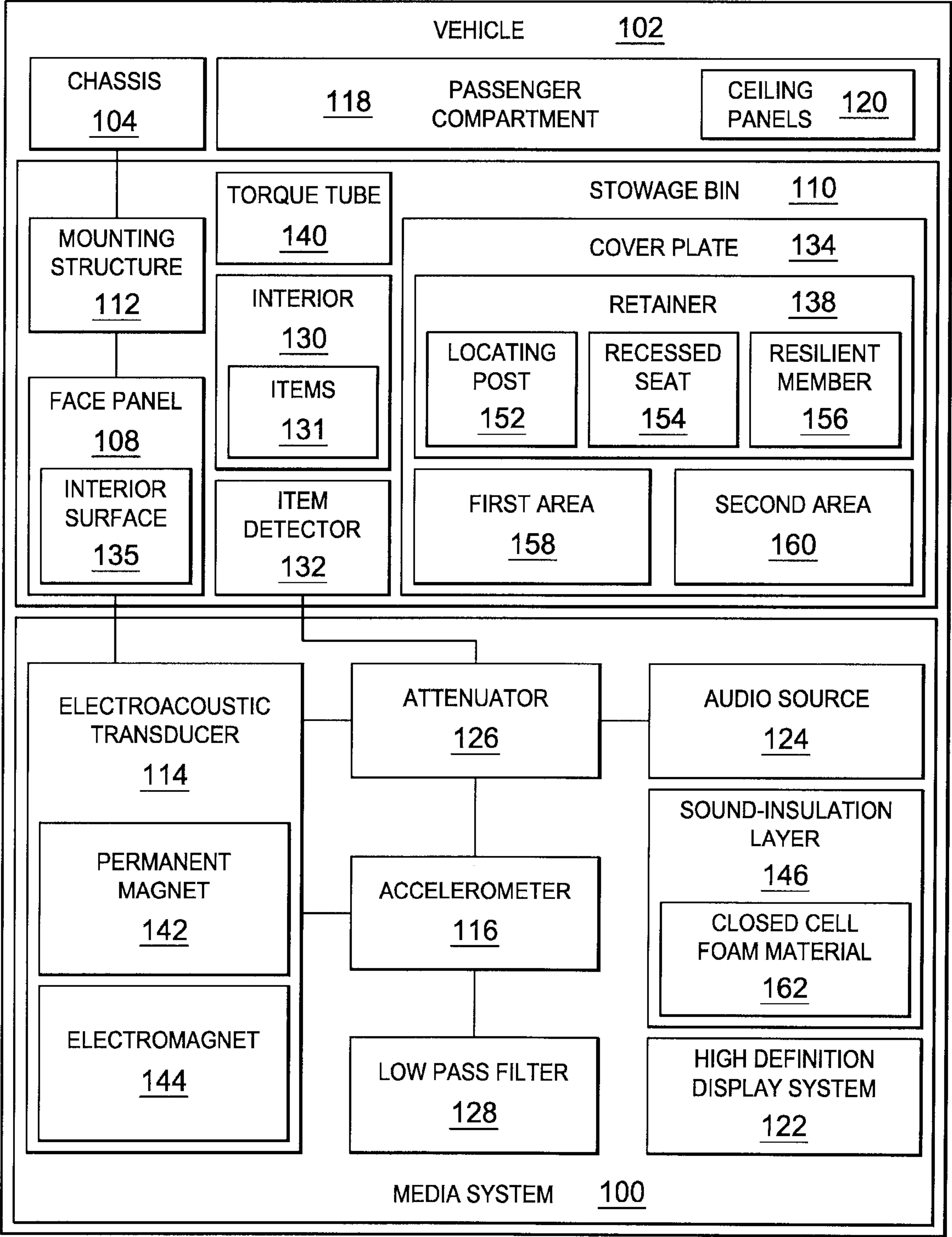


FIG. 1

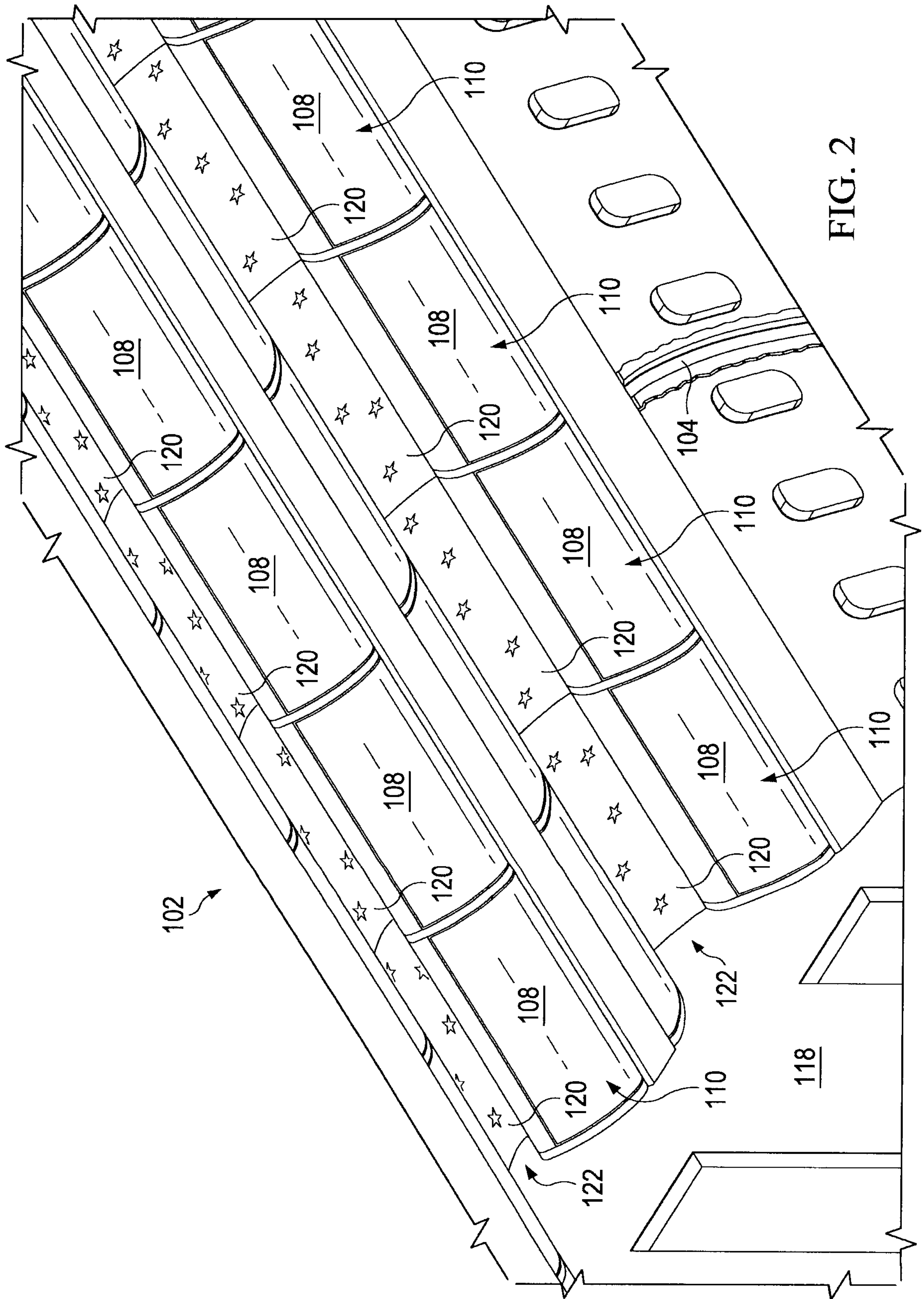


FIG. 2

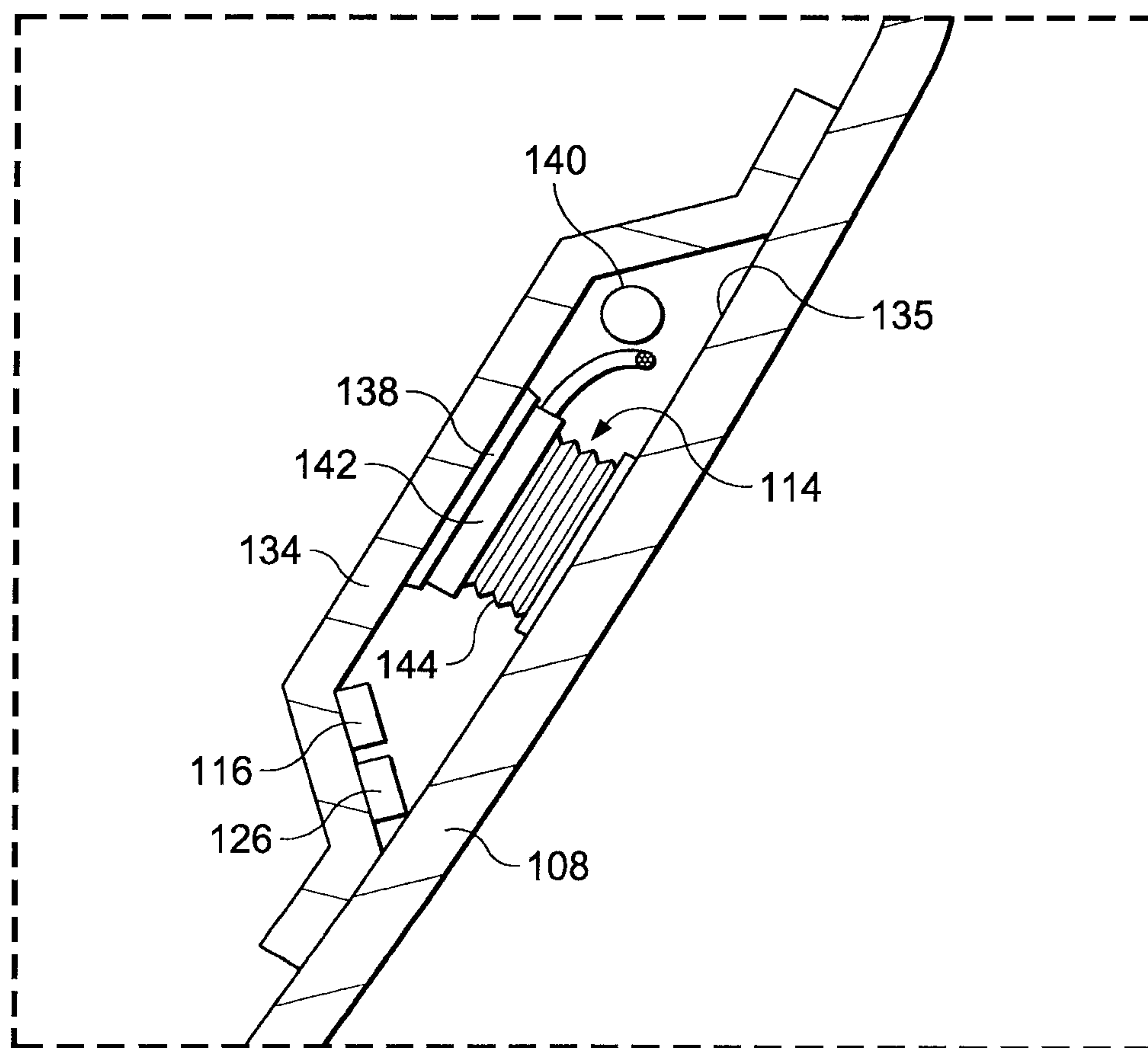
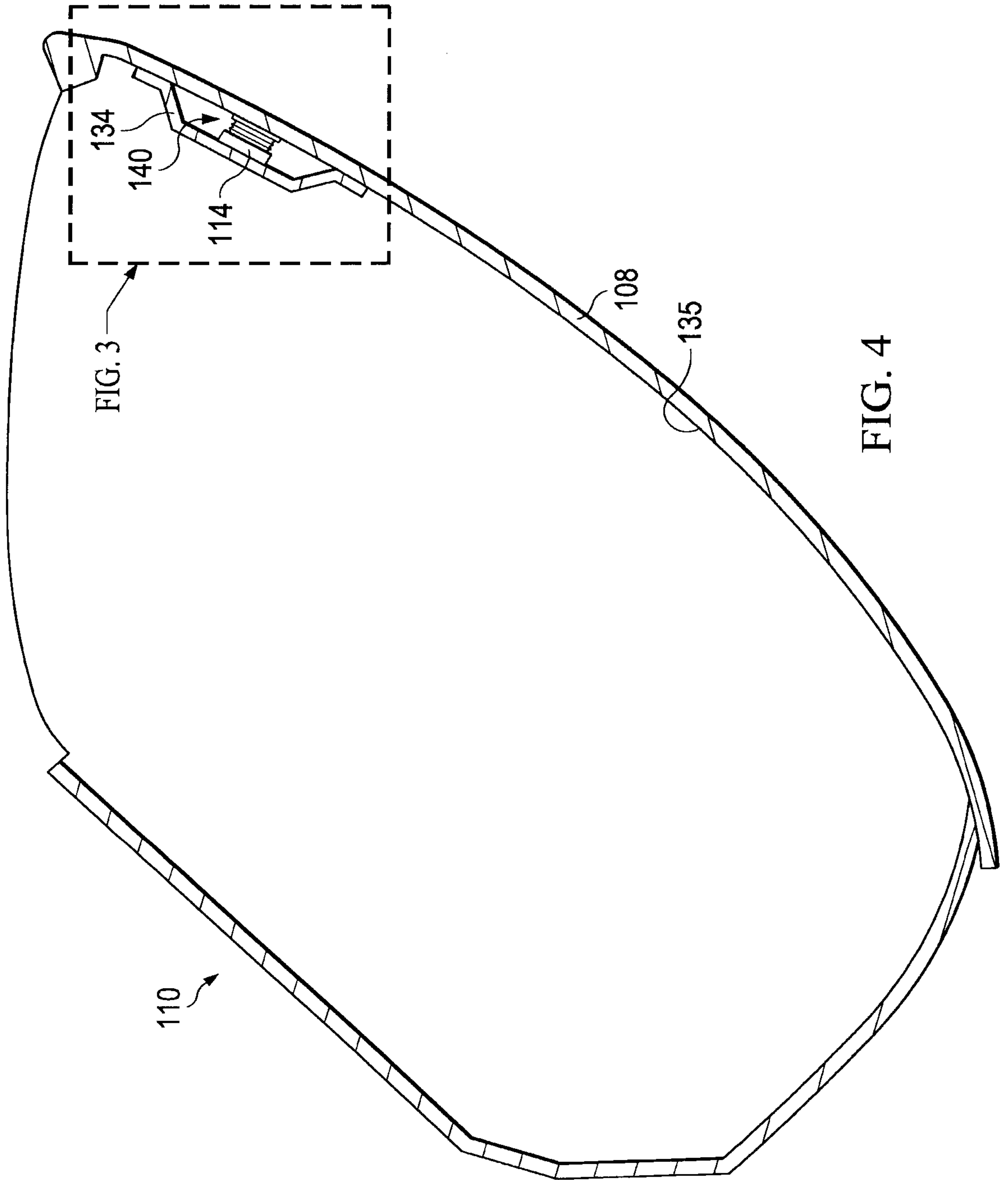


FIG. 3



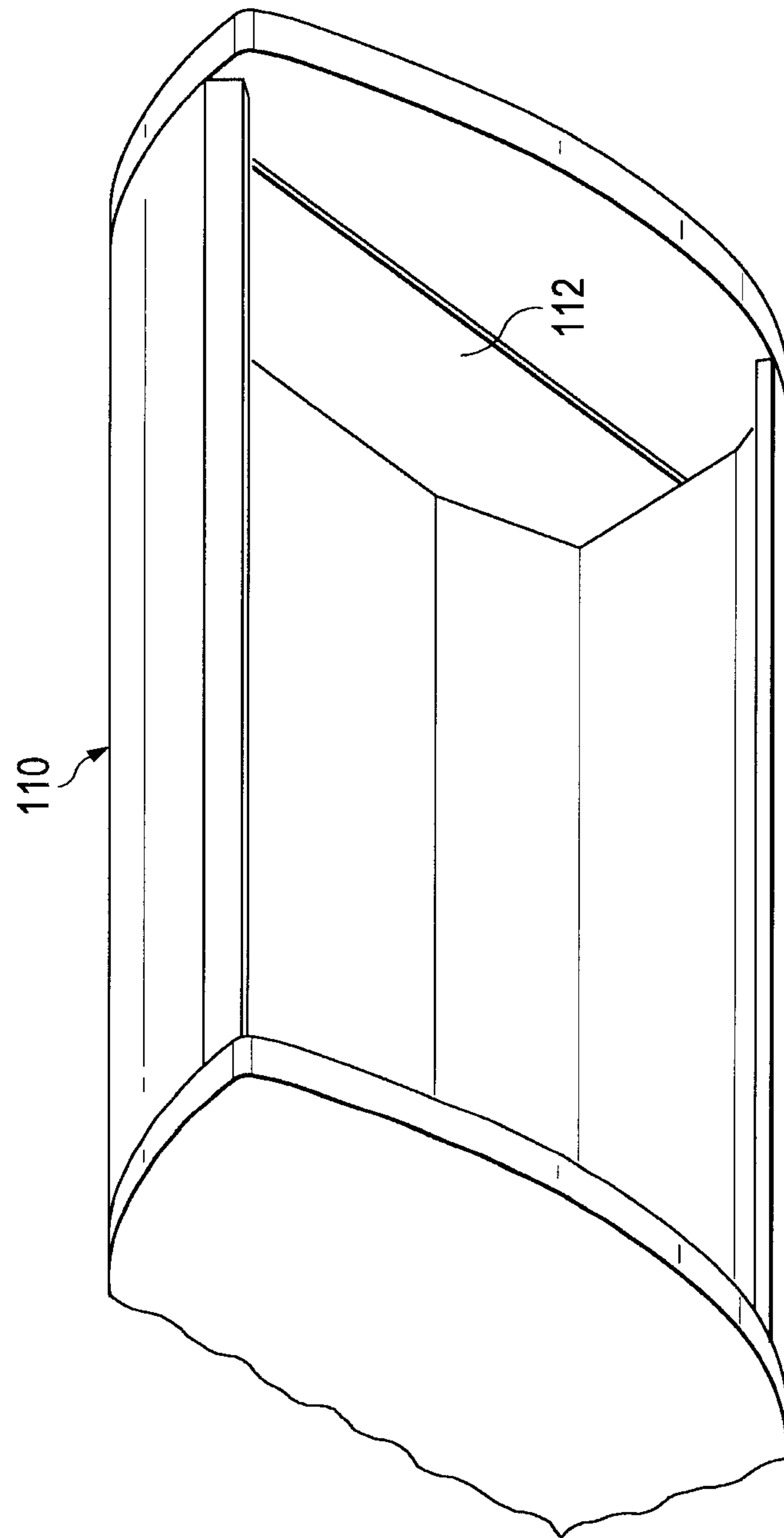


FIG. 5

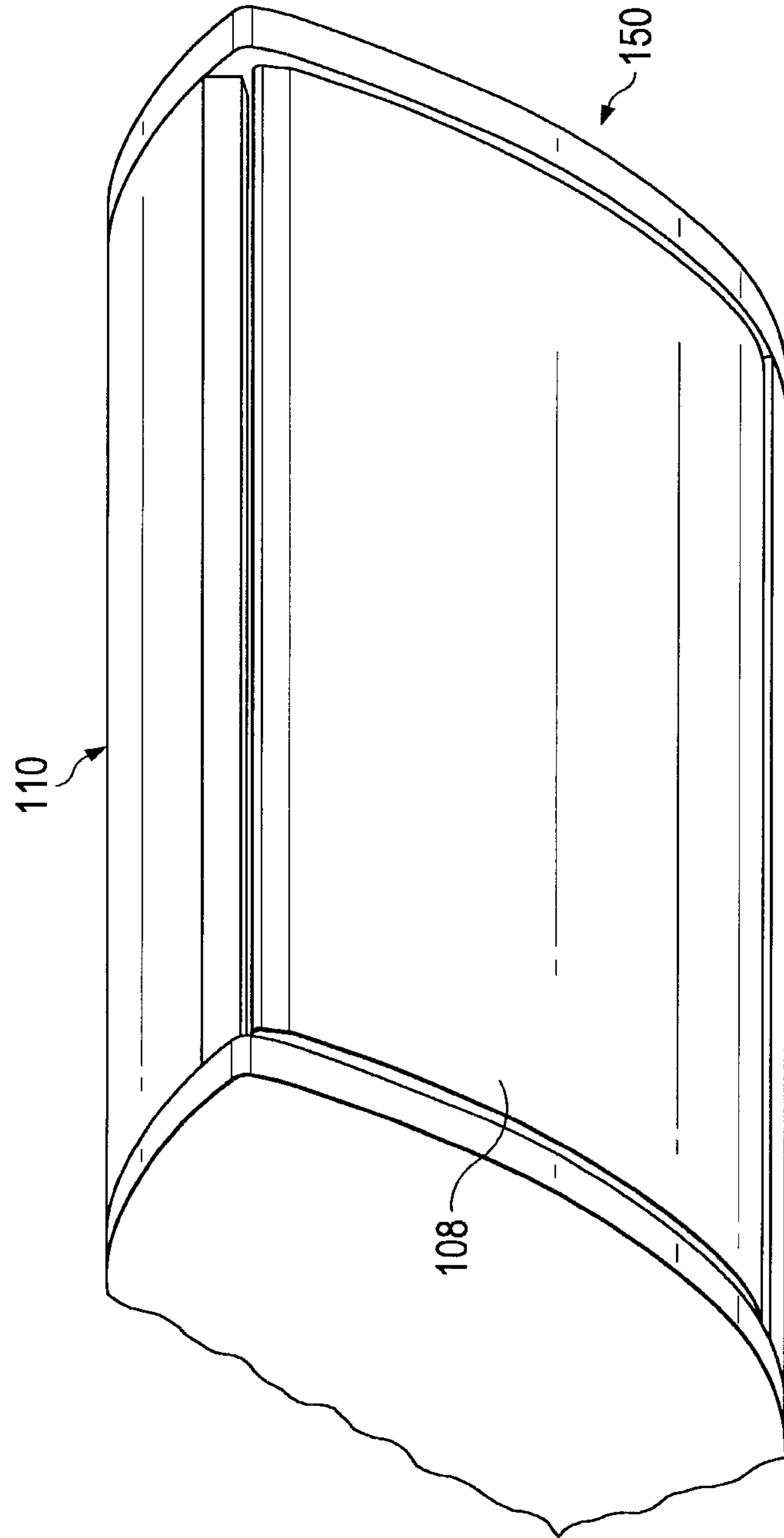


FIG. 6

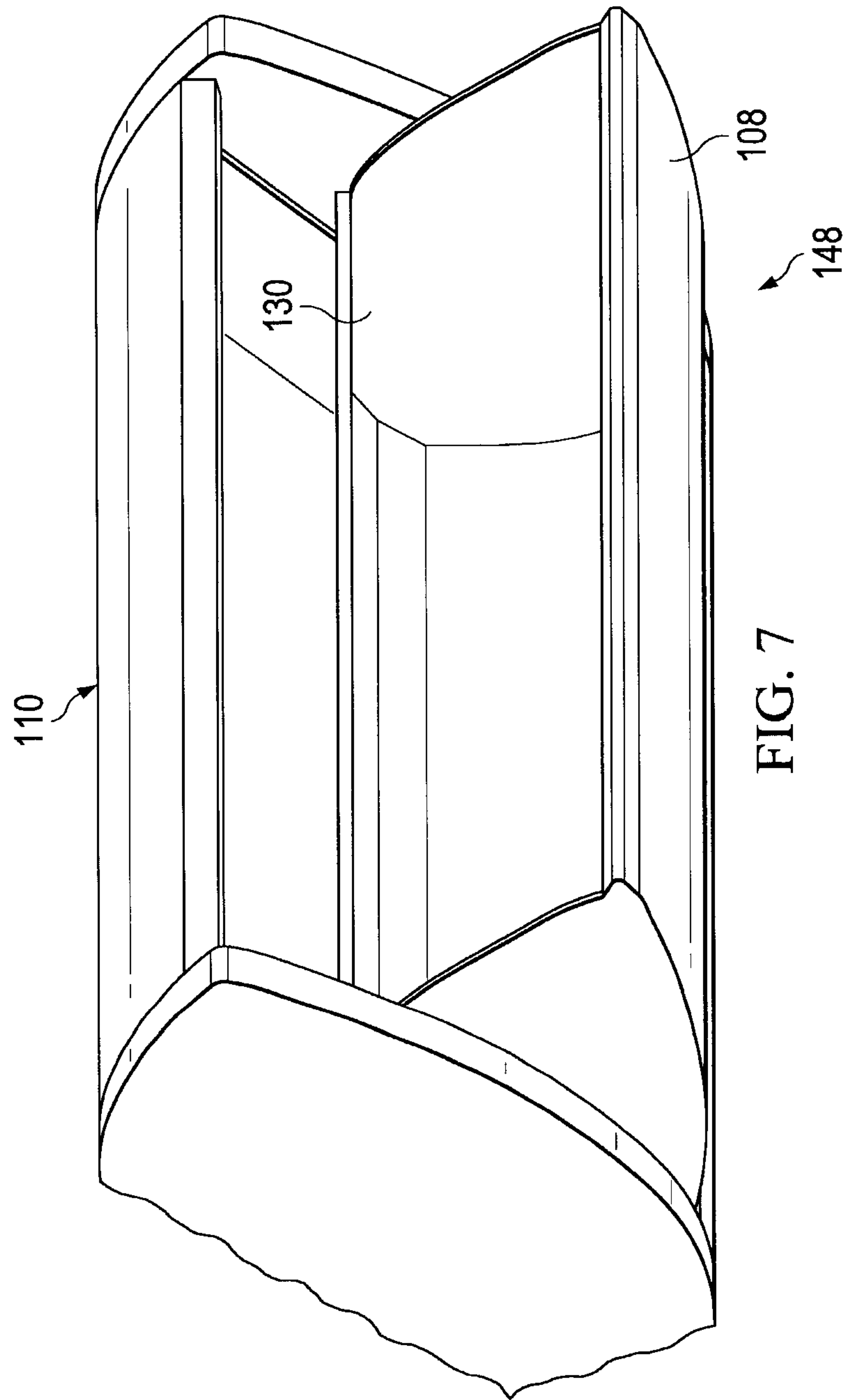
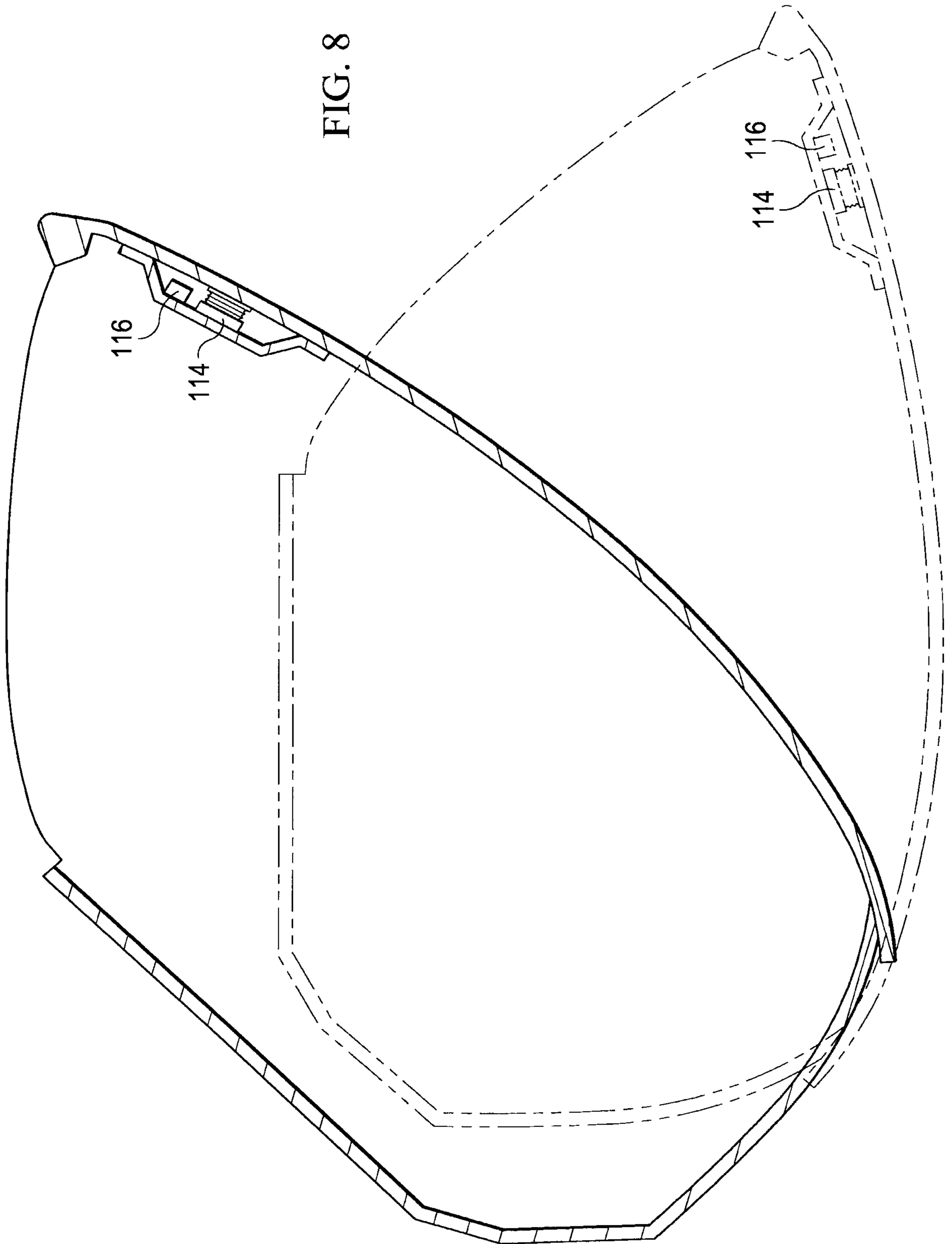


FIG. 7

FIG. 8





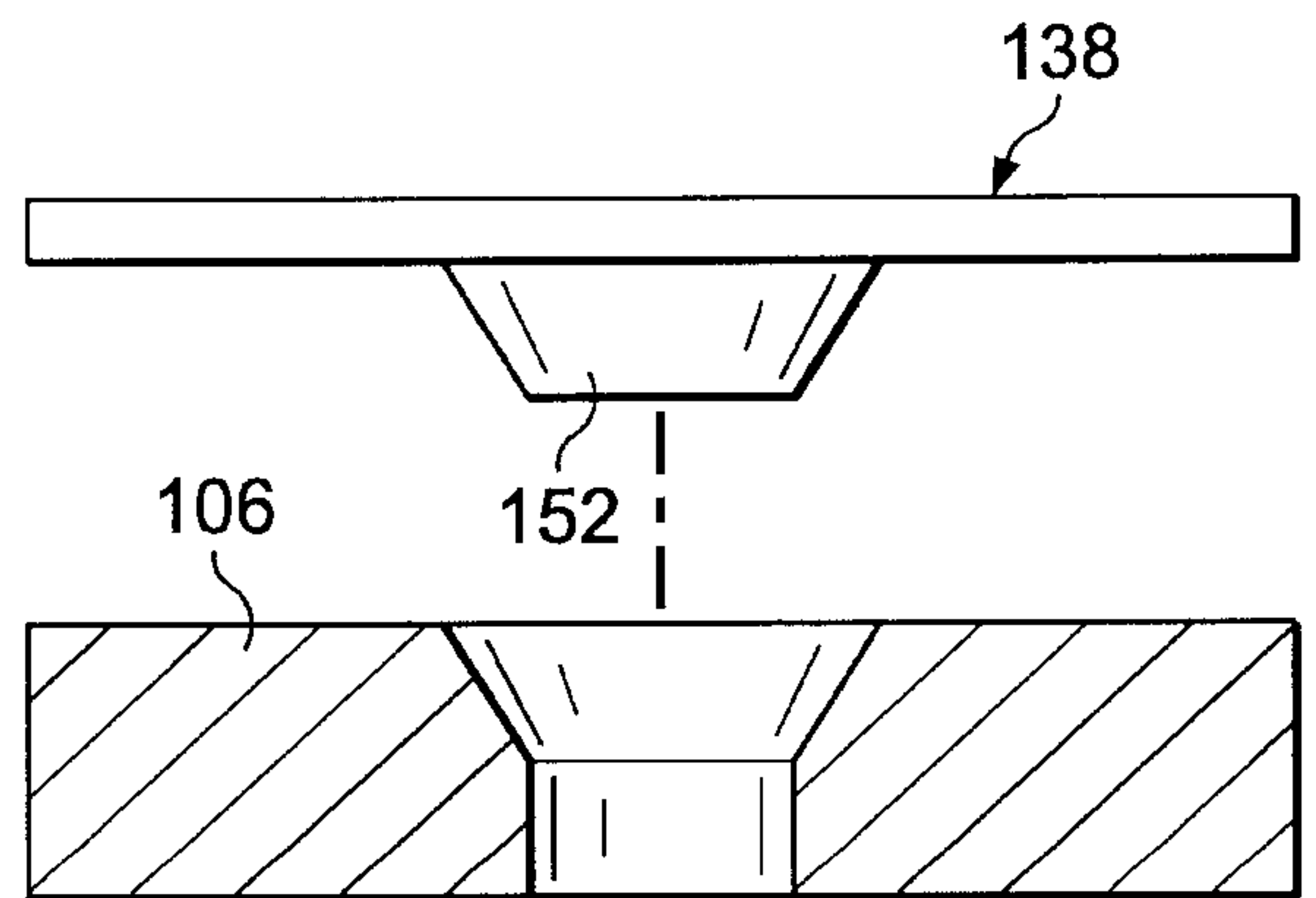
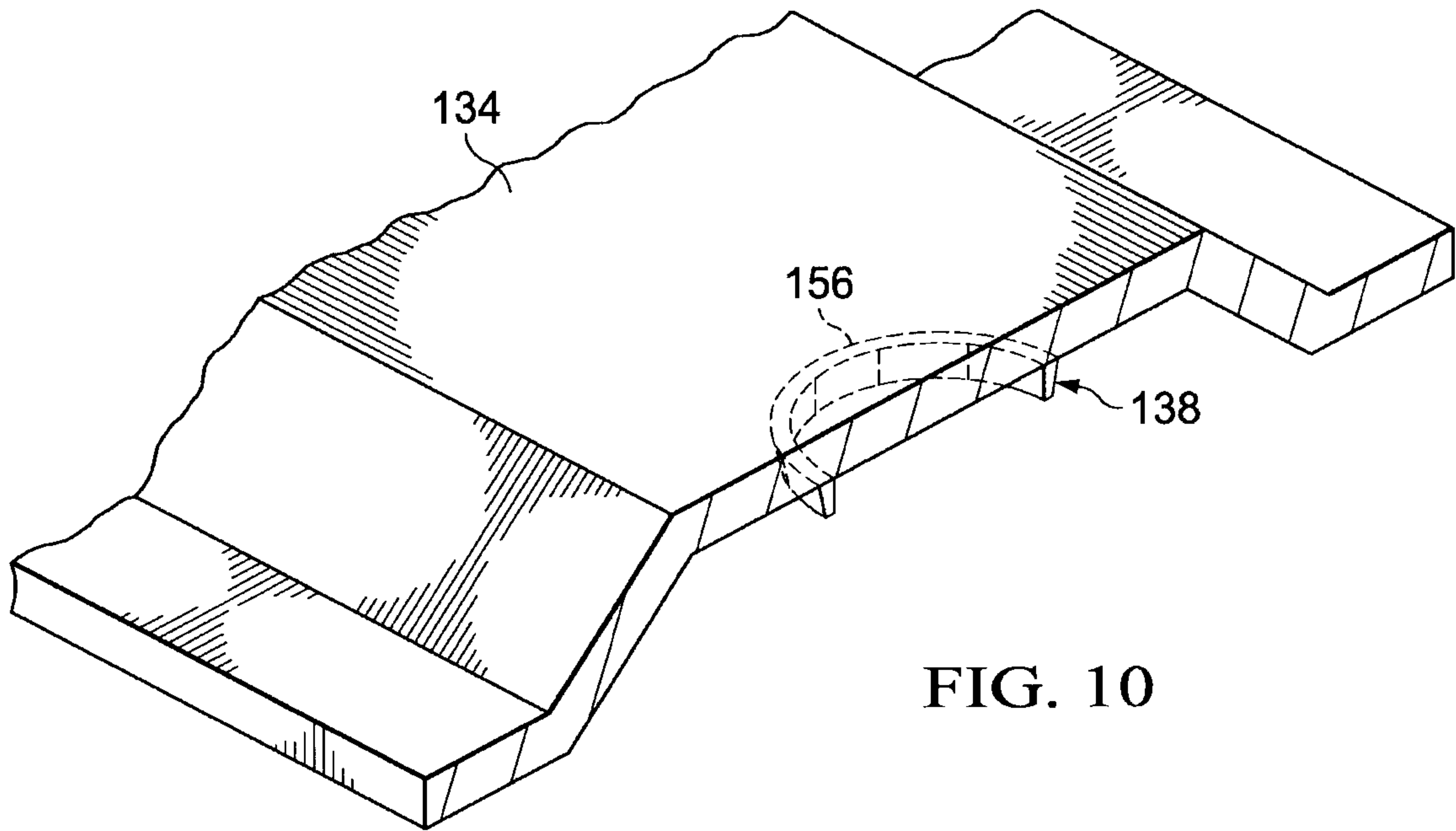


FIG. 11

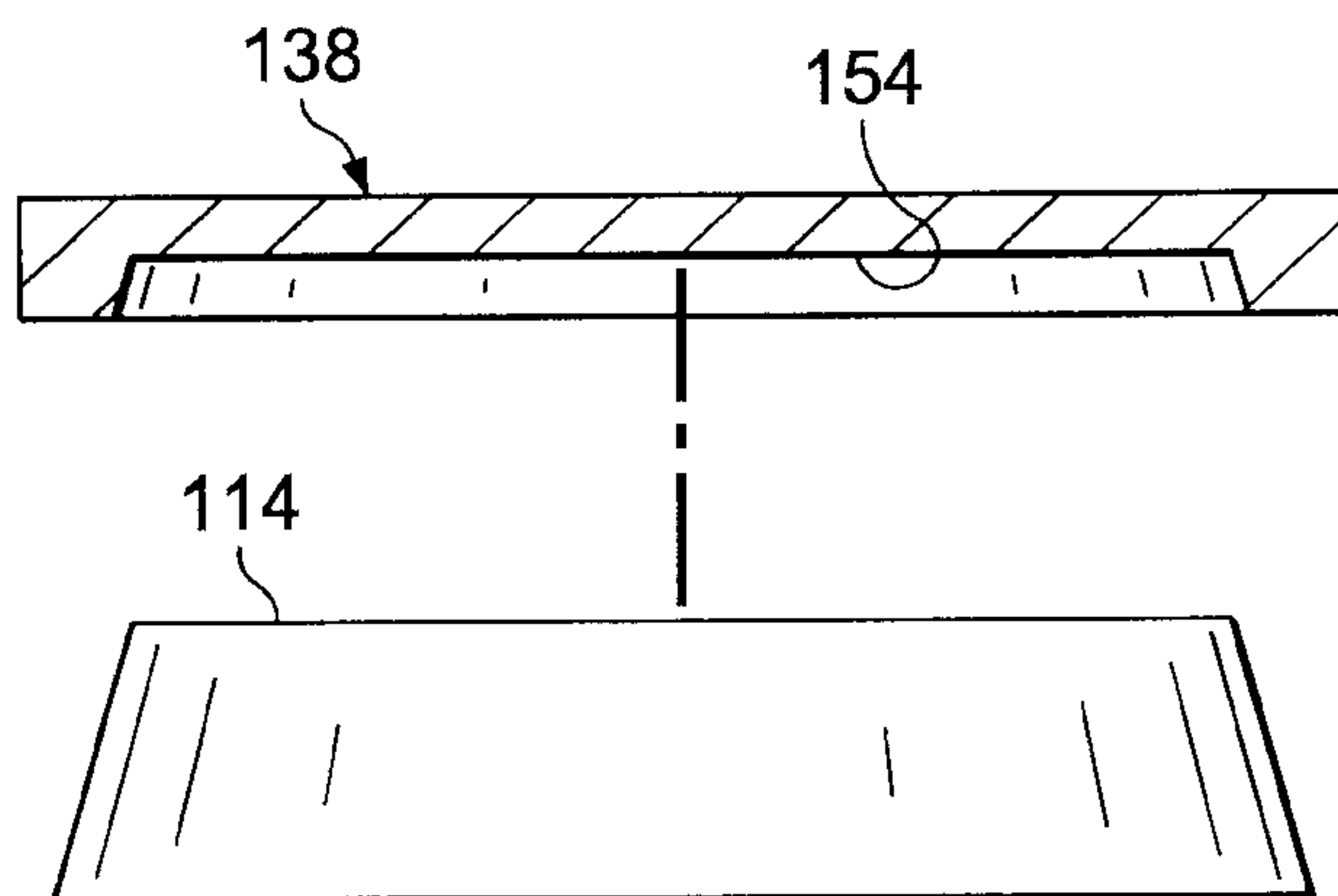


FIG. 12

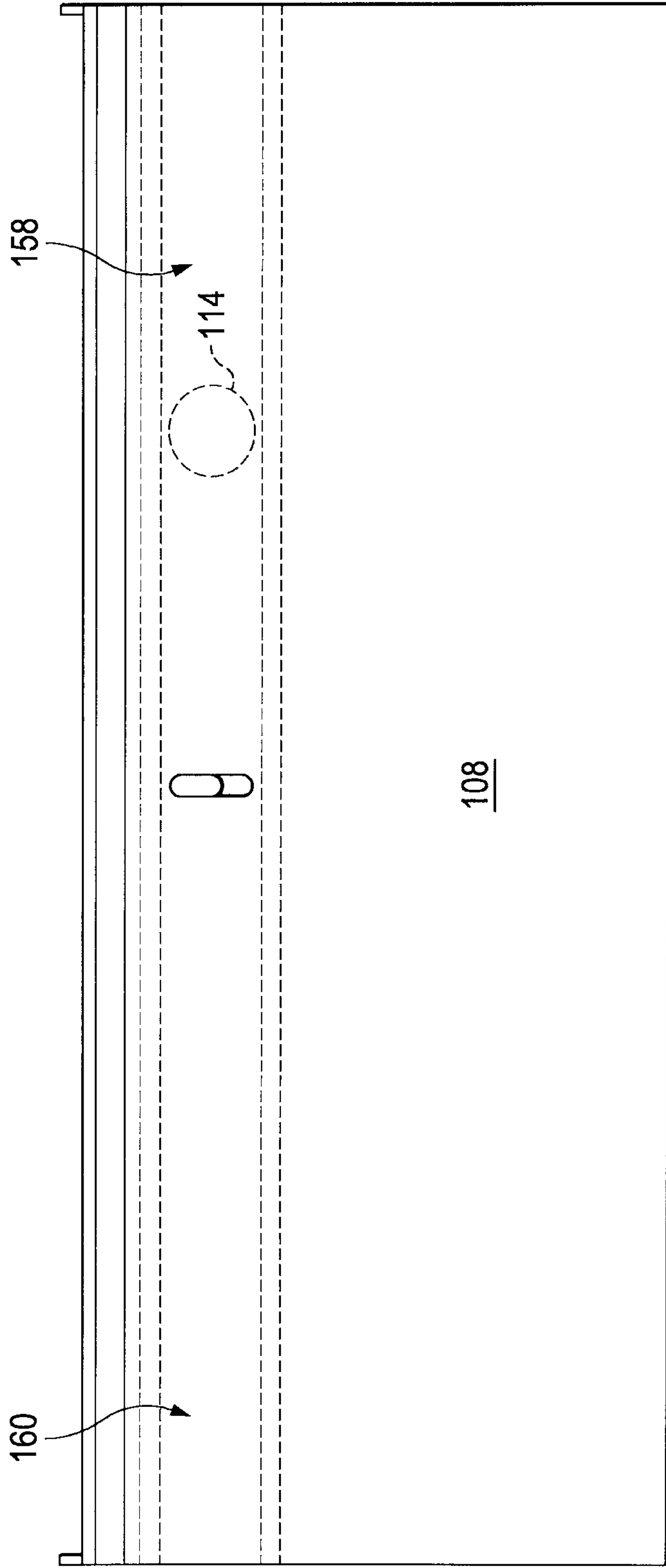
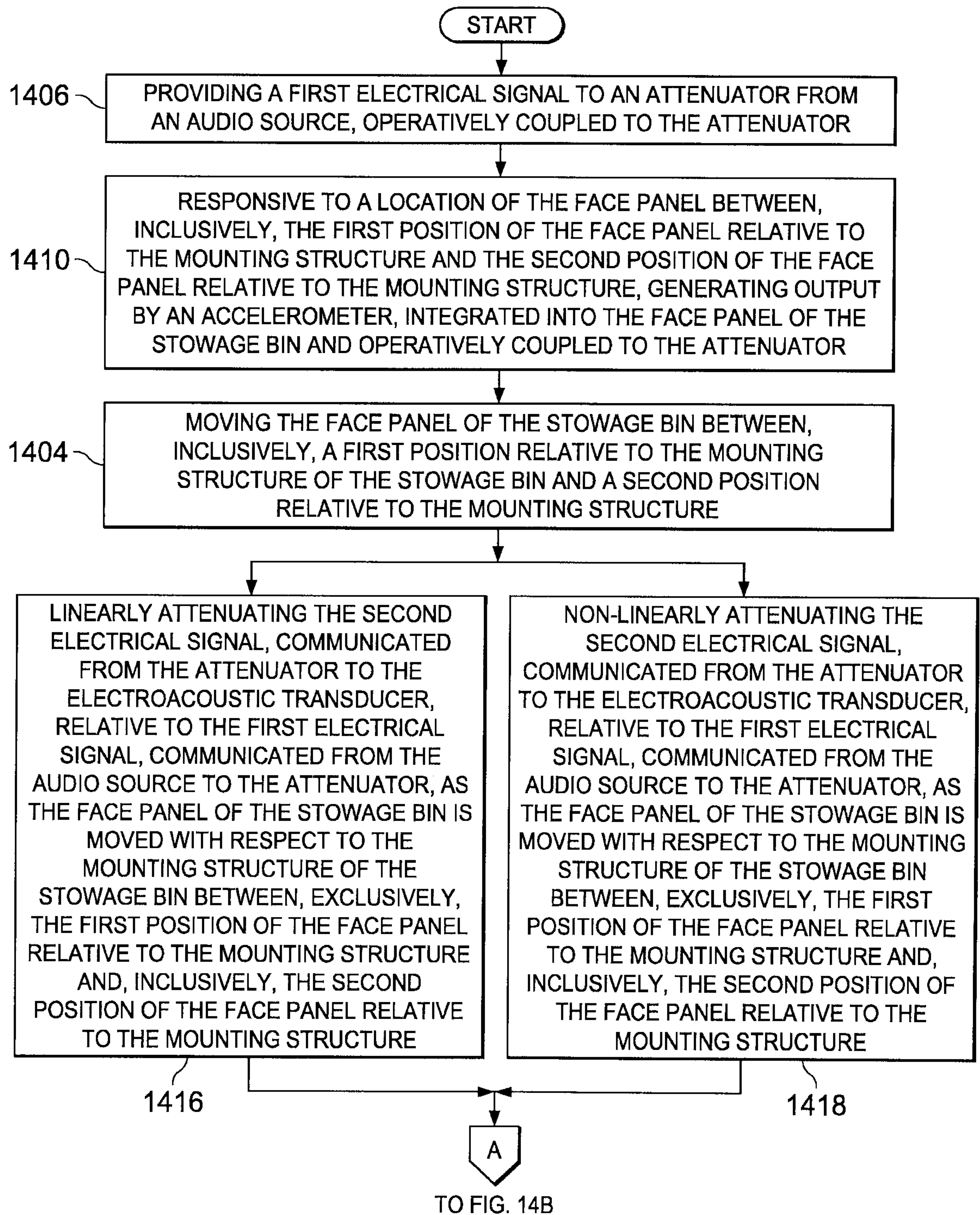


FIG. 13

FIG. 14A



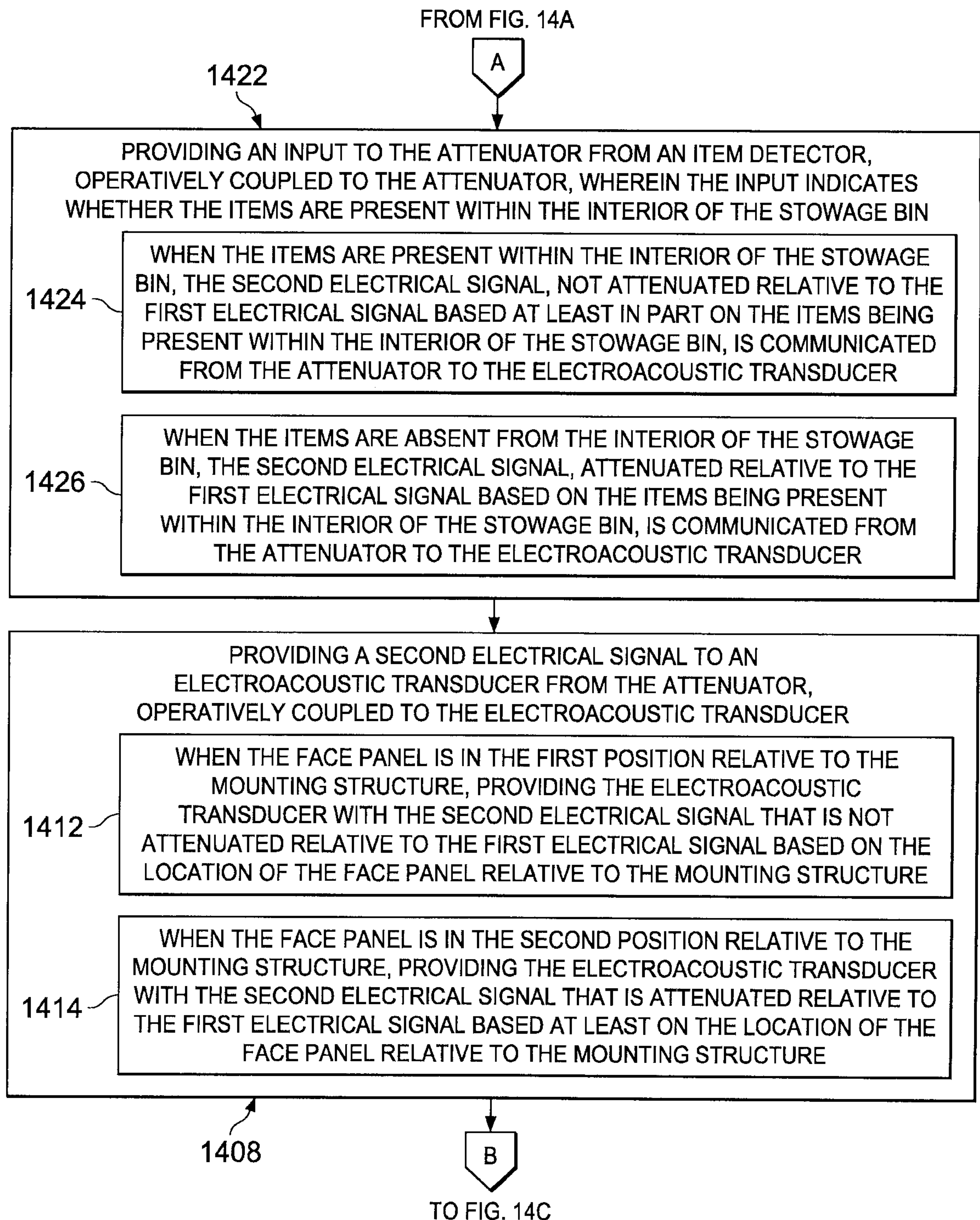


FIG. 14B

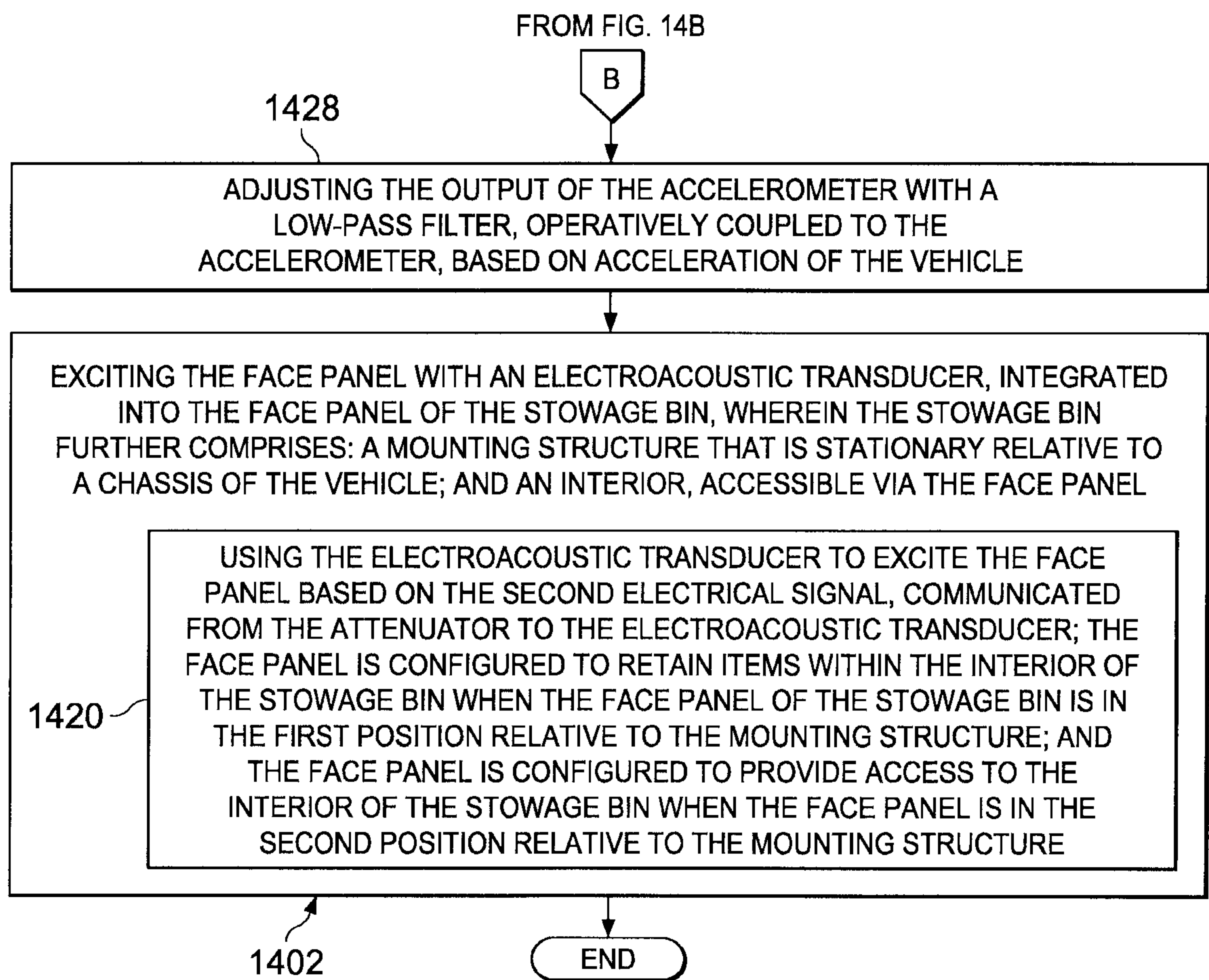


FIG. 14C

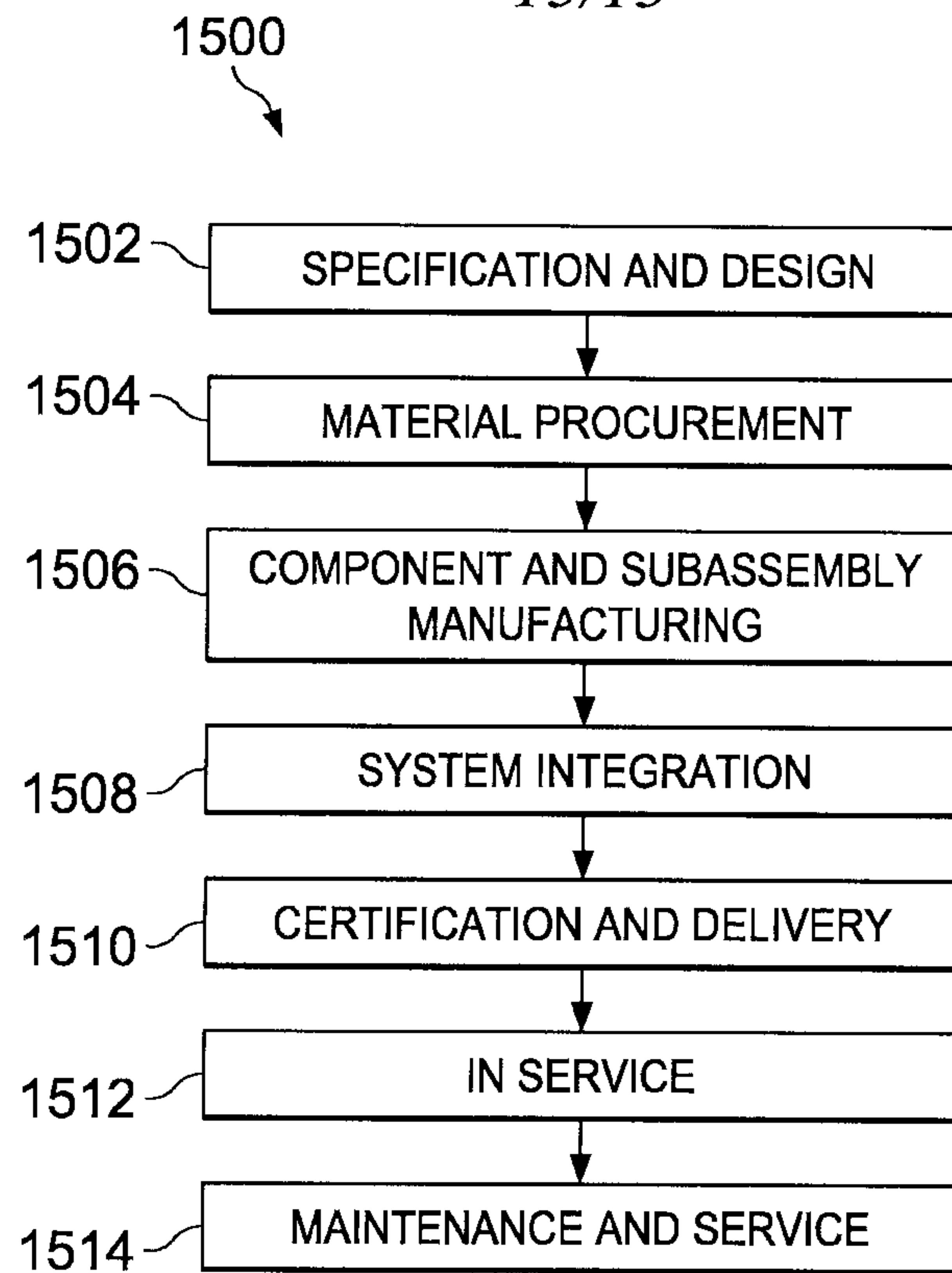


FIG. 15

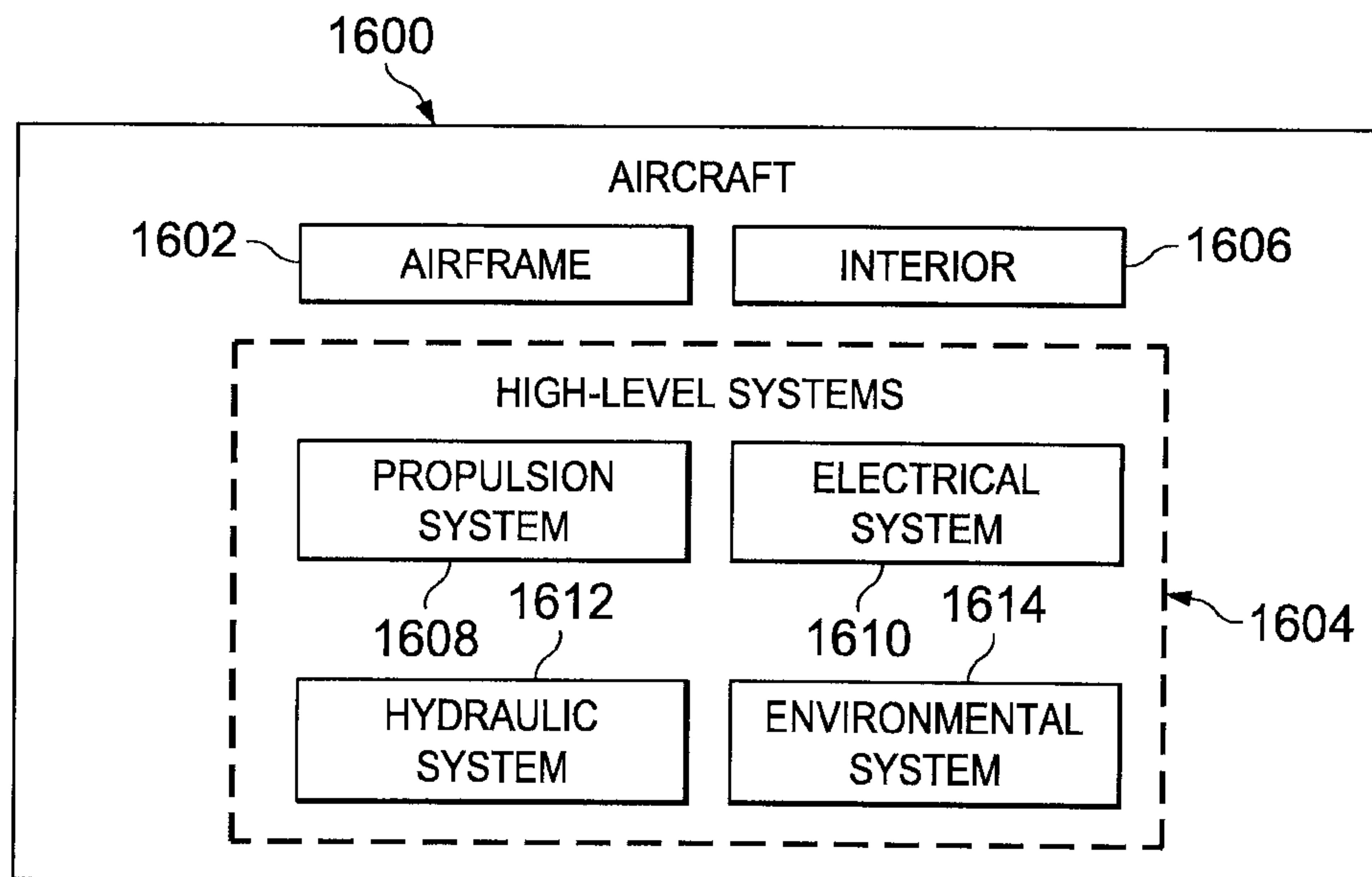


FIG. 16

