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(54) **MOUNTING SYSTEMS FOR SECURING COMPONENTS TO VEHICLE BODY PANELS**

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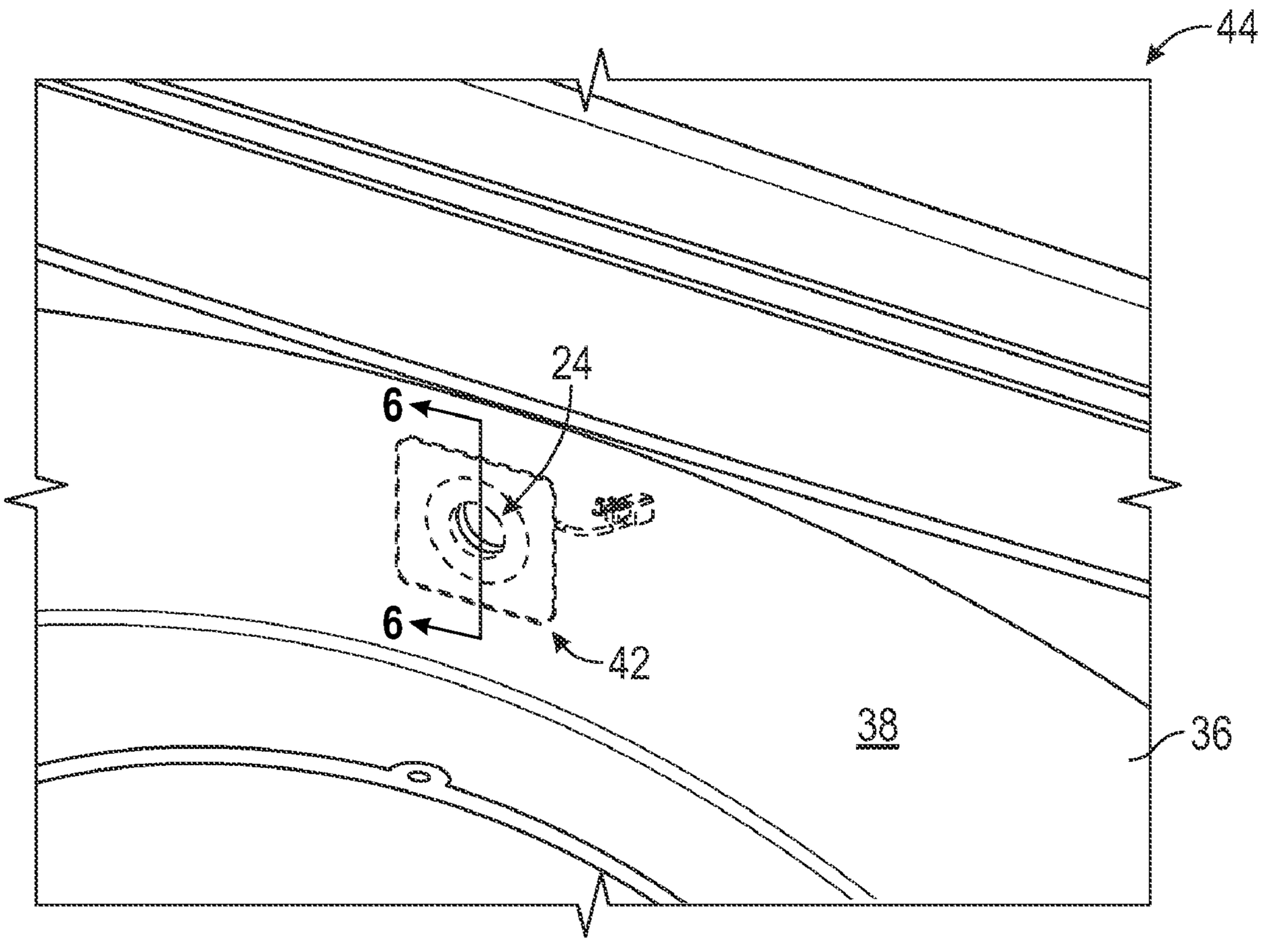
(57) **ABSTRACT**

Mounting systems are described for mounting a vehicle component to an interior surface of a vehicle body panel. An exemplary mounting system may include a locking mount that can be secured to the interior surface of the vehicle body panel by a structural patch. The vehicle component may be an exciter that can be secured to the locking mount to achieve positive contact relative to the vehicle body panel and achieve desired acoustic requirements for broadcasting audio signals.



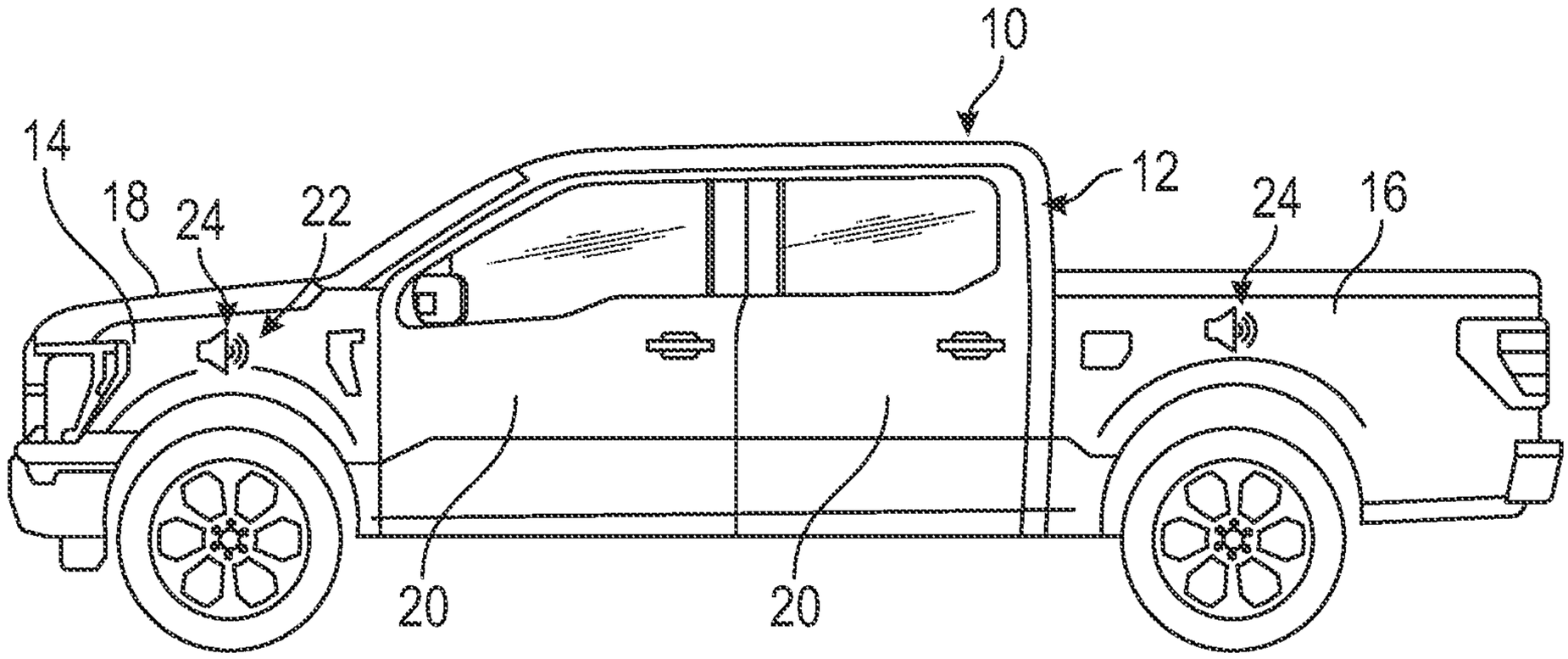


FIG. 1

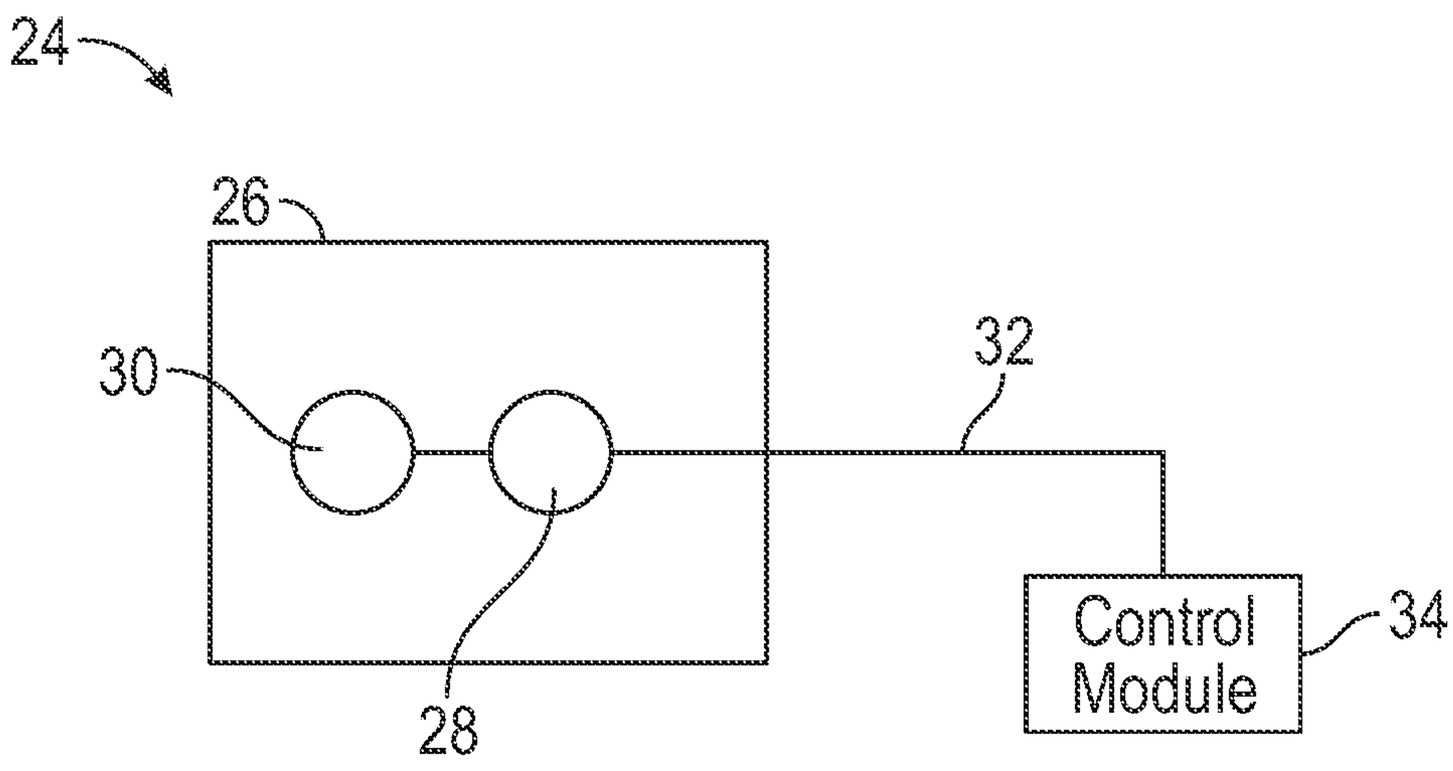


FIG. 2

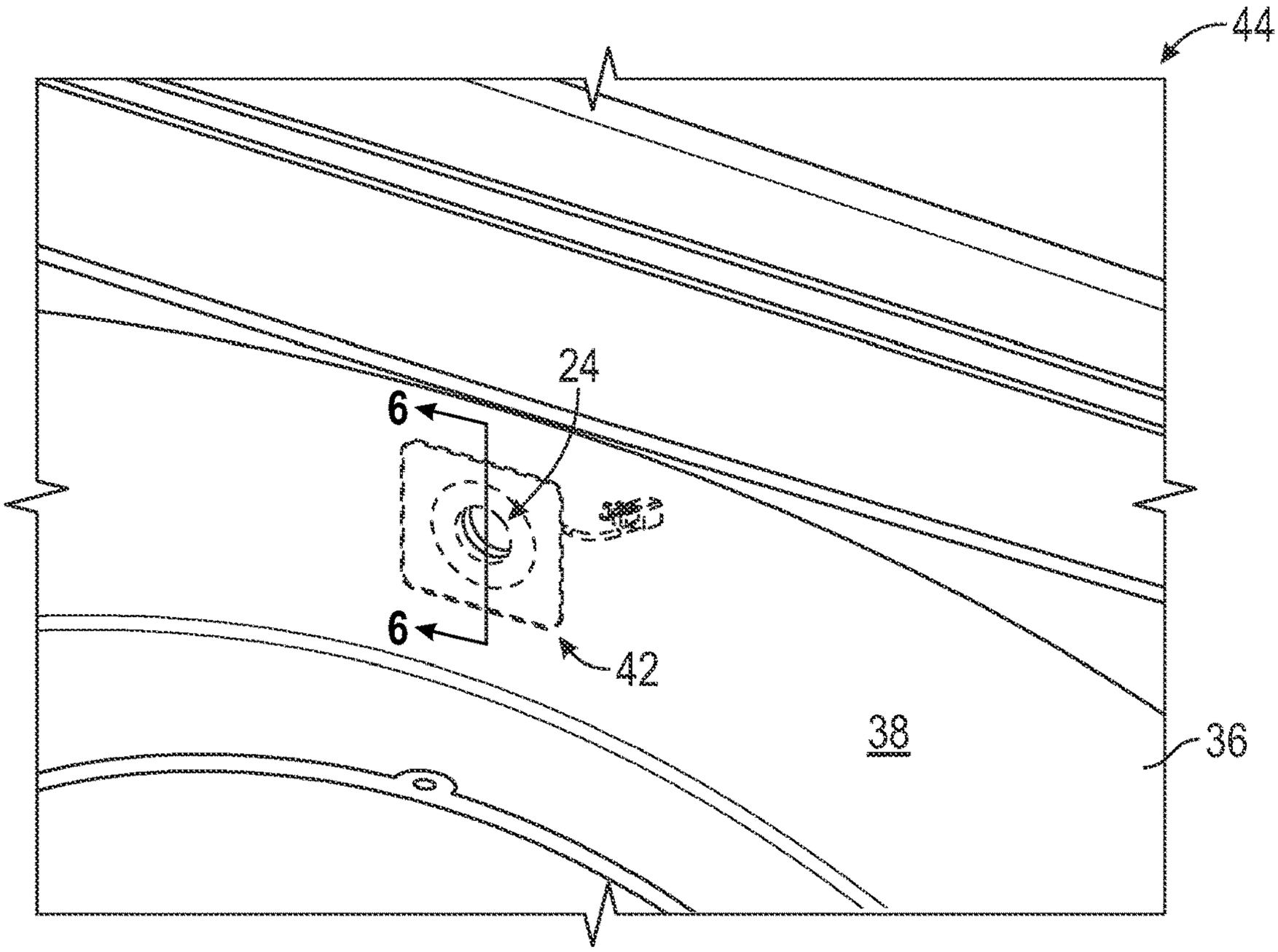


FIG. 3

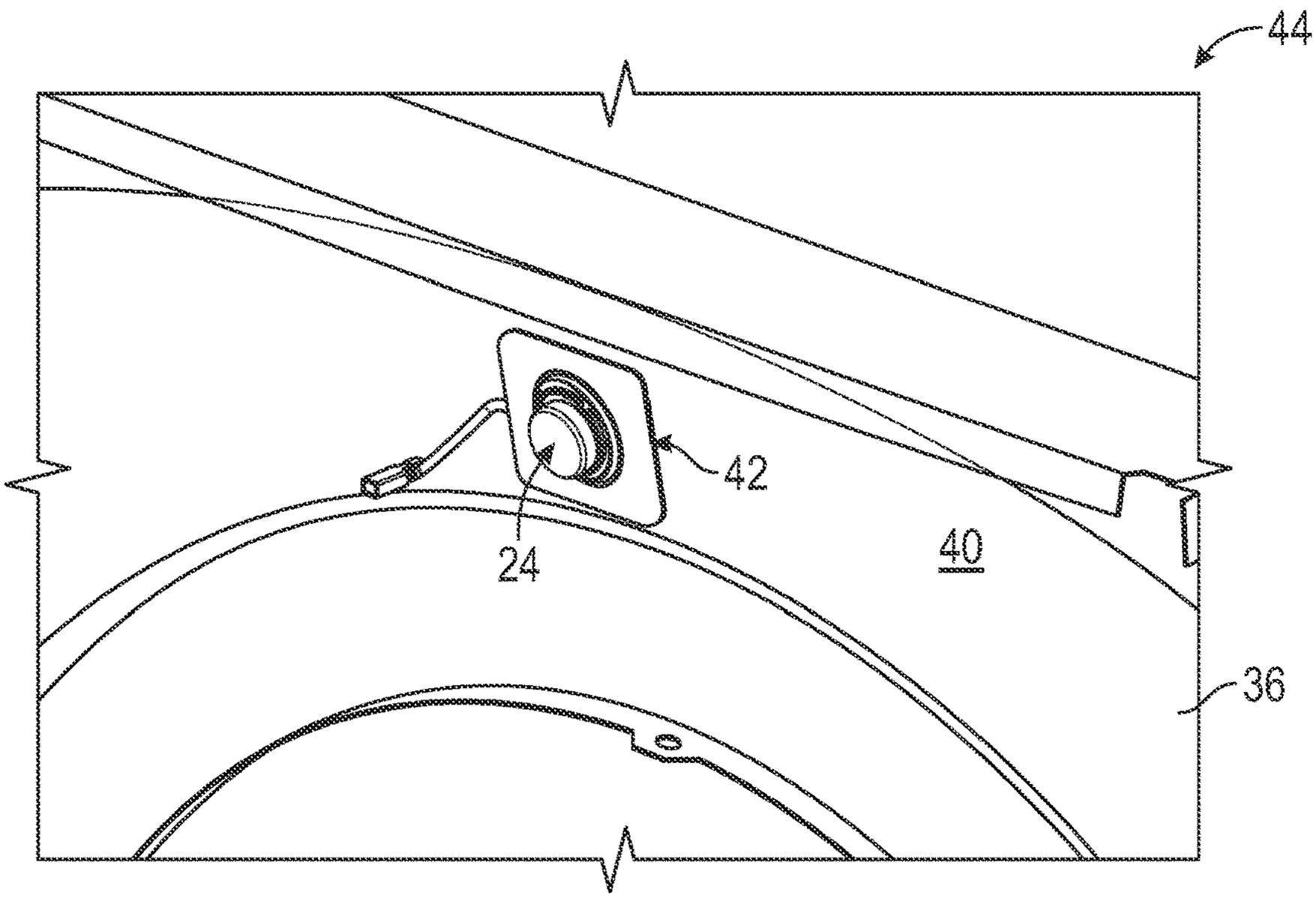


FIG. 4

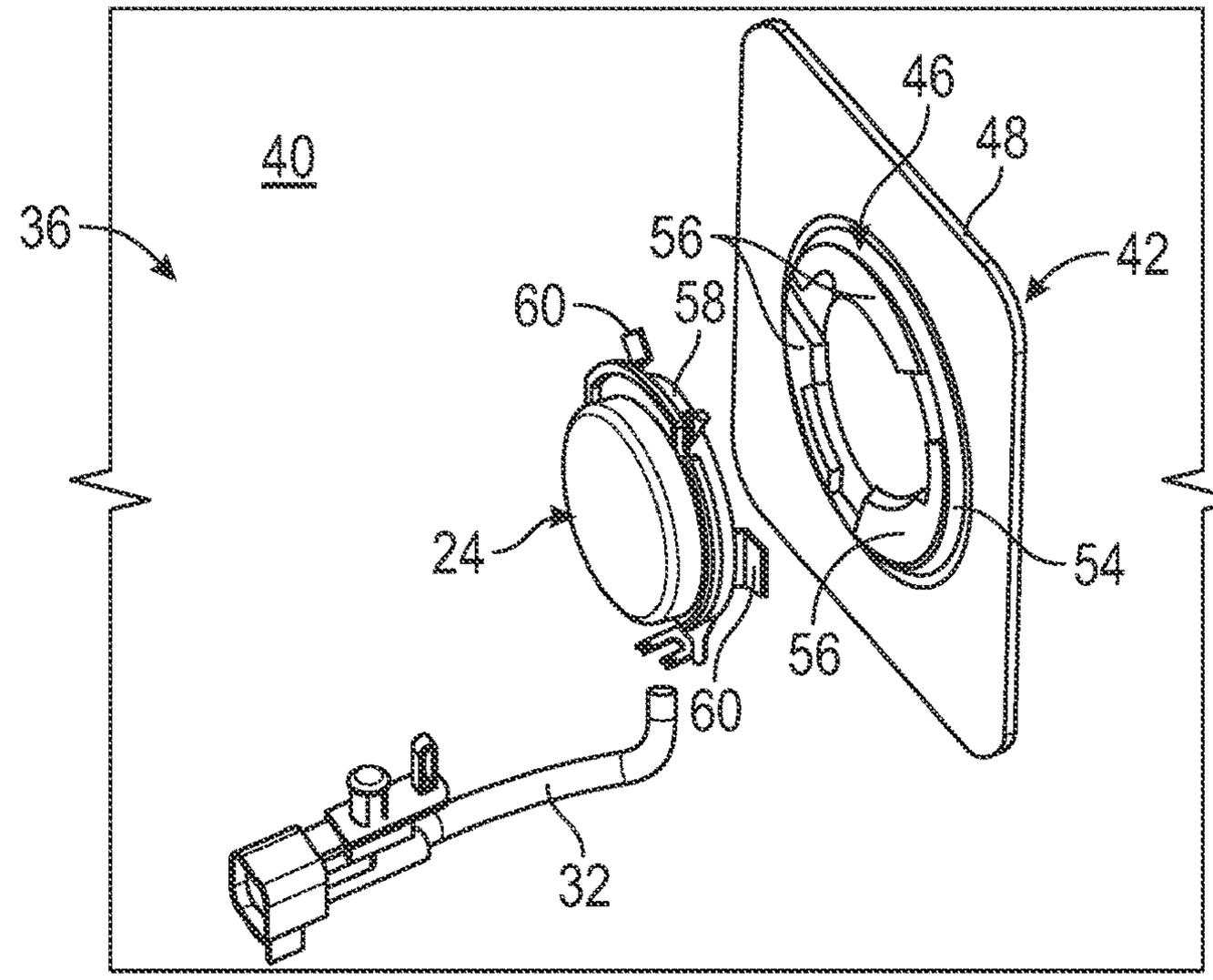


FIG. 5

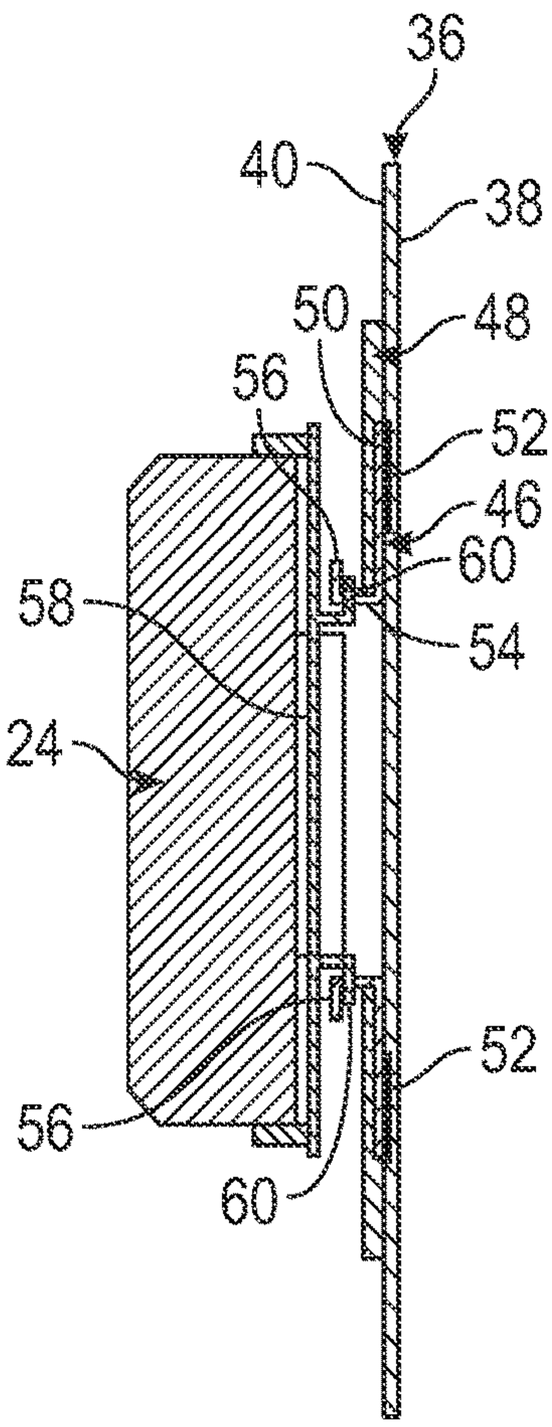


FIG. 6

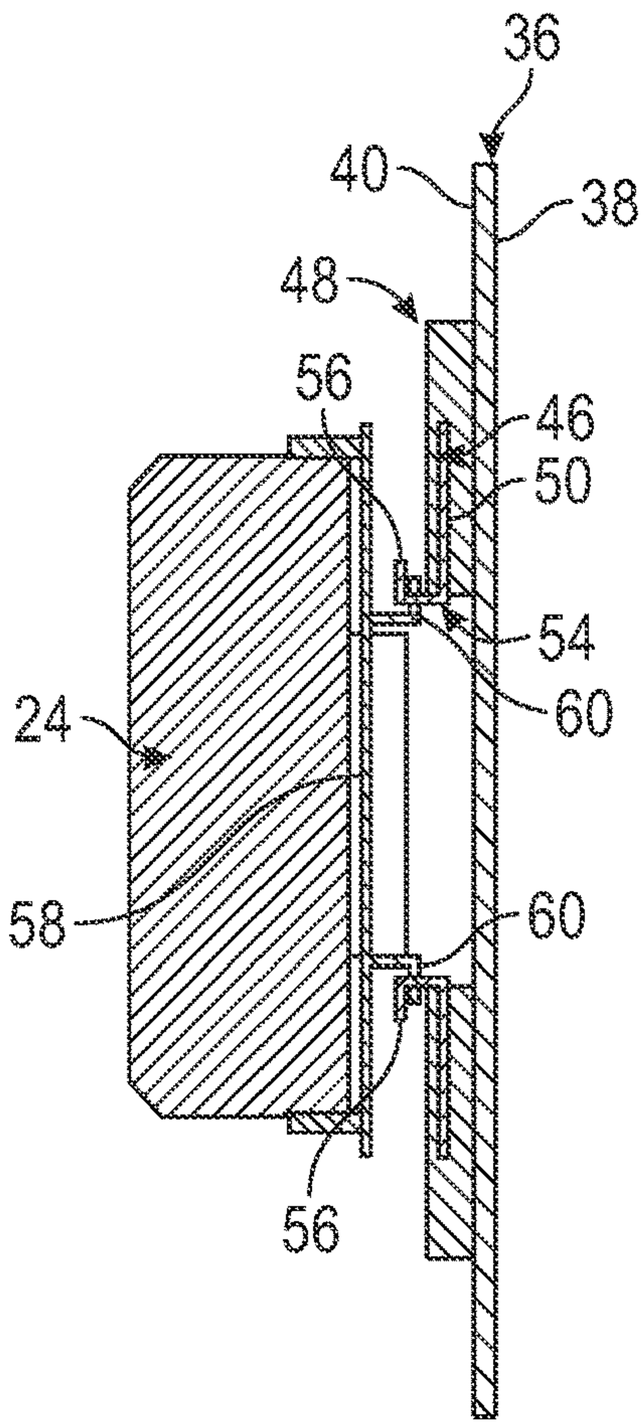


FIG. 7

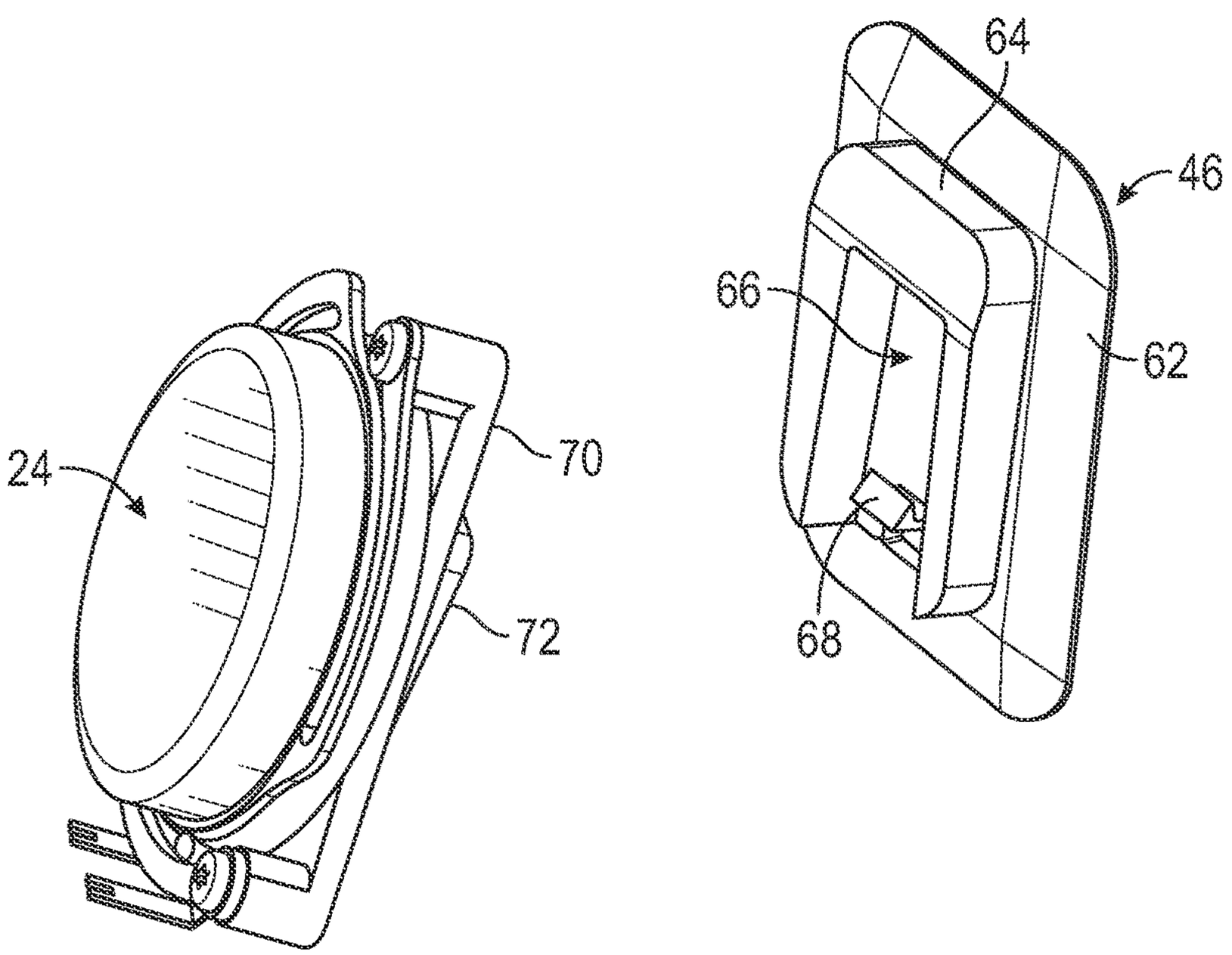


FIG. 8A

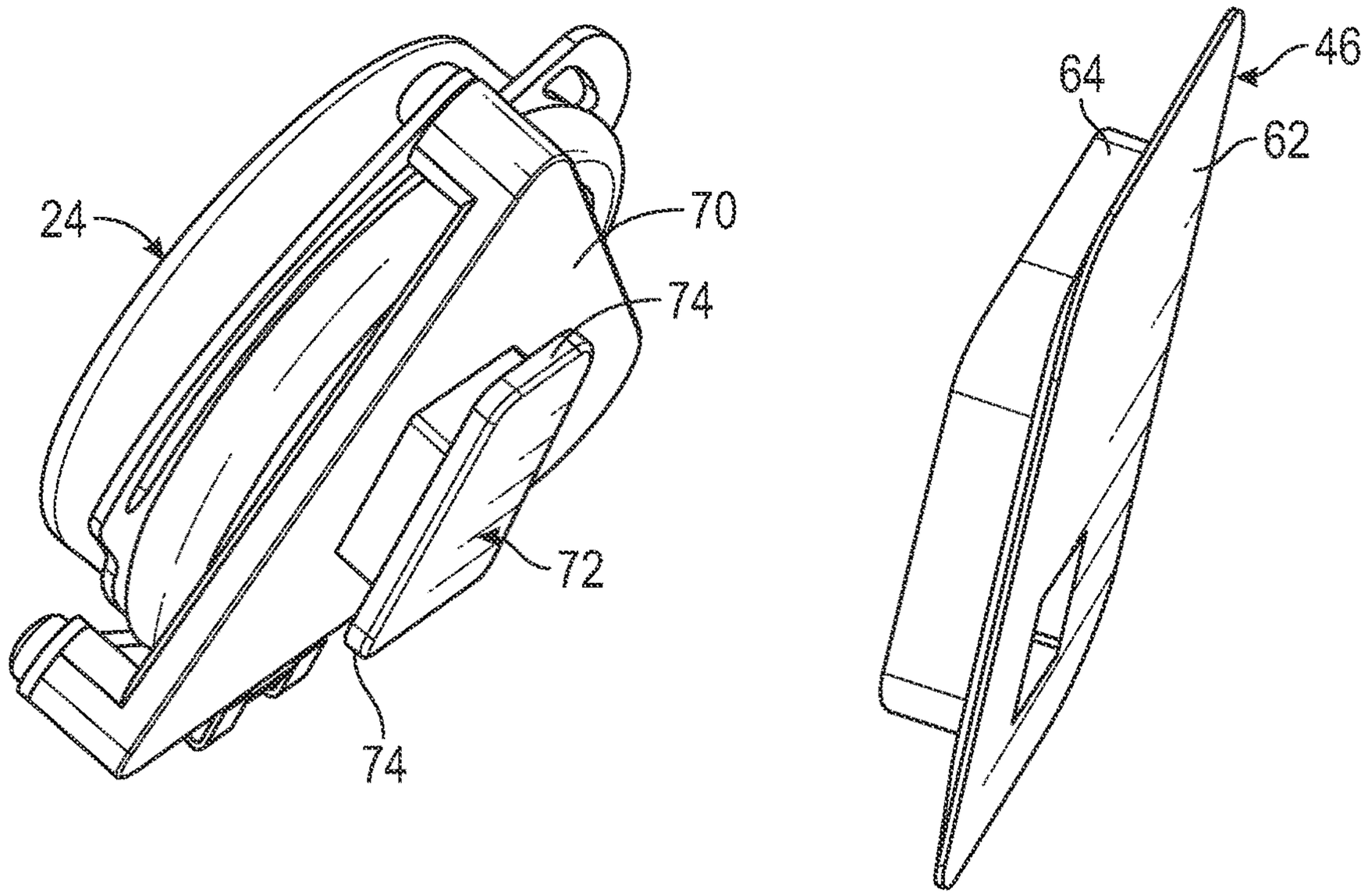


FIG. 8B

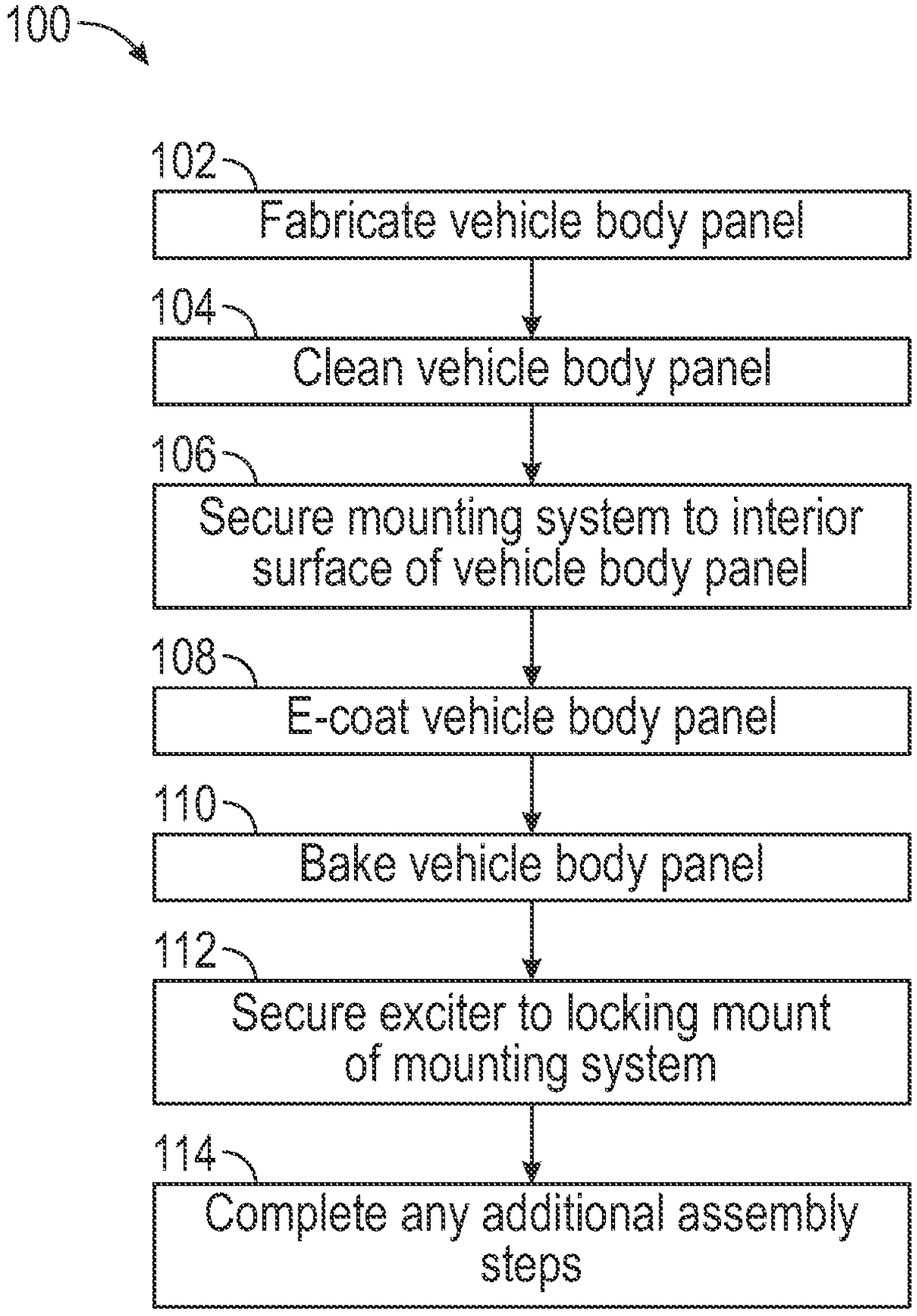

100
102
Fabricate vehicle body panel
104
Clean vehicle body panel
106
Secure mounting system to interior surface of vehicle body panel
108
E-coat vehicle body panel
110
Bake vehicle body panel
112
Secure exciter to locking mount of mounting system
114
Complete any additional assembly steps

FIG. 9

MOUNTING SYSTEMS FOR SECURING COMPONENTS TO VEHICLE BODY PANELS

TECHNICAL FIELD

[0001] This disclosure relates to motor vehicles, and more particularly to mounting systems for mounting components to vehicle body panels.

BACKGROUND

[0002] Automotive vehicle bodies include a multitude of body panels. Vehicle components are often mounted to the body panels.

SUMMARY

[0003] A vehicle assembly according to an exemplary aspect of the present disclosure includes, among other things, a mounting system including a locking mount and a structural patch, and a vehicle component mounted to the locking mount.

[0004] In a further non-limiting embodiment of the foregoing vehicle assembly, the mounting system is secured to an interior surface of a vehicle body panel.

[0005] In a further non-limiting embodiment of either of the foregoing vehicle assemblies, the vehicle body panel is an outer panel of a front fender or a rear quarter panel.

[0006] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the vehicle component is an exciter.

[0007] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the locking mount includes a base and a collar that protrudes outwardly from the base.

[0008] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the vehicle component includes a mounting base having a mating flange that is configured to engage a cam tab of the collar.

[0009] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the vehicle component includes a mounting base having a mounting flange that includes a lip that is configured to engage a flexible prong of the collar.

[0010] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the base is embedded within the structural patch.

[0011] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, the structural patch is a mastic patch or an adhesive patch.

[0012] In a further non-limiting embodiment of any of the foregoing vehicle assemblies, an adhesive is applied to a base of the locking mount.

[0013] A vehicle assembly according to another exemplary aspect of the present disclosure includes, among other things, a vehicle body panel including an exterior surface and an interior surface, a mounting system including a locking mount and a structural patch arranged to secure the locking mount relative to the interior surface, and a vehicle component secured to the locking mount of the mounting system.

[0014] In a further non-limiting embodiment of the foregoing vehicle assembly, the vehicle body panel is an outer panel of a front fender or a rear quarter panel.

[0015] In a further non-limiting embodiment of either of the foregoing vehicle assemblies, the vehicle component is a vibration exciter.

[0016] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, a base of the locking mount is trapped between the structural patch and the interior surface of the vehicle body panel.

[0017] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, an adhesive is applied between the base and the interior surface.

[0018] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, a base of the locking mount is trapped between the structural patch and the interior surface of the vehicle body panel.

[0019] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, the locking mount includes a base and a collar that protrudes outwardly from the base.

[0020] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, the vehicle component includes a mounting base having a mating flange that is configured to engage a cam tab of the collar.

[0021] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, the vehicle component includes a mounting base having a mounting flange that includes a lip that is configured to engage a flexible prong of the collar.

[0022] In a further nom-limiting embodiment of any of the foregoing vehicle assemblies, the structural patch is a mastic patch or an adhesive patch.

[0023] The embodiments, examples, and alternatives of the preceding paragraphs, the claims, or the following description and drawings, including any of their various aspects or respective individual features, may be taken independently or in any combination. Features described in connection with one embodiment are applicable to all embodiments, unless such features are incompatible.

[0024] The various features and advantages of this disclosure will become apparent to those skilled in the art from the following detailed description. The drawings that accompany the detailed description can be briefly described as follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** schematically illustrates a motor vehicle.

[0026] FIG. **2** schematically illustrates an exciter that can be mounted to a motor vehicle.

[0027] FIG. **3** illustrates a first side of a vehicle body panel.

[0028] FIG. **4** illustrates a second side of the vehicle body panel of FIG. **3**.

[0029] FIG. **5** is a partial exploded view of a vehicle assembly that includes the vehicle body panel of FIGS. **3** and **4**

[0030] FIG. **6** is a cross-sectional view through section **6-6** of FIG. **3**.

[0031] FIG. **7** illustrates another exemplary vehicle assembly.

[0032] FIGS. **8**A and **8**B illustrate an exemplary locking mount of a mounting system.

[0033] FIG. **9** schematically illustrates an assembly method for assembling a vehicle assembly that includes a vehicle component, a mounting system, and a vehicle body panel.

DETAILED DESCRIPTION

[0034] This disclosure details mounting systems for mounting a vehicle component to an interior surface of a vehicle body panel. An exemplary mounting system may include a locking mount that can be secured to the interior surface of the vehicle body panel by a structural patch. The vehicle component may be an exciter that can be secured to the locking mount to achieve positive contact relative to the vehicle body panel and achieve desired acoustic requirements for broadcasting audio signals. These and other features of this disclosure are described in greater detail below.

[0035] FIG. **1** schematically illustrates a motor vehicle **10** (hereinafter referred to simply as the "vehicle"). The vehicle **10** may be a pickup truck, a car, a van, a sport utility vehicle, a hearse, a semi tractor-trailer, or any other type of vehicle. The vehicle **10** could also be a conventional motor vehicle, a traction battery powered hybrid or electric vehicle, or an autonomous vehicle (i.e., a driverless vehicle).

[0036] Although a specific component relationship is illustrated in the figures of this disclosure, the illustrations are not intended to limit this disclosure. In other words, the placement and orientation of the various components of the vehicle **10** are shown schematically and could vary within the scope of this disclosure. In addition, the various figures accompanying this disclosure are not necessarily drawn to scale, and some features may be exaggerated or minimized to emphasize certain details of a particular component, assembly, or system.

[0037] The vehicle **10** includes a vehicle body **12**. The vehicle body **12** may include a plurality of vehicle body panels. For example, the vehicle body **12** may include front side panels **14** (e.g., front fenders), rear side panels **16** (e.g., rear quarter panels), a hood panel **18**, one or more closure member panels **20**, etc.

[0038] The vehicle **10** may further be equipped with an acoustic vehicle alerting system (AVAS) **22** for communicating with passengers/users/pedestrians both inside and outside the vehicle **10**. The AVAS **22** may include one or more exciters **24** (e.g., vibration exciters). The total number of exciters **24** provided on the vehicle **10** is not intended to limit this disclosure.

[0039] Each exciter **24** may be configured to broadcast audio signals to the outside of the vehicle **10** by vibrating corresponding portions of the vehicle body panel to which it is mounted. The audio signals may include a word or phrase, a chime or other sound effect, a series of sounds effects, or any combination of words and sounds effects, for example.

[0040] The exciter **24** may include a housing **26** with internal components such as a driver/actuator **28** and a voice coil **30** that are used to generate sound (see FIG. **2**). The driver/actuator **28** can be a motor assembly, for example. The voice coil **30** may be coupled to one of the vehicle body panels of the vehicle body **12**, which allows the vehicle body panel to act as an acoustic baffle of a speaker for amplifying sound. The exciter **24** may further include a wire connection **32** to a power source and a control module **34**. The control module **34** may generate an electrical impulse signal that is transmitted to the exciter **24** to cause it to begin to vibrate at the frequency of the signal in order to broadcast audio signals to the surrounding environment. These vibrations may transfer through the vehicle body panel to radiate the desired audio signal.

[0041] The exciters **24** must be reliably mounted to the vehicle body **12** in order to function properly. However, many competing requirements are involved when deciding how and where to mount the exciters **24** relative to the vehicle body **12**. These competing requirements may include but are not limited to acoustic requirements (e.g., the exciter **24** should be capable of efficiently transferring vibrations through the vehicle body panel to which it is mounted), studio requirements (e.g., the exciter **24** should not be visible from the exterior of the vehicle **10**), operational requirements (e.g., the mounting strategy should not interfere with structural portions of the vehicle body panel or operations of nearby components), durability requirements (e.g., the mounting strategy should be robust enough to withstand operation in high repetition and extreme temperature situations), excitation requirements (e.g., the exciter **24** should not be constrained in a manner that eliminates range of movement), assembly requirements (e.g., the exciter **24** should accommodate tolerance variations and be easily and efficiently locatable and installable within the vehicle body **12**), and/or serviceability requirements (e.g., the exciter **24** should be accessible and removable for servicing). This disclosure is therefore directed to mounting systems for reliably mounting exciters **24** or other types of vehicle components to vehicle body panels in a manner that addresses the foregoing requirements.

[0042] FIGS. **3** and **4**, with continued reference to FIGS. **1-2**, illustrate an exemplary vehicle body panel **36**. In an embodiment, the vehicle body panel **36** is an outer panel of a front fender of the vehicle **10**. However, the teachings of this disclosure could be extended to any vehicle body panel of the vehicle body **12**.

[0043] The vehicle body panel **36** may include an exterior surface **38** (see FIG. **3**, sometimes referred to as a class A surface) and an interior surface **40** (see FIG. **4**, sometimes referred to as the B-side of the class A surface). An exciter **24** may be mounted to the vehicle body panel **36** by a mounting system **42**. Together, the vehicle body panel **36**, the exciter **24**, and the mounting system **42** establish a vehicle assembly **44** of the vehicle **10**.

[0044] In an embodiment, the exciter **24** is mounted directly to the interior surface **40** of the vehicle body panel **36** by the mounting system **42**. The exciter **24** and the mounting system **42** are not visible when viewing the vehicle body panel **36** from a an environment that surrounds the exterior surface **38**.

[0045] Referring now to FIGS. **5** and **6**, the mounting system **42** may include a locking mount **46** and a structural patch **48**. The locking mount **46** may be secured relative to the interior surface **40** of the vehicle body panel **36** by the structural patch **48**.

[0046] In an embodiment, the structural patch **48** is a mastic patch. In another embodiment, the structural patch **48** is a peel-and-stick adhesive patch. Other types of structural patches could also be used and are therefore contemplated as being within the scope of this disclosure. Once the structural patch **48** is cured/stiffened, such as within a baking process during manufacturing and assembly, the structural patch **48** securely fixates the locking mount **46** to the vehicle body panel **36**.

[0047] In an embodiment, a base **50** of the locking mount **46** is trapped between the structural patch **48** and the interior surface **40** of the vehicle body panel **36** (see FIG. **6**). In such an embodiment, the base **50** of the locking mount **46** directly contacts the interior surface **40**. An adhesive **52** may be applied between the base **50** and the interior surface **40** for

augmenting attachment and reducing the required bearing load of the structural patch **48**. The adhesive **52** may be a two-sided adhesive tape or any other suitable type of adhesive, for example.

[0048] In another embodiment, the base **50** of the locking mount **46** is embedded within the structural patch **48** (see FIG. **7**). In such an embodiment, the base **50** of the locking mount **46** does not directly contact the interior surface **40** of the vehicle body panel **36**.

[0049] The locking mount **46** may be configured a clocking lock ring mount that includes the base **50** and a collar **54** that protrudes outwardly from the base **50**. The collar **54** may protrude outwardly in a direction away from the interior surface **40** in a mounted position of the locking mount **46**.

[0050] The collar **54** may include a plurality of outwardly extending cam tabs **56** that are circumferentially spaced about the collar **54**. A mounting base **58** of the exciter **24** may include a plurality of mating flanges **60**. Each mating flange **60** may engage one of the cam tabs **56** in order to mount the exciter **24** to the locking mount **46** and therefore fixate the exciter **24** relative to the vehicle body panel **36**. As the exciter **24** is moved (e.g., rotated) further into place, the mating flanges **60** may further engage the cam tabs **56** to provide a secure mounting arrangement. The total number of cam tabs **56** and mating flanges **60** provided could vary and is not intended to limit this disclosure. Once connected to the locking mount **46**, the exciter **24** achieves positive contact with the vehicle body panel **36** for achieving desired acoustic requirements. The exciter **24** is thus appropriately arranged to vibrate the interior surface **40** for facilitating sound radiation to the exterior environment.

[0051] The mounting arrangement described above is a twist-in-place design. However, other implementations are possible. As shown in FIGS. **8**A and **8**B, for example, the locking mount **46** could alternatively provide a snap-in-place design. In this embodiment, the locking mount **46** may include a base **62** that can interface with the structural patch (not shown) and a collar **64** that protrudes outwardly from the base **62**. A recessed portion **66** may be formed in the collar **64**. One or more flexible prongs **68** may be provided within the recessed portion **66**.

[0052] A mounting base **70** of the exciter **24** may include a mounting flange **72** having a pair of opposing lips **74**. One lip **74** may be inserted into the recessed portion **66**, and the mounting flange **72** may then be rotated downwardly in order to force the other lip **74** to engage the flexible prong **68** as the exciter **24** is moved further toward the locking mount **46** to snap-connect the exciter **24** to the locking mount **46**. Once connected to the locking mount **46**, the exciter **24** achieves positive contact with the vehicle body panel **36** for achieving desired acoustic requirements. The exciter **24** is thus appropriately arranged to vibrate the interior surface **40** for facilitating sound radiation to the exterior environment.

[0053] In the embodiments discussed above, the mounting system **42** is utilized to mount an exciter **24** to the interior surface **40** of the vehicle body panel **36**. However, a person of ordinary skill in the art having the benefit of this disclosure would recognize that the mounting system **42** could be utilized to securely mount any type of vehicle component to the interior surface **40** of the vehicle body panel **36**.

[0054] FIG. **9**, with continued reference to FIGS. **1**-**8**B, schematically illustrates an assembly method **100** for assembling the vehicle assembly **44**. For example, the assembly method **100** can be employed for mounting the exciter **24** to the vehicle body panel **36** via the mounting system **42** of the vehicle assembly **44**.

[0055] First, at block **102**, the vehicle body panel **36** may be fabricated, such as in a stamping process, for example. The vehicle body panel **36** may then be cleaned at block **104**.

[0056] Next, at block **106**, the mounting system **42** may be secured to the interior surface **40** of the vehicle body panel **36**. The mounting system **42** may be delivered to the final assembly plant as an assembly component, thereby simplifying the overall vehicle assembly process. The vehicle body panel **36** may then e-coated as part of an electro-deposition process at block **108**.

[0057] Subsequent to being e-coated, the vehicle body panel **36** may be placed in an oven and then baked for a predefined amount of time as part of a baking process at block **110**. The baking process cures the e-coating and also stiffens the structural patch **48** of the mounting system **42**, thereby securely fixating the locking mount **46** relative to the interior surface **40** of the vehicle body panel **36**.

[0058] The exciter **24** (or some other vehicle component) is next secured to the locking mount **46** at block **112**. Positive contact between the exciter **24** and the vehicle body panel **36** is therefore achieved through the mounting system **42** for meeting desired acoustic requirements. Additional assembly steps associated with the vehicle body panel **36** (e.g., painting, etc.) may be performed at block **114** to complete the assembly method **100**.

[0059] The mounting systems of this disclosure enable vehicle components to be securely fixated to the B-side of the class A surface of vehicle body panels. The components may be fixated to achieve robust contact with adjacent panel surfaces without the need for additional bracketry that is attached directly to the adjacent panel surfaces and without requiring weld nut attachments that could show through the class A surface. The proposed mounting systems further enable simple and efficient installation on the assembly floor during manufacturing.

[0060] Although the different non-limiting embodiments are illustrated as having specific components or steps, the embodiments of this disclosure are not limited to those particular combinations. It is possible to use some of the components or features from any of the non-limiting embodiments in combination with features or components from any of the other non-limiting embodiments.

[0061] It should be understood that like reference numerals identify corresponding or similar elements throughout the several drawings. It should be understood that although a particular component arrangement is disclosed and illustrated in these exemplary embodiments, other arrangements could also benefit from the teachings of this disclosure.

[0062] The foregoing description shall be interpreted as illustrative and not in any limiting sense. A worker of ordinary skill in the art would understand that certain modifications could come within the scope of this disclosure. For these reasons, the following claims should be studied to determine the true scope and content of this disclosure.

What is claimed is:

1. A vehicle assembly, comprising:

a mounting system including a locking mount and a structural patch; and

a vehicle component mounted to the locking mount.

2. The vehicle assembly as recited in claim **1**, wherein the mounting system is secured to an interior surface of a vehicle body panel.

3. The vehicle assembly as recited in claim **2**, wherein the vehicle body panel is an outer panel of a front fender or a rear quarter panel.

4. The vehicle assembly as recited in claim **1**, wherein the vehicle component is an exciter.

5. The vehicle assembly as recited in claim **1**, wherein the locking mount includes a base and a collar that protrudes outwardly from the base.

6. The vehicle assembly as recited in claim **5**, wherein the vehicle component includes a mounting base having a mating flange that is configured to engage a cam tab of the collar.

7. The vehicle assembly as recited in claim **5**, wherein the vehicle component includes a mounting base having a mounting flange that includes a lip that is configured to engage a flexible prong of the collar.

8. The vehicle assembly as recited in claim **5**, wherein the base is embedded within the structural patch.

9. The vehicle assembly as recited in claim **1**, wherein the structural patch is a mastic patch or an adhesive patch.

10. The vehicle assembly as recited in claim **1**, comprising an adhesive applied to a base of the locking mount.

11. A vehicle assembly, comprising:

a vehicle body panel including an exterior surface and an interior surface;

a mounting system including a locking mount and a structural patch arranged to secure the locking mount relative to the interior surface; and

a vehicle component secured to the locking mount of the mounting system.

12. The vehicle assembly as recited in claim **11**, wherein the vehicle body panel is an outer panel of a front fender or a rear quarter panel.

13. The vehicle assembly as recited in claim **11**, wherein the vehicle component is a vibration exciter.

14. The vehicle assembly as recited in claim **11**, wherein a base of the locking mount is trapped between the structural patch and the interior surface of the vehicle body panel.

15. The vehicle assembly as recited in claim **14**, comprising an adhesive applied between the base and the interior surface.

16. The vehicle assembly as recited in claim **11**, wherein a base of the locking mount is trapped between the structural patch and the interior surface of the vehicle body panel.

17. The vehicle assembly as recited in claim **11**, wherein the locking mount includes a base and a collar that protrudes outwardly from the base.

18. The vehicle assembly as recited in claim **17**, wherein the vehicle component includes a mounting base having a mating flange that is configured to engage a cam tab of the collar.

19. The vehicle assembly as recited in claim **17**, wherein the vehicle component includes a mounting base having a mounting flange that includes a lip that is configured to engage a flexible prong of the collar.

20. The vehicle assembly as recited in claim **11**, wherein the structural patch is a mastic patch or an adhesive patch.

* * * * *