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(54) **VEHICLE FLOOR COVER RETENTION SYSTEM AND DEVICE**

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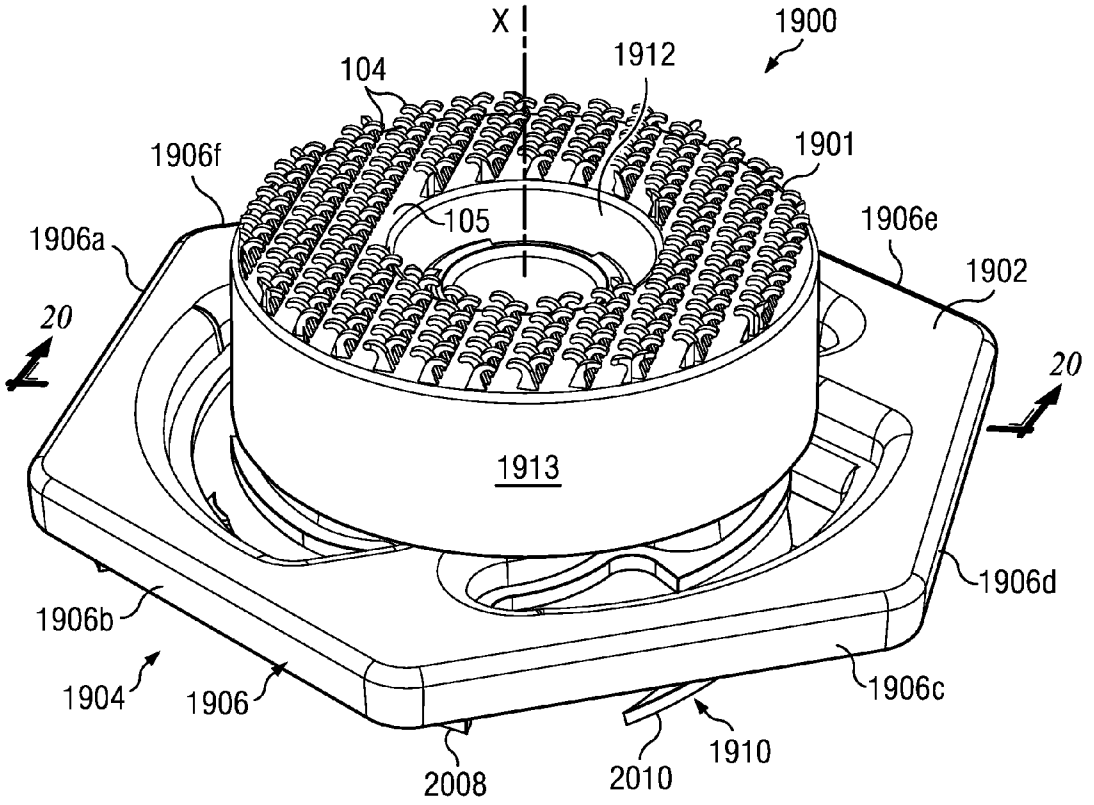
(57) **ABSTRACT**

Closed sockets are formed in the lower surface of a vehicle floor cover, such as a mat or tray. Each socket is adapted to receive a vehicle floor cover retention device which stands up from the floor of the vehicle foot well in which the floor cover is being installed. The sidewall of the body of each device acts as a physical stop to the sidewall of a respective socket, preventing or mitigating movement of the floor cover within the foot well. The top surface of the device may have a first fastener which is adapted to engage a second fastener on the ceiling of the socket. The device may be an adapter which is fastened to preexisting OEM mat retention structure. Embodiments of the adapter include one assembled from two pieces around an OEM retention post with an enlarged head.



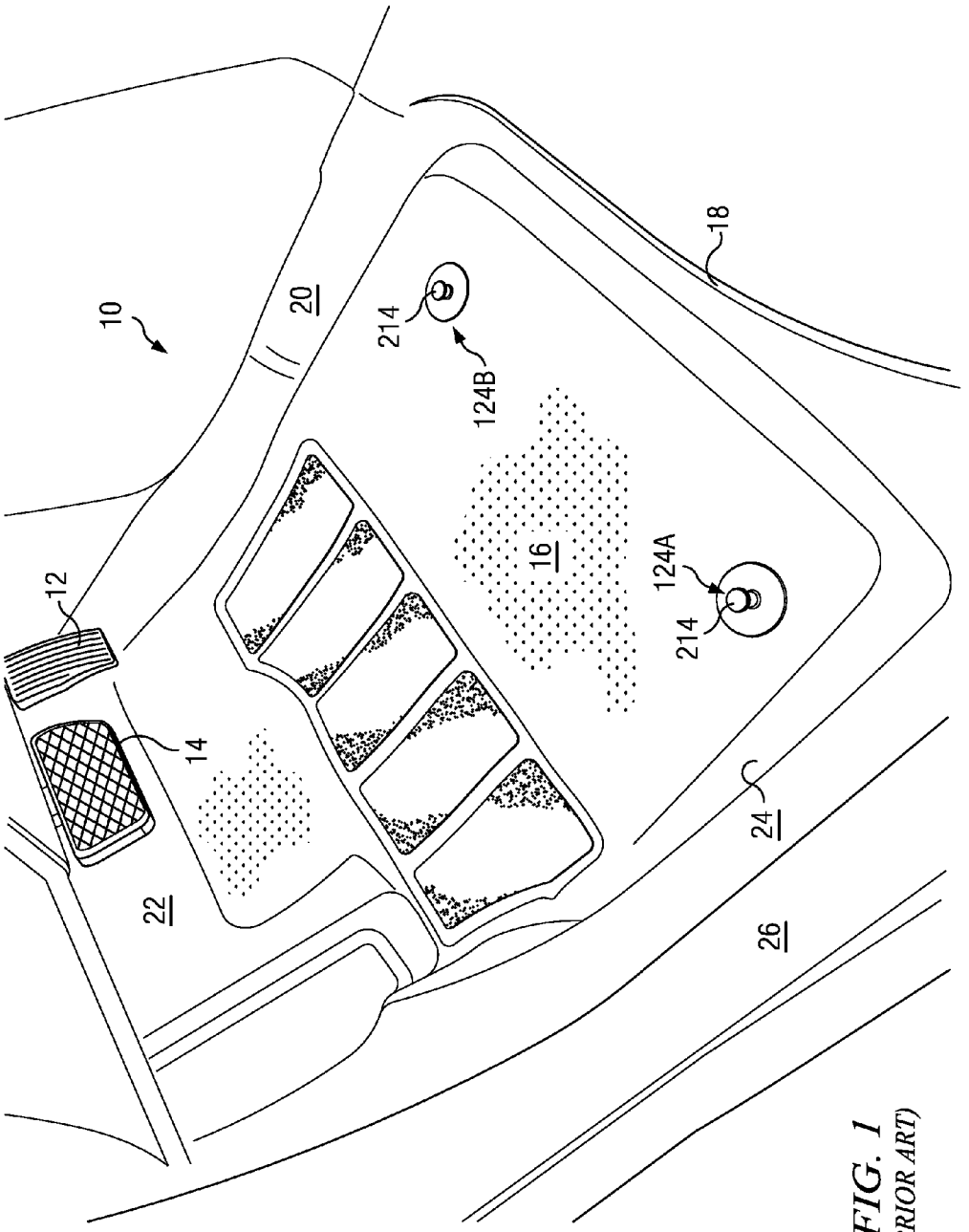


FIG. 1
(PRIOR ART)

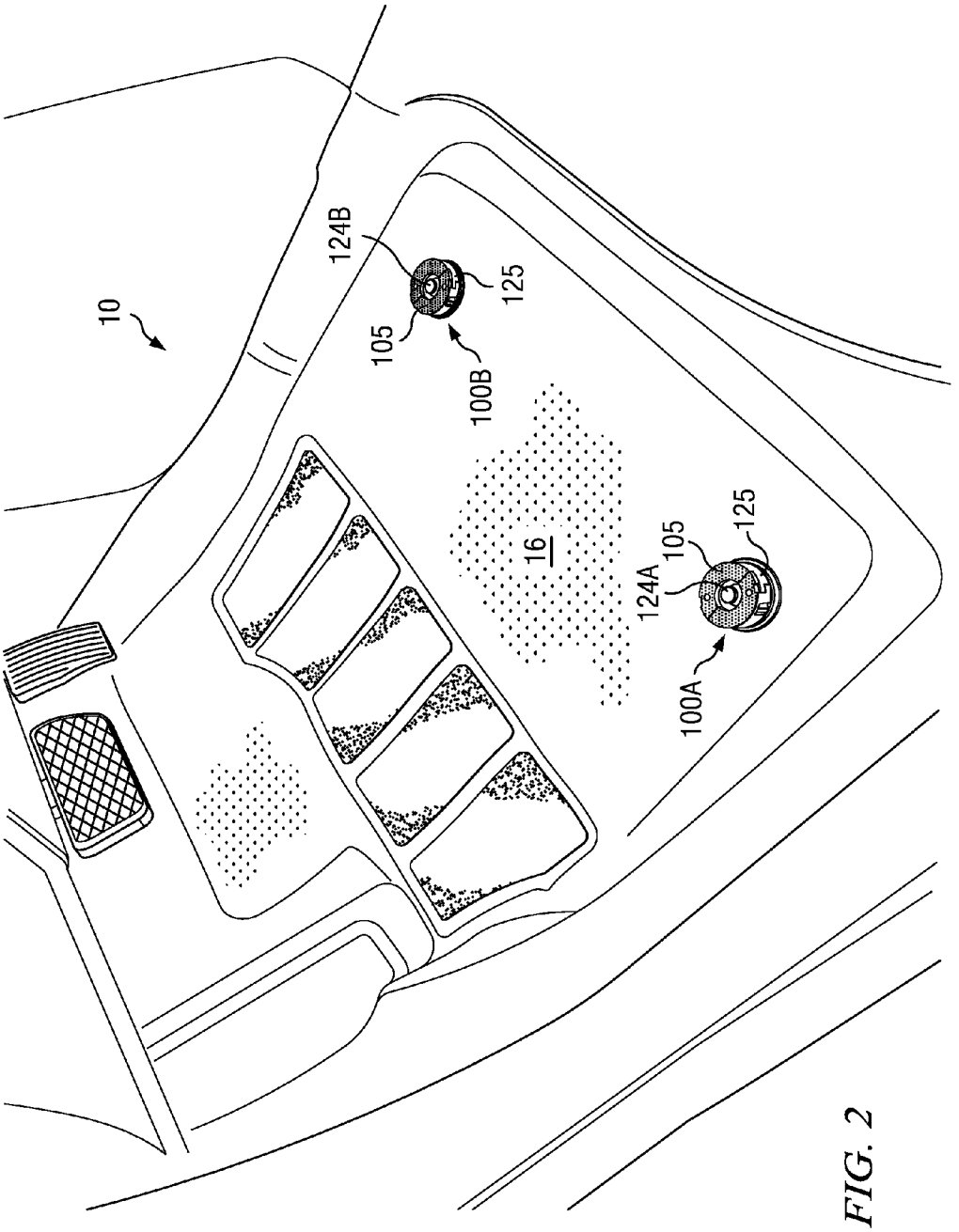


FIG. 2

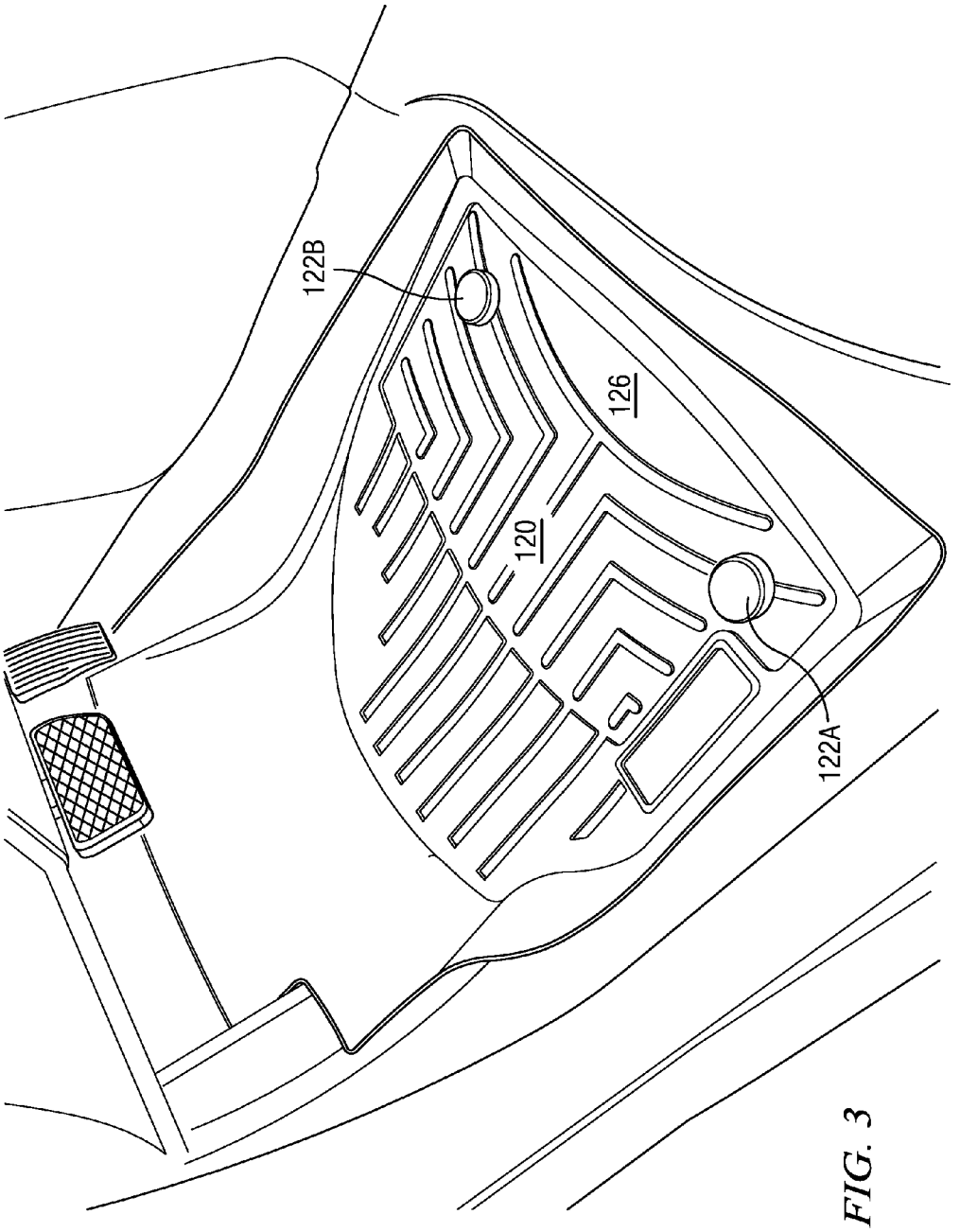


FIG. 3

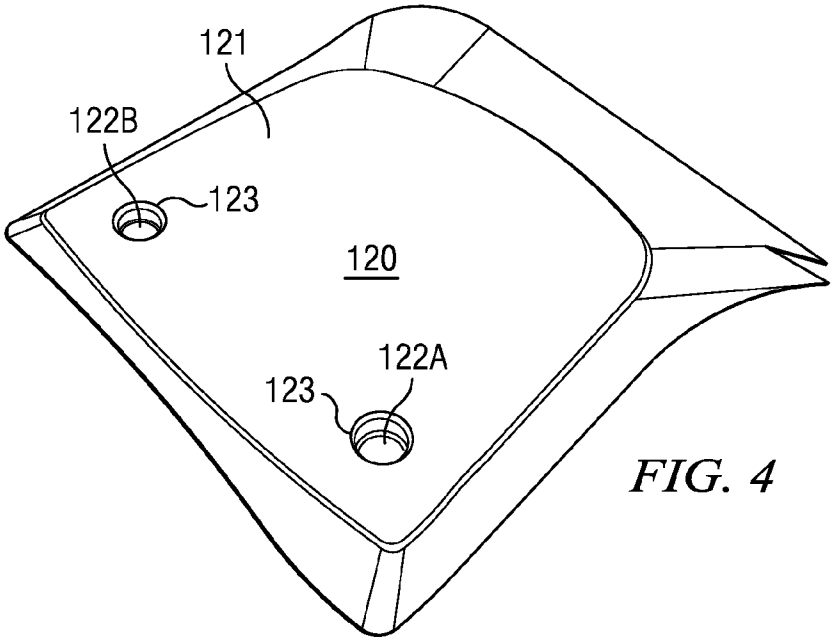


FIG. 4

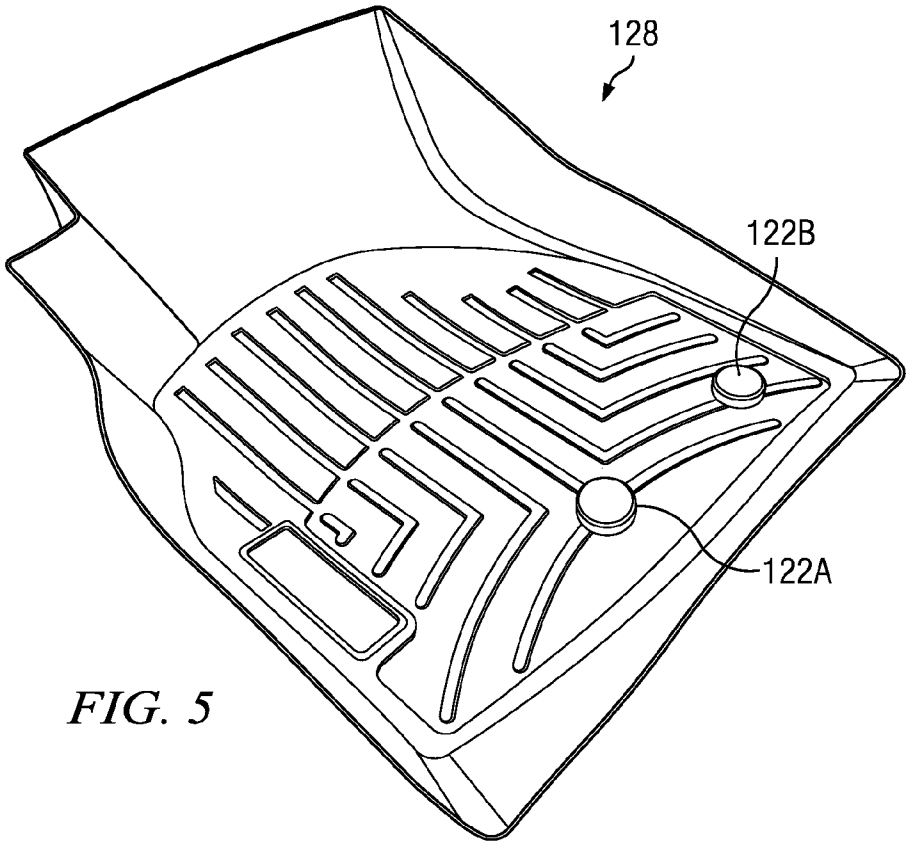


FIG. 5

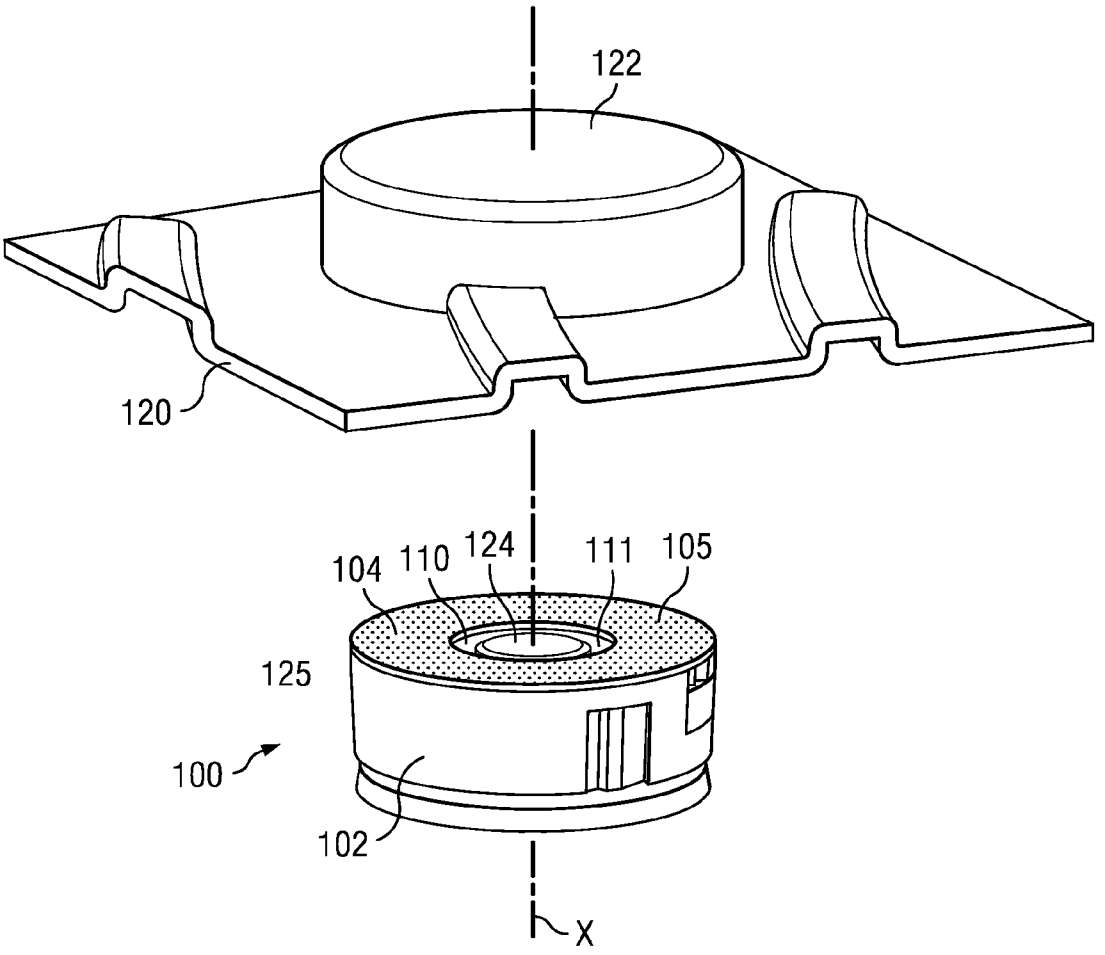


FIG. 6

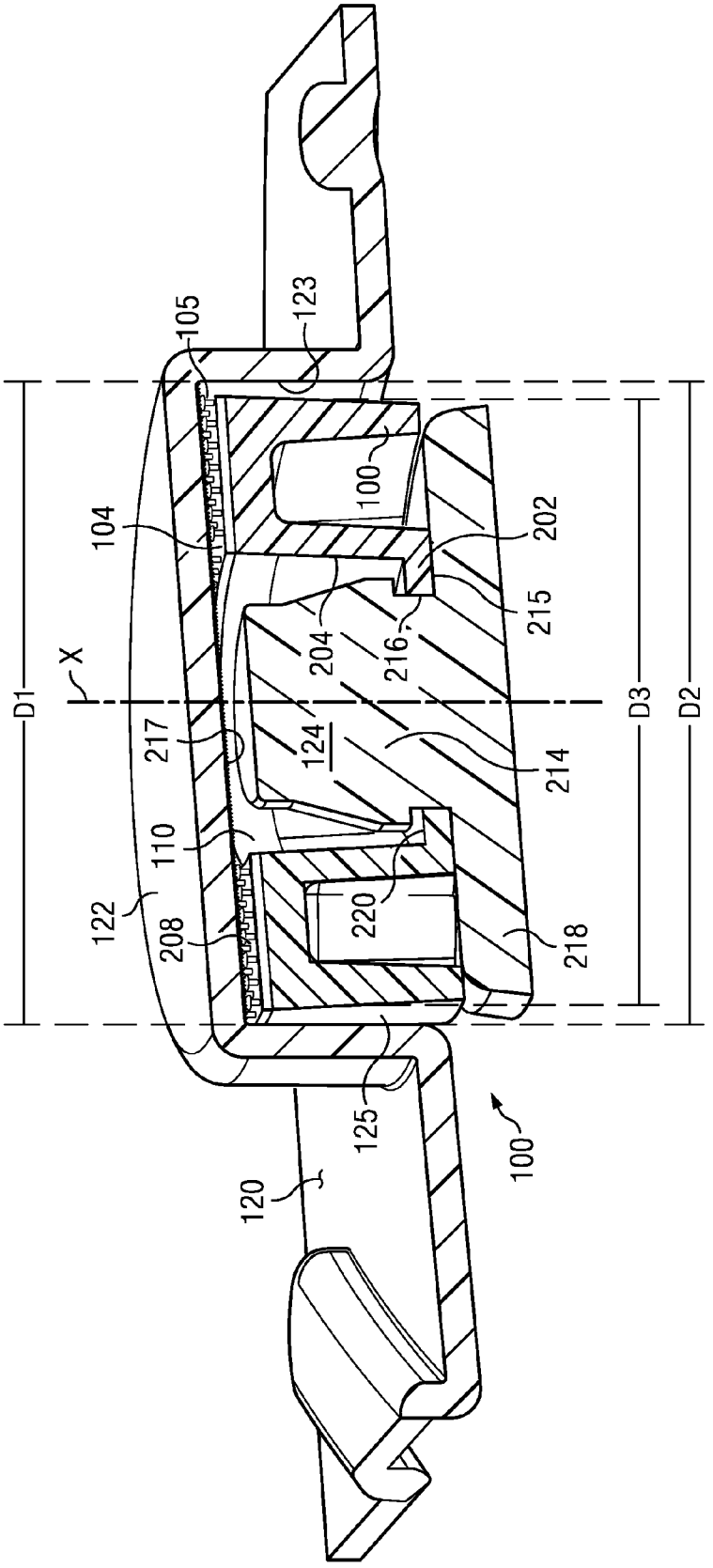

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FIG. 7

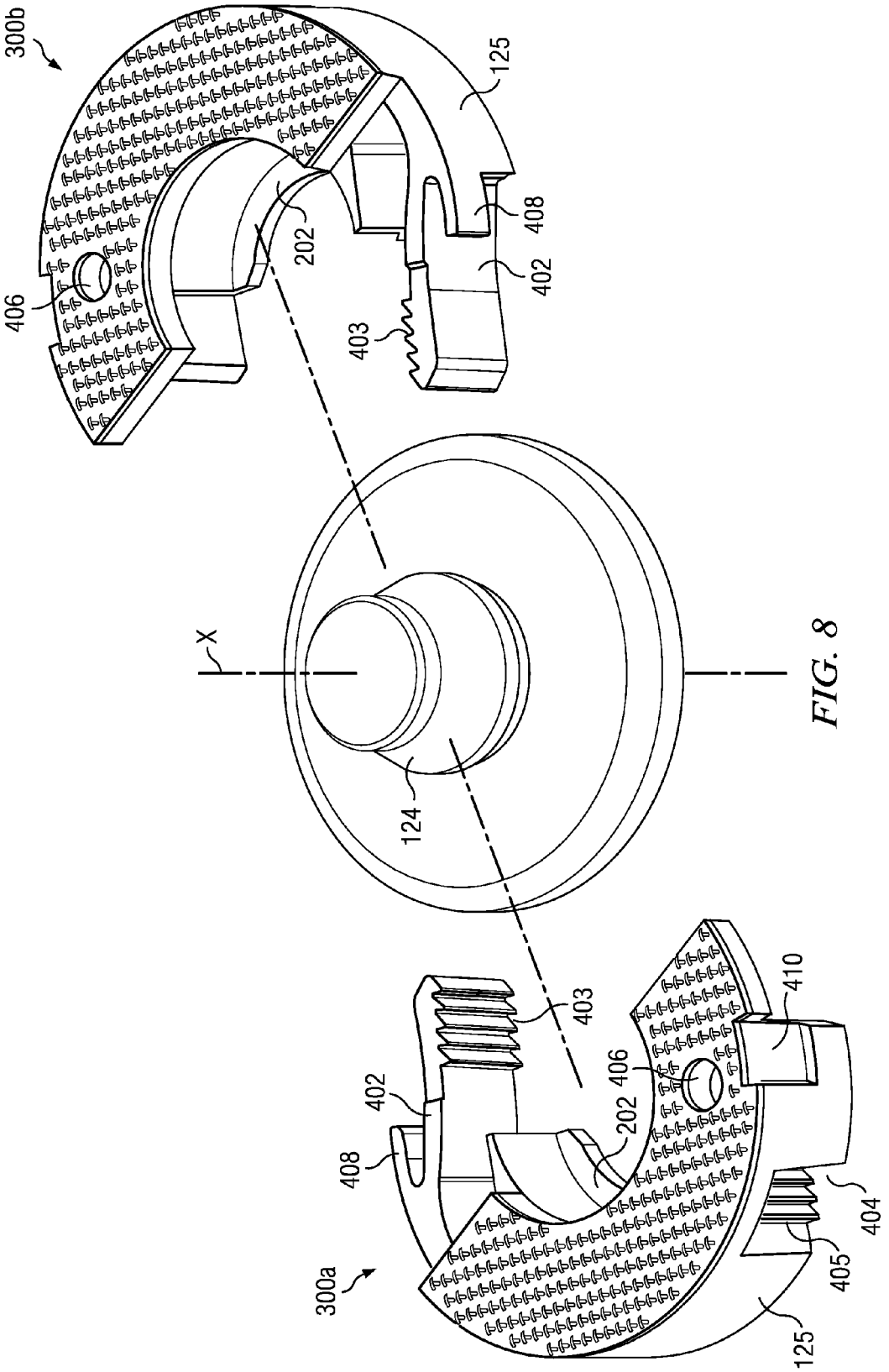
300b
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FIG. 8

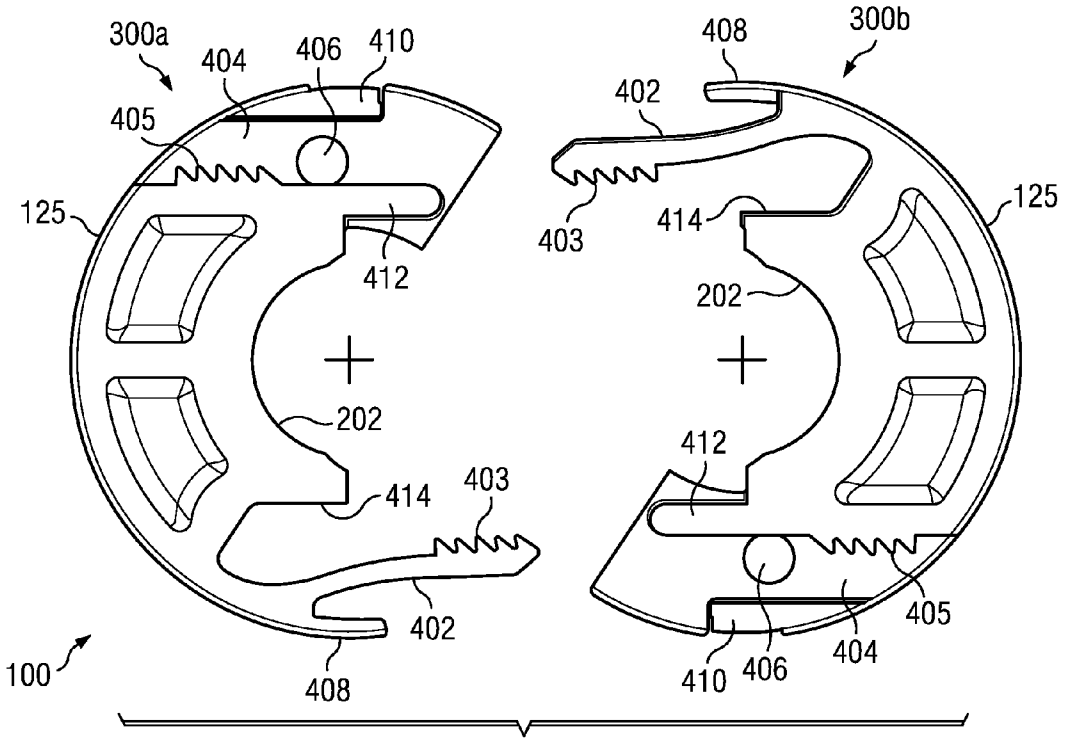
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FIG. 9

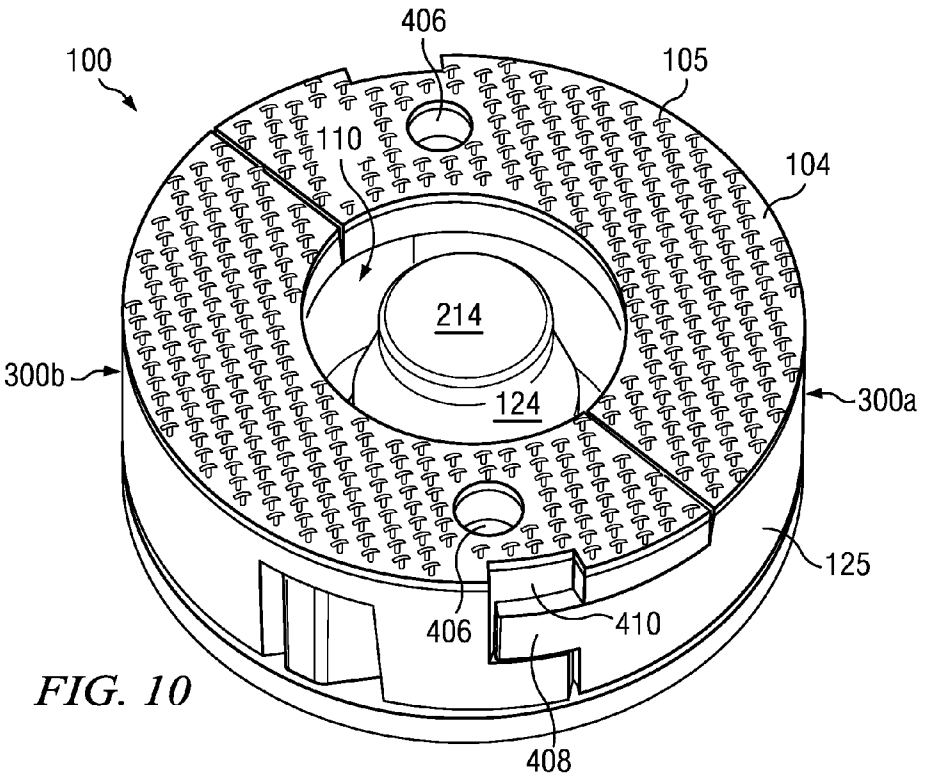
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FIG. 10

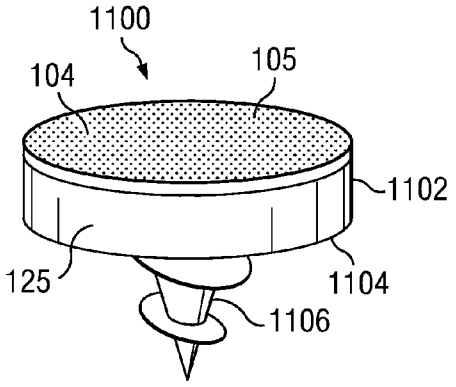

FIG. 11A

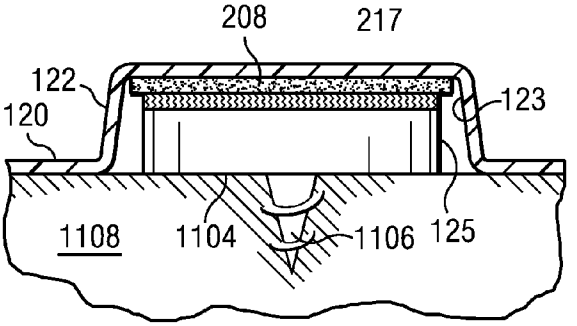

FIG. 11B

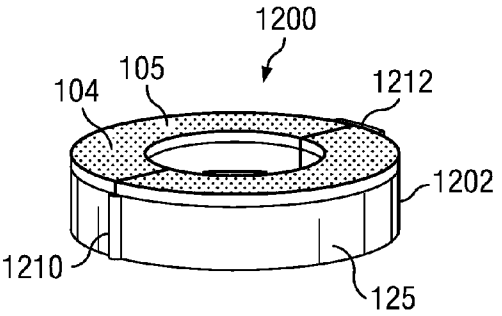

FIG. 12A

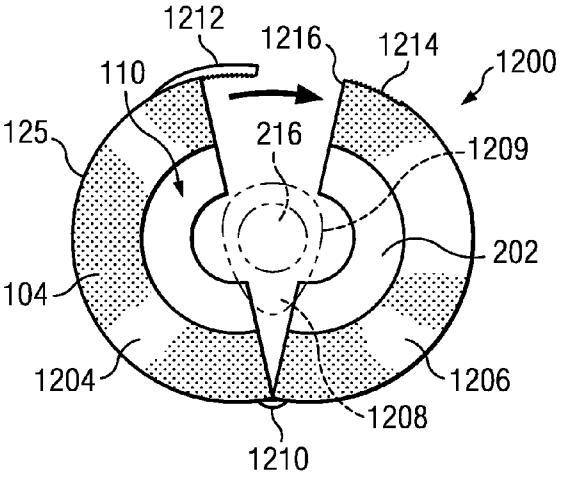

FIG. 12B

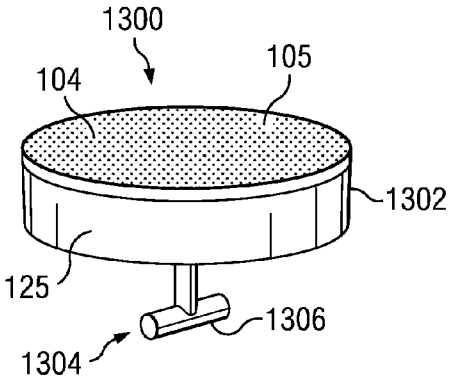

FIG. 13A

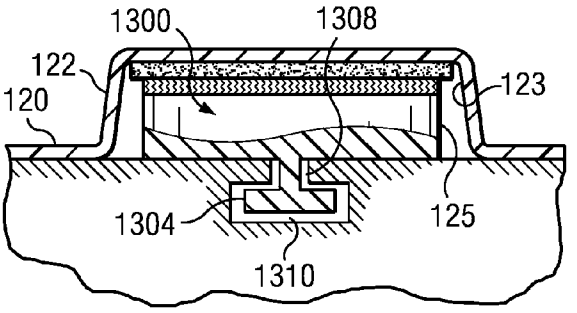

FIG. 13B

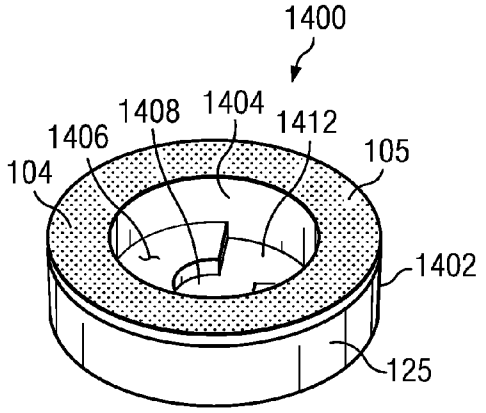

FIG. 14A

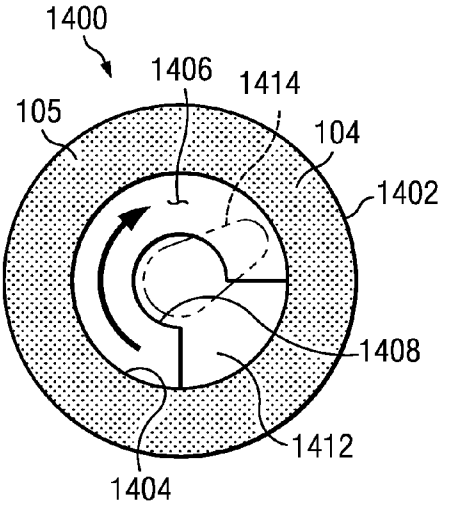

FIG. 14B

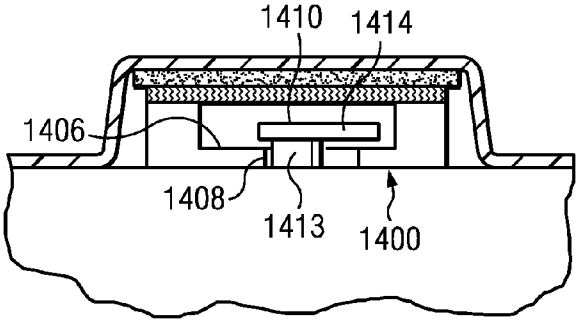

FIG. 14C

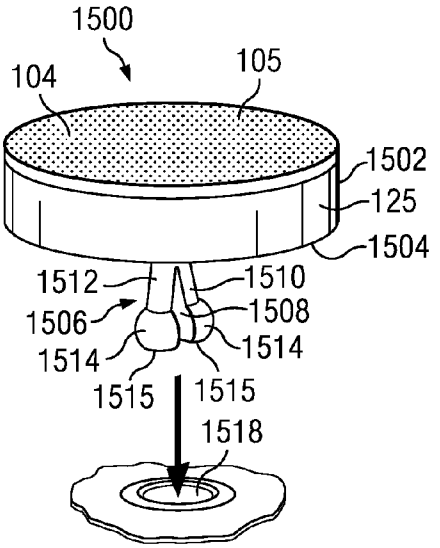

FIG. 15A

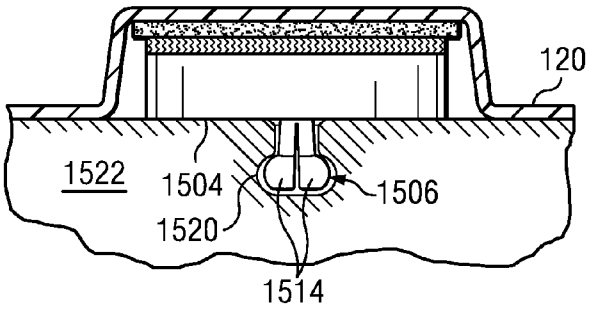

FIG. 15B

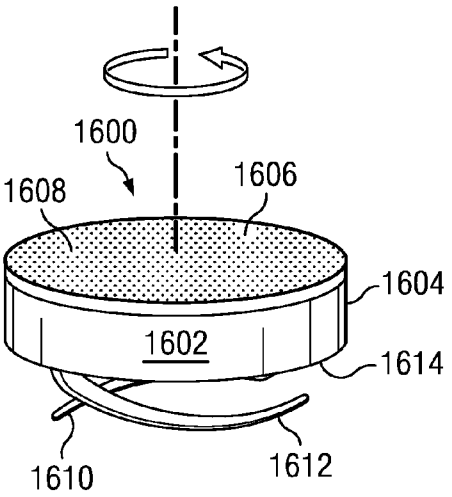

FIG. 16

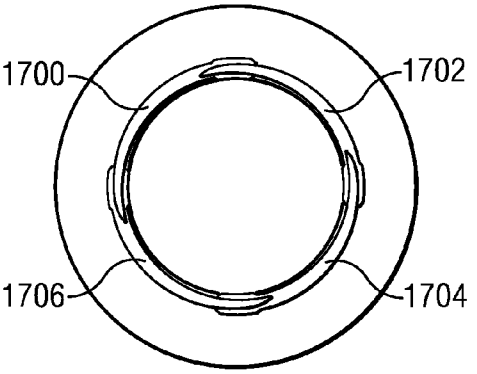

FIG. 17

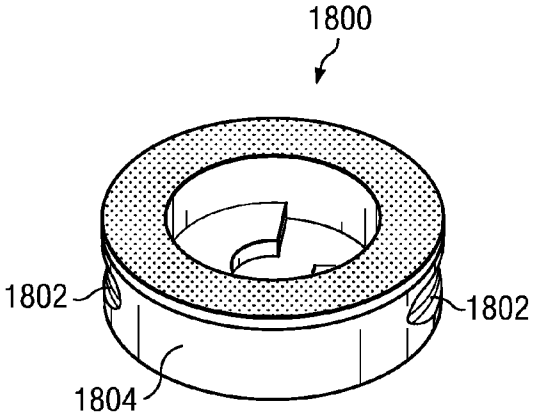

FIG. 18A

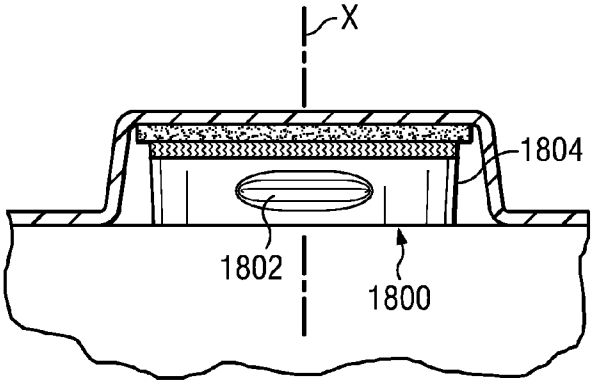

FIG. 18B

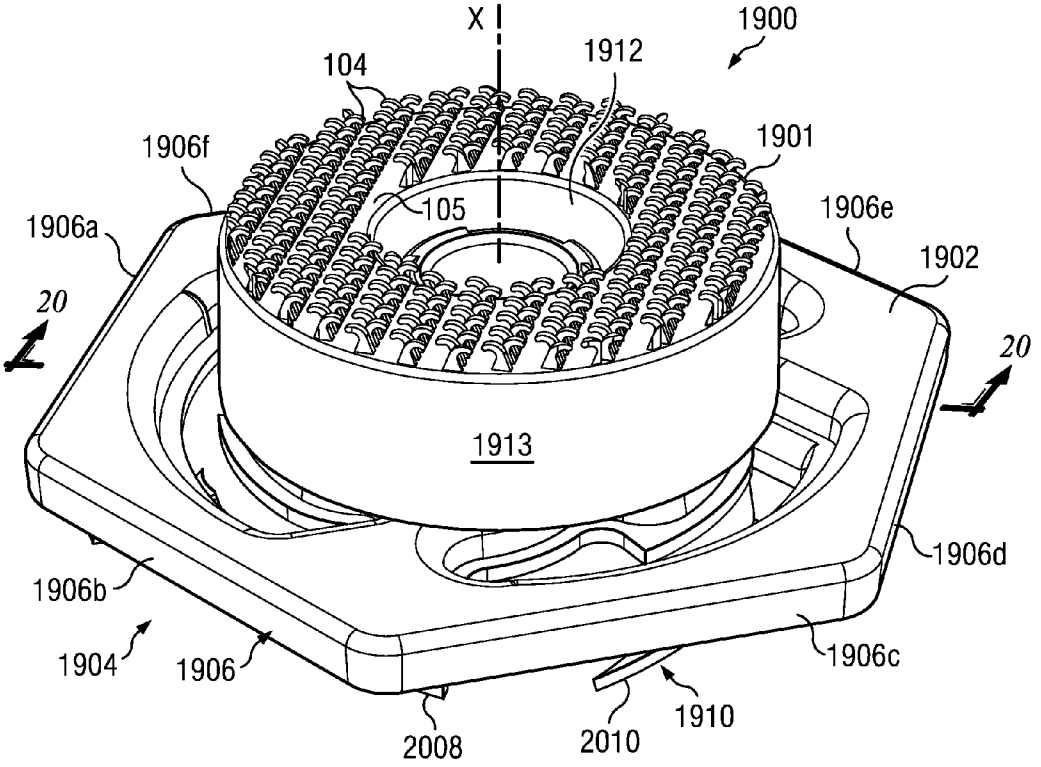
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FIG. 19

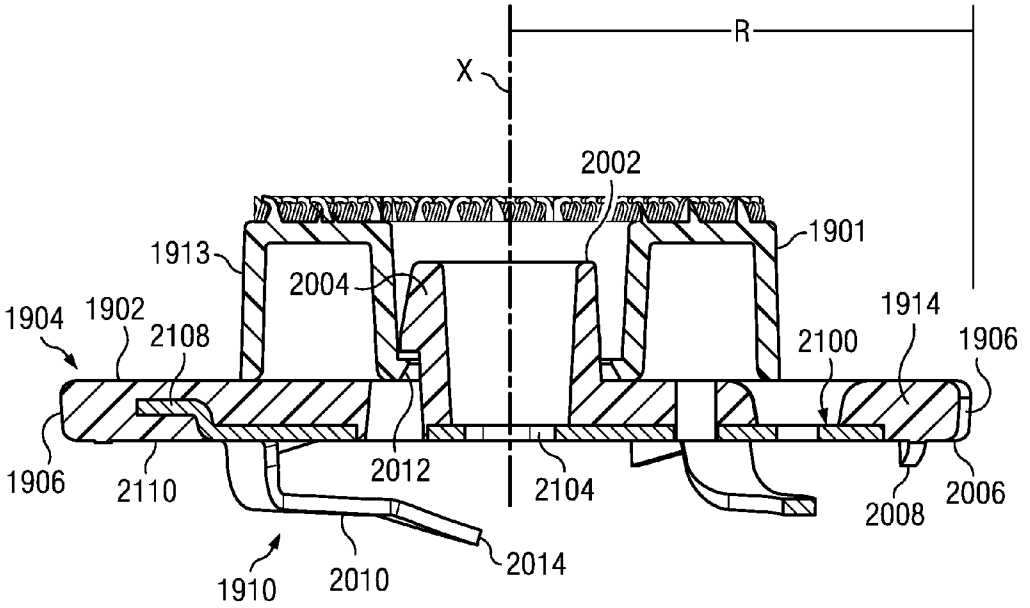
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FIG. 20

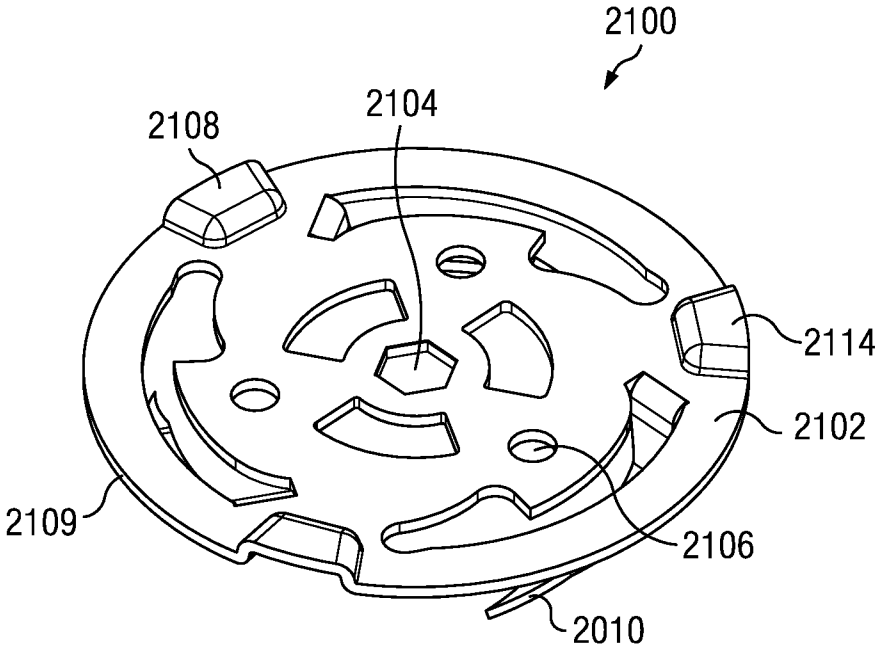

FIG. 21A

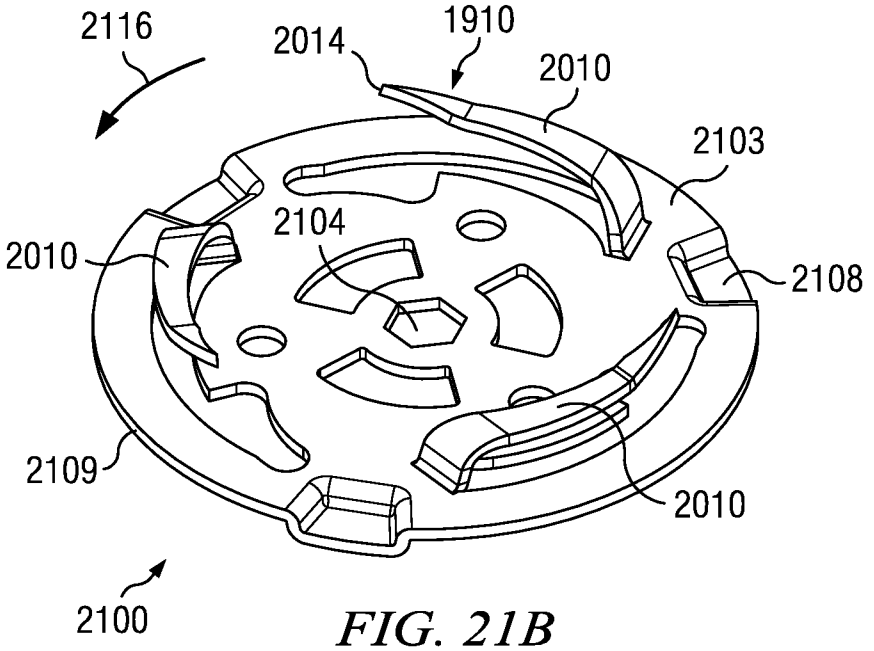

FIG. 21B

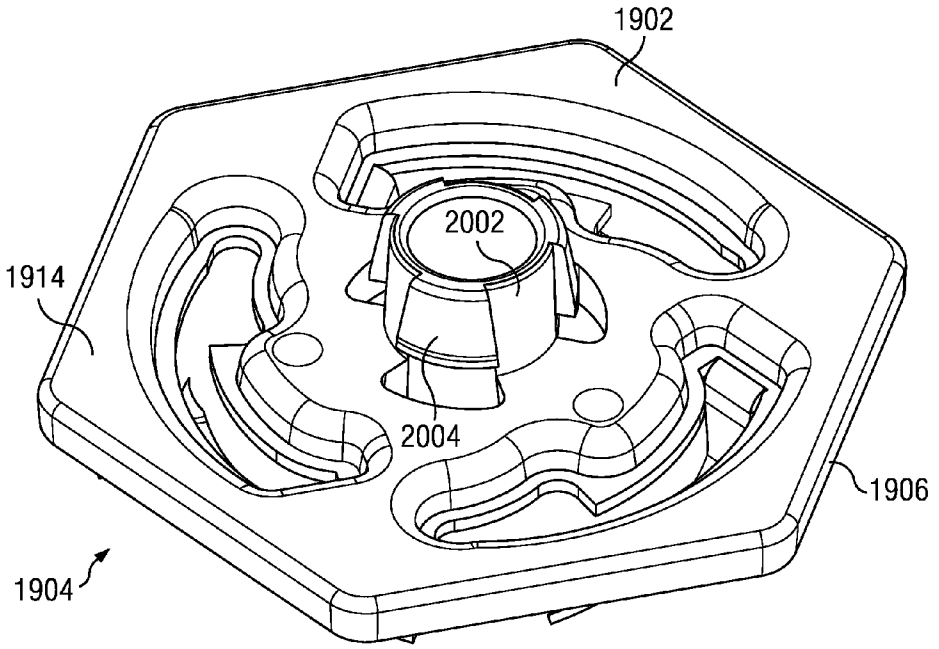

FIG. 22A

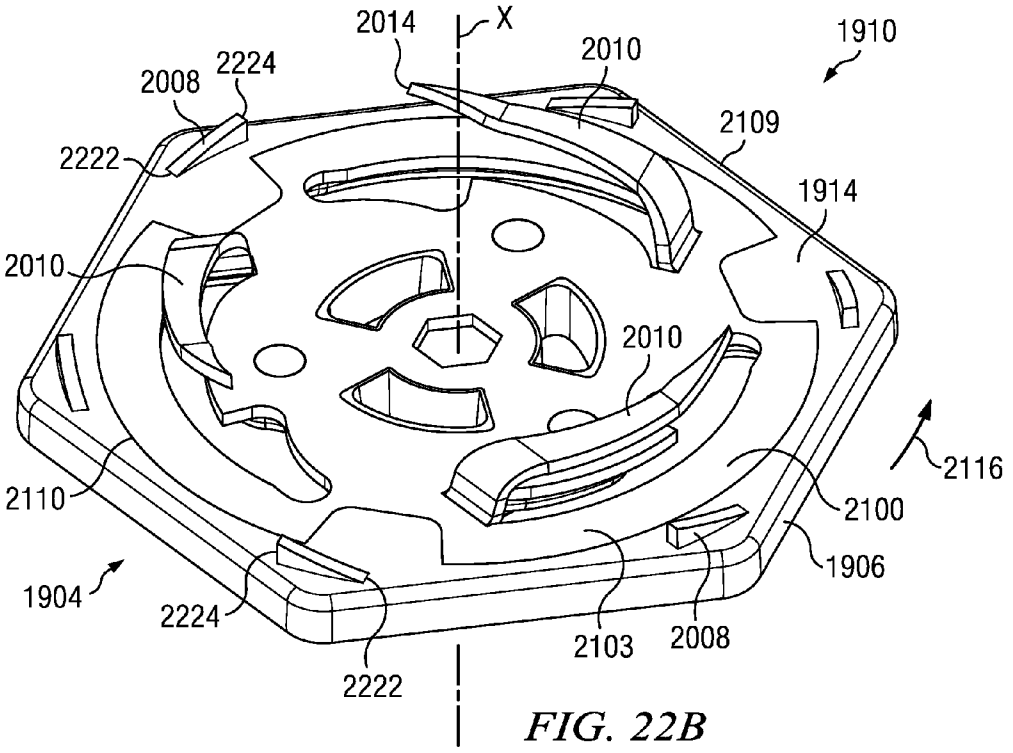

FIG. 22B

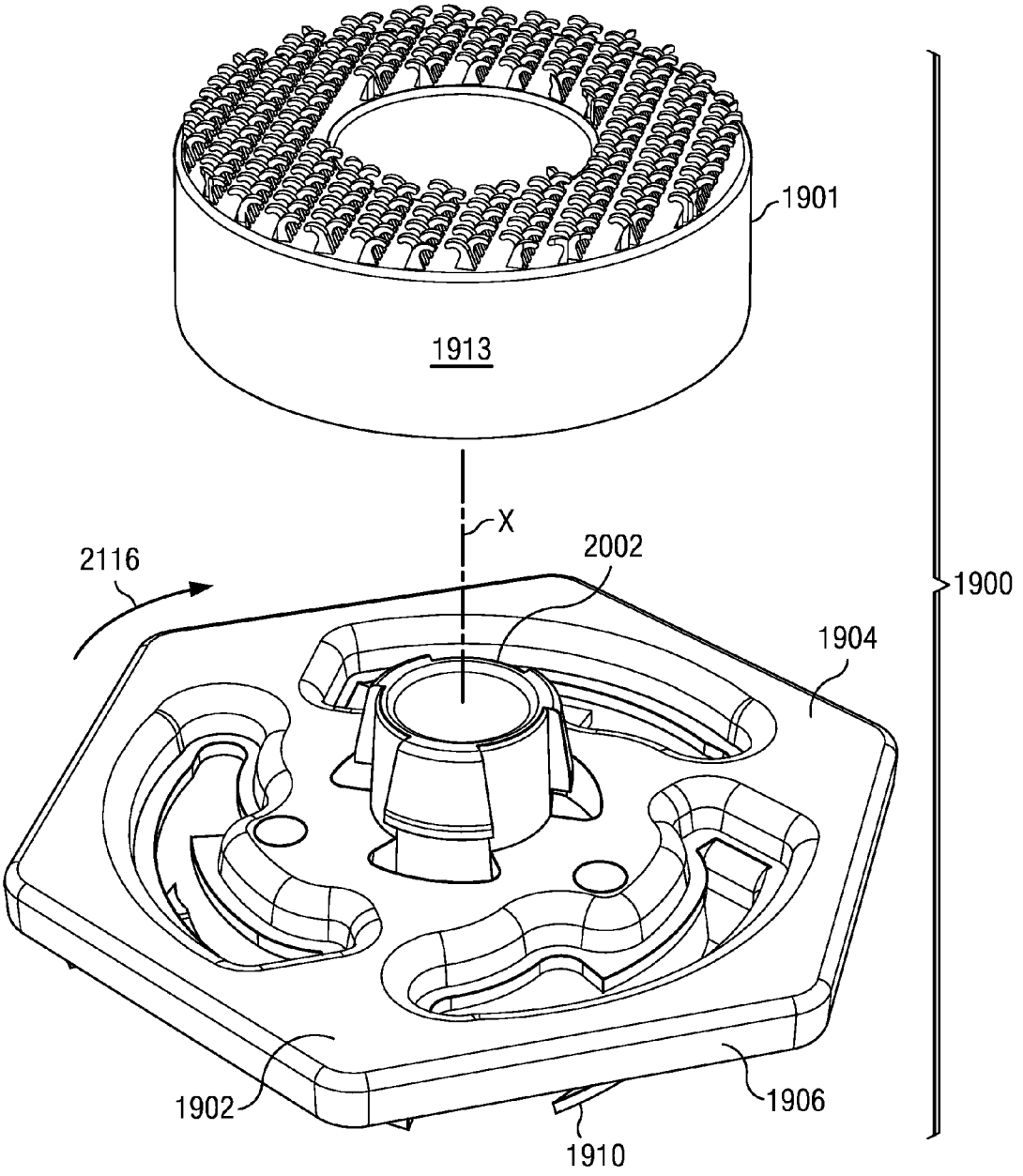

FIG. 23

VEHICLE FLOOR COVER RETENTION SYSTEM AND DEVICE

BACKGROUND OF THE INVENTION

[0001] In most conventional vehicles, such as cars, trucks and SUV's, the foot wells for the occupants are carpeted. Vehicle floor covers, including floor mats and trays, have been provided to protect the foot wells of these vehicles. However, vehicle drivers and passengers tend to move their feet around, which can bunch up or cause folding of a mat, or possibly shift the position of the mat or tray, causing the gas, brake or clutch pedals, or other vehicle controls or features, to be occluded. Vehicle floor trays, which are fit to the three dimensional walls of the foot well, are sturdier and less prone to deformation and shifting, yet still require placement and securing aids.

[0002] To aid in the placement and stability of floor covers and ultimately provide a more solid feel to the occupant's feet, vehicle manufacturers (commonly called original equipment manufacturers or OEMs) now usually place retention posts or other devices or structure in the vehicle foot wells. Often the floor mats or trays are designed to have respective apertures sized to accept the retention posts through them. However, retention post placement varies from manufacturer to manufacturer and may even vary from model to model. If the retention post placement is repositioned even a slight amount, the holes in the mats and trays will need to be likewise repositioned, requiring redesign of the mats and trays. In addition OEM mat retention systems vary widely; some use upstanding posts, others use hooks, still others use preformed holes or cavities in the foot well floor to which other fasteners are affixed. Some OEM retention devices terminate in a knob which is twisted to lock the mat or tray in place. The variance in OEM mat retention systems makes the provision of aftermarket floor mats and trays for these models more costly and less universal. Further, intentionally providing a hole through a vehicle floor cover necessarily reduces its ability to protect the carpeting underneath from debris and fluids.

[0003] Most OEM floor mat retention devices require a modicum of mental and physical effort on the part of the end user to effectively fasten the mat to the floor and, without the exercise of this level of care and effort, may not be adequately engaged. Thus a need exists for a vehicle retention post attachment device that can be used to secure a vehicle floor mat or tray without the need for an aperture in the mat or tray, and which relies on a more universal, passive and error-free means to prevent the lateral shifting of a floor mat or tray in a vehicle foot well.

SUMMARY OF THE INVENTION

[0004] In one aspect of the invention, a vehicle floor cover retention system is provided in which a vehicle floor cover, such as a mat or tray, has one or more sockets formed in its lower surface. The system further includes, for each socket, a retention device which stands up from the vehicle foot well floor. The socket has a sidewall of a predetermined depth that extends from the general lower surface of the floor cover to a closed ceiling. A socket depth is preselected to be more than or equal to a height of a sidewall of the retention device. The sidewall of the retention device is high enough that it acts as a physical stop to the sidewall of the socket, thereby preventing or mitigating lateral movement of the floor cover inside the vehicle foot well. The body of the retention device can be circularly cylindrical, or have a sidewall that is slightly inversely frustoconical (with a top being slightly larger than a bottom). The socket can likewise be substantially circularly cylindrical, but may have a draft for reasons of manufacturability. The retention device further includes a connector of one of many different kinds Many of the retention devices are in the nature of adapters and fasten in various ways to the OEM retention devices in the foot well. But some embodiments of the invention's retention device do not have adapters but fasten directly into the carpet backing A top surface of the retention device of the invention can have a fastener, such as hook and loop material, a magnet, or a physical snap, which fastens to a corresponding fastener disposed on the ceiling of the socket which receives the retention device.

[0005] A principal advantage of the retention system of the invention is its relatively passive nature. In some embodiments the end user does not have to forcibly push or snap a device on a mating piece, nor does he or she have to rotate a part to attach the mat or tray. Once an adapter has been installed on the OEM retention structure, one time, the tray can be placed on or lifted off of the adapters with a simple motion. The adapters thus locate the mat or tray and retain it.

[0006] According to another aspect of the invention, there is provided a multiple-piece retention device or adapter which is removably installed by a consumer onto an original equipment manufacturer (OEM) vehicle foot well retention post which extends upwardly from a floor of the vehicle foot well. The OEM retention post has a shaft portion of one diameter and a head portion of a second, larger diameter. A cavity, disposed inside a body of the adapter, is dimensioned to receive the head of the OEM retention post. An engagement ridge, axially spaced from an upper surface of the body, extends inwardly from a general inner surface of the cavity and forms a passageway dimensioned to receive the shaft of the OEM retention post. The body may be divided into two or more pieces where each of the pieces includes a portion of the engagement ridge and where the pieces are capable of being securely attached to one another. A first fastener is disposed on the upper surface of the body, which is fastenable to a second fastener disposed on a lower surface of the mat or tray being retained.

[0007] According to yet another aspect of the invention, there is provided an affixation/retention device which consists of a substantially plate-shaped handgrip member, a vehicle retention member and a carpet affixation member. The vehicle retention member is sized to be received in a socket of a vehicle floor cover. The carpet affixation member is adapted to be twisted into the carpeting of the vehicle foot well by a human hand on the handgrip member.

[0008] In an embodiment, at least one anti-backout wedge is formed on the lower face of the handgrip member. The anti-backout wedge has a leading edge and trailing edge and resists any torque on the device in a direction opposite the predetermined rotational direction.

[0009] In an embodiment, the handgrip member includes a metal plate and a plastic component overmolded around the metal plate. At least one radially inwardly extending embayment is formed in the plane adjacent the lateral outer margin of the metal plate. The metal plate does not form any portion of the lower face of the handgrip member within the area of the embayment, instead a lower surface of the plastic component forms the lower face of the handgrip member within

the embayment. The affixation member joined to the handgrip member is adapted to be axially twisted into a carpeted surface of a vehicle foot well.

[0010] The present invention provides an advantage over making a hole in the vehicle floor cover sized to receive a vehicle retention post. When the head of the retention post is large, in the prior art, the aperture in the floor mat may have to fit loosely around the retention post. In addition, the present invention reduces the need to redesign the floor mats or trays when the retention post placement is slightly changed; the area of the upper surface of the attachment device can be chosen to be smaller than the area of the second fastener on the dome interior, permitting some lateral shift. More likely, if the design of the OEM retention post or other structure is changed, the adapter that fits it can be changed without redesigning the mat or tray. The attachment device allows for the attachment of the floor mat or tray to the vehicle foot well while maintaining a tight retention and location. By obviating the need of forming a hole in the floor cover for the retention post, the fastening device provides superior protection to the underlying carpet from fluids, debris and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further aspects of the invention and their advantages can be discerned in the following detailed description, in which like characters denote like parts and in which:

[0012] FIG. **1** is a perspective view of vehicle foot well according to the prior art;

[0013] FIG. **2** is a view similar to that shown in FIG. **1**, with adapters according to one aspect of the invention having been installed on original equipment manufacturer (OEM) mat retention devices;

[0014] FIG. **3** is a top perspective view of a vehicle floor tray according to the invention, installed in the vehicle foot well using the adapters shown in FIG. **2**;

[0015] FIG. **4** is a bottom perspective view of the vehicle floor tray shown in FIG. **3**;

[0016] FIG. **5** is a perspective view of another vehicle floor tray according to the invention, showing an alternative placement of sockets;

[0017] FIG. **6** is a detailed exploded isometric view of a vehicle floor cover retention system using a retention device or adapter as seen in FIG. **2**;

[0018] FIG. **7** is a cross sectional view taken through a vehicle floor cover and adapter assembled to an OEM vehicle floor cover retention post;

[0019] FIG. **8** is an isometric view of an embodiment of an adapter according to the invention as provided in two pieces, the view showing the relationship of the pieces prior to their assembly around an OEM retention post;

[0020] FIG. **9** is a bottom view of the two pieces of the adapter shown in FIG. **8**, prior to their assembly;

[0021] FIG. **10** is an isometric view of the adapter shown in FIG. **8** as assembled around an OEM retention post;

[0022] FIG. **11**A is an isometric view of another embodiment of a floor cover retention device according to the invention;

[0023] FIG. **11**B is a sectional view of the retention device shown in FIG. **11**A, as installed in a vehicle foot well and receiving a vehicle floor cover;

[0024] FIG. **12**A is an isometric view of another embodiment of an adapter or retention device according to the invention;

[0025] FIG. **12**B is a top view of the adapter shown in FIG. **12**A, as closing around an OEM floor mat retention device;

[0026] FIG. **13**A is an isometric view of another embodiment of a retention device according to the invention;

[0027] FIG. **13**B is sectional view of the embodiment shown in FIG. **13**A, shown attaching a floor cover to a vehicle foot well;

[0028] FIG. **14**A is an isometric view of another embodiment of an adapter or retention device according to the invention;

[0029] FIG. **14**B is a top view of the adapter shown in FIG. **14**A, illustrating its attachment to an OEM floor mat retention device;

[0030] FIG. **14**C is a sectional view of the adapter shown in FIGS. **14**A and **14**B, shown attaching a floor cover to a vehicle foot well;

[0031] FIG. **15**A is an isometric view of another embodiment of an adapter or retention device according to the invention and an associated cavity in a vehicle floor well;

[0032] FIG. **15**B is a sectional view of the retention device of FIG. **15**A, shown attaching a floor cover to a vehicle foot well;

[0033] FIG. **16** is an isometric view of another embodiment of a retention device for use with the invention, employing helical tines;

[0034] FIG. **17** is a bottom view of an embodiment similar to that shown in FIG. **16**, showing four helical tines;

[0035] FIG. **18**A is an isometric view of another embodiment of a retention device or adapter according to the invention and showing finger depressions to aid in a manual twisting motion; and

[0036] FIG. **18**B is a side view of the embodiment shown in FIG. **18**A; and

[0037] FIG. **19** a perspective view of a affixation/retention device according to another embodiment of the invention;

[0038] FIG. **20** is a cross sectional view taken substantially along line **20**-**20** of FIG. **19**;

[0039] FIG. **21**A is a perspective view of the top of a metal plate of a handgrip member of the affixation/retention device shown in FIG. **19**;

[0040] FIG. **21**B is a perspective view of the bottom of the metal plate shown in FIG. **21**A;

[0041] FIG. **22**A is a perspective view of the top of the overmolded handgrip member of the affixation/retention device shown in FIG. **19**;

[0042] FIG. **22**B is a perspective view of the bottom of the overmolded handgrip member and vehicle carpet affixation member of the affixation/retention device shown in FIG. **19**; and

[0043] FIG. **23** a detailed exploded isometric view of affixation/retention device shown in

[0044] FIG. **19**.

DETAILED DESCRIPTION

[0045] FIG. **1** shows a typical original equipment manufacturer (OEM) vehicle foot well **10** prior to a floor mat or tray being placed within it. The illustrated foot well is of the driver's side, as is evident from the gas pedal **12** and the brake pedal **14**. Typically although not universally, a floor **16** of the foot well **10** is carpeted. The floor **16** of the foot well **10** may be bounded by other foot well surfaces, so as to form a generally concave shape. These bounding foot well surfaces may include a rear or aft side **18**, transitioning the floor **16** to a seat pedestal (not shown); an inboard side **20**, which will be

disposed between the floor **16** and a transmission tunnel or center console; a firewall **22**, which is a forward continuation of floor **16** and which generally slopes upwardly and forwardly, and forward of the gas and brake pedals **12** and **14**; and an outboard side **24**, which is disposed between the floor well floor **16** and a door sill **26**.

[0046] Particularly on the driver's side, vehicle manufacturers now usually equip the foot well **10** with one or two hold-down or retention devices, in order fix the mat or tray (generically, "floor cover") in place and prevent its shifting and fouling with gas pedal **12** and/or brake pedal **14**. In this illustrated embodiment there are two OEM retention devices **124**A and **124**B, and they take the form of posts with enlarged heads **214**. Many different floor mat retention systems have been developed by different vehicle manufacturers and this makes the provision of custom-fitted foot well covers for these vehicles more challenging. In this illustrated embodiment, the OEM retention posts are meant to be inserted entirely through respective holes in an OEM floor mat (not shown.)

[0047] The placement of the spaced-apart OEM retention devices **124**A and **124**B is typical; OEM retention device **124**A is located toward the aft and outboard margins of floor **16**, while retention device **124**B is positioned toward the aft and inboard corner of floor **16**. While OEM vehicle retention devices **124**A and **124**B stand up more or less perpendicularly from floor **16**, they could be located in one or more of the adjacent foot well surfaces and be canted at an angle to the vertical.

[0048] FIG. **2** shows a beginning stage in the deployment of one form of the invention. In one embodiment of the invention, adapters or further retention devices **100**A, **100**B are furnished for each OEM retention device **124**A, **124**B. In this embodiment, the adapters **100**A, **100**B take the form of generally cylindrical pucks or disks which completely surround respective ones of the OEM retention devices **124**A, **124**B and are affixed to them in such a way that their inadvertent separation becomes highly improbable, even upon application of considerable vertical or lateral force. After their installation, each of the adapters **100**A, **100**B will present an upstanding sidewall **125** that extends for some distance above the floor **16**. Sidewall **125** is at a considerable angle to the floor **16** and in most instances will be roughly perpendicular to it. In the illustrated embodiment, each adapter **100**A,B is further equipped with a fastener **105** on its top surface **104**. In this illustrated embodiment, fasteners **105** are hook-and-loop material or hook-and-loop molded topography.

[0049] FIGS. **3** and **4** illustrate a floor cover **120** (the one illustrated here is a floor tray) for use with the retention system of the invention. As seen in FIG. **4**, the floor cover **120** has a general lower surface **121** into which are formed a pair of sockets **122**A and **122**B. Sockets **122**A,B are transversely spaced apart from each other and may be located near the rear margin of floor cover **120**, and in this embodiment are respectively located near the inboard and outboard margins of the tray **120**. The spacing and location of the sockets **122**A and **122**B match the spacing and location of OEM posts **124**A and **124**B. Each socket **122**A,B has a sidewall **123** which extends upwardly and inwardly from the general lower surface **121**. The sidewall **123** makes a substantial angle to general lower surface **121**, as will be described in more detail below. Each socket **122**A,B is sized to receive an OEM post **124**A or **124**B, as previously fitted with an adapter **100**A or **100**B. The floor tray **120** illustrated in FIGS. **3** and **4** has been thermoformed from a blank of thermoplastic material of substantially uniform thickness. Therefore, in this embodiment each socket **122**A or **122**B shows up as a puck, dome or other shape on the upper surface of the part which is a projection of the shape of the socket beneath it, as seen for example in FIG. **3**. Where the floor cover **120** is manufactured by injection or compression molding, the domes or pucks in the upper surface may be less prominent or may be entirely absent.

[0050] In this embodiment, an end user of the floor cover **120** doesn't have to do much work in installing it into his or her vehicle. The user first fits the OEM posts **124**A, **124**B with adapters **100**A and **100**B. Then the user takes the floor cover **120** and positions the sockets **122**A and **122**B over the attached adapters **100**A and **100**B so that the adapters **100**A and **100**B are received within the sockets **122**A and **122**B. In those embodiments where the adapters **100**A and **100**B have a fastener such as hook and loop material or topography on their respective upper surfaces, the user presses the sockets **122**A and **122**B down on the adapters **100**A and **100**B, and the installation is complete. The user does not have to thread or forcibly press any retention device through an aperture in the mat or tray, and doesn't have to twist or turn any hook, end knob or lock to secure the mat or tray in place.

[0051] The retention system of the invention primarily relies on the interaction between adapter sidewall **125** and socket sidewall **123** to prevent lateral movement; one acts as a physical stop to the other. In those instances where there are at least two sockets and adapters **122**, **100**, the mat or tray is also prevented from rotating around the axis of either.

[0052] FIG. **5** illustrates a different embodiment in which a thermoformed floor tray **128** is provided, as before, with sockets **122**A and **122**B. Socket **122**B is located near the inboard and rear margin of tray **128**. Socket **122**A, however, is located near the longitudinal center line of the part and near its rear margin. This embodiment illustrates that there can be considerable variation in the placement of the sockets **122**A and **122**B and of the OEM posts with which they are meant to align.

[0053] A single retention device **100** and an associated portion of a floor cover **120** are seen in FIG. **6**. The retention device or adapter **100** includes a body **102** disposed around a vertical axis X. In the illustrated embodiment, the external surface or side wall **125** of the body **102** is substantially circularly cylindrical or pillbox-like and is roughly parallel to axis X. In the illustrated embodiment, side wall **125** is actually slightly frustoconical rather than straight cylindrical; adapter **100** is wider at the top than it is at the bottom. In other embodiments, the external sidewalls of the body **125** can be cylindrical in the mathematical sense (that is, a cross section of the sidewall at one point on axis X will show a shape that is similar to a cross section taken at another point on axis X), prismatic, oval, or other convenient shape, but preferably sidewall **125** is disposed to be at a substantial angle to the horizontal.

[0054] The body **102** has a general exterior upper surface **104** on which a first fastener **105** is formed or affixed. For example, the upper surface may be integrally molded with the body **102** so as to have hook or loop features in it; alternatively, a layer of hook or loop material may be applied to a plastic substrate as by gluing or heat bonding. In other embodiments fastener **105** could be a magnet or a snap. The body **102** is preferably injection-molded of plastic but may also be formed from rubber or other thermosetting material, or even a metal. Surface **104** is, in this embodiment, formed to

be planar and substantially perpendicular to axis X; more generally the curvature (if any) of surface **104** should be a mirror image of the shape of socket ceiling **217** (described below).

[0055] A cavity **110** is formed by the body **102**. In the embodiment illustrated by FIG. **6**, an opening **111** in the general exterior upper surface **104** communicates it to the cavity **110**. In an alternative embodiment, the general exterior upper surface **104** could be continuous with no opening.

[0056] In FIG. **7**, the retention device or adapter **100** is shown assembled around an OEM retention post **124**, and the retention device **100** in turn is fastened to the ceiling **217** of socket **122**. The illustrated OEM retention device **124** typically is supplied by the vehicle manufacturer and may be of any of various forms, others of which will be described below. The illustrated OEM post **124** has a shaft **216**, which terminates in a free and enlarged end or head **214**, wherein at least one diameter of the head **214** is larger than the diameter of the shaft **216**. In this illustrated embodiment the cavity **110** is disposed between the general upper surface **104** of the device or adapter **100** and an engagement ridge or annulus **202** formed to be remote from the general upper surface **104**. Cavity **110** is shown here as having a generally cylindrical interior sidewall **204** although it could take other shapes, as might happen where the enlarged head of the OEM retention post is not radially symmetrical. In the illustrated embodiment a lower surface **215** of the engagement ridge **202** forms or is a part of the lower surface of the adapter **100**. The cavity inner surface **204** is dimensioned such that when it receives the head **214** of the retention post, the top of the head **214** of the retention post does not extend beyond the general exterior upper surface **104** of the adapater body **102**. In other words, the cavity **110** is tall enough to accommodate the head **214**.

[0057] The engagement ridge **202** extends radially inwardly from the general inner surface **204** and is axially spaced from the general upper surface **104**. The engagement ridge **202** forms a restricted passageway that is dimensioned to receive the shaft **216** of the retention post **124**. The passageway formed by the engagement ridge **202** is smaller than the head of the retention post **214**, and accordingly, when the body **102** is attached around the retention post **124**, it cannot be lifted off by even a large amount of axial force. In the illustrated embodiment, a central passageway defined by the engagement ridge **202** fairly tightly receives the shaft **216**; in an alternative embodiment, this fit could have a looser tolerance so as to permit some variance in the shaft size or shape.

[0058] A second fastener **208** is placed on an underside of the floor cover **120**, and it is preferred that the second fastener **208** be attached to or make up the ceiling **217** of the socket **122**. The second fastener may be hook-and-loop material meant to mate with the hook-and-loop material of the first fastener **105**; it is also possible for the hook and loop topography to be molded into the ceiling **217**. Accordingly, when the floor cover **120** having a socket **122** is placed over the body **102**, the second fastener **208** fastens to the first fastener **105**. In other embodiments, one of fasteners **105** and **208** can be a magnet and the other of the fasteners **105** and **208** can be a magnet or a piece of ferromagnetic material such as steel. In yet other embodiments, fasteners **105** and **208** could form components of a spring-biased mechanical snap.

[0059] The socket **122** has a top diameter, D**1**, at the ceiling of the socket **122** and a bottom diameter, D**2**, at the general lower surface of the socket **122**. The adapter **100** has a diameter D**3**. The greatest diameter of the adapter **100**, D**3**, is less than the top D**1** and bottom D**2** socket **122** diameters. This insures that the floor cover **120** will fit on the adapter **100**.

[0060] Typically, the retention post **124** protrudes upwardly through a layer of carpet (here shown schematically at **218**). A thickness of the engagement ridge **202** between its lower surface **215** and its upper surface **220** may be chosen to be smaller than a length of the unenlarged portion of shaft **216**, for ease in installation by the consumer.

[0061] The upstanding sidewall **123** preferably approaches parallelism with axis X, but in order to get good mold release characteristics, the sidewall **123** may be at a slight angle to axis X, such as up to six degrees, and preferably 3 to 5 degrees. One embodiment of sidewall **125**, however, is somewhat inversely frustoconical, such that the top of adapter **100** is slightly larger in diameter than its bottom. In any particular vehicle, the OEM retention post **124** may not be completely vertical but may be canted, either as a result of its being installed in a nonhorizontal surface or because of loose tolerances or controls on such verticality. Sidewall **125** compensates for this somewhat in that even as slightly canted, the sidewall **125** will present an abutment or stop to the sidewall **123** which is more at 90 degrees to the horizontal than the OEM post axis. This maximizes the ability of surface **125** to stop lateral displacement of mat or tray **120** without the socket **122** camming over the top **104** of the adapter **100**.

[0062] More generally, the adapter **100** minimally should present some sort of bump or impediment to the lateral displacement of the socketed mat or tray **120**. Various shapes could achieve this. Preferably the height of socket wall **123** (from ceiling **217** to the general lower surface **121** of floor cover **120**) and the height of the retention device sidewall body **125** should be at least 4 mm for acceptable functionality. Further and in the illustrated embodiment, a diameter of socket **122** at ceiling **217** is preselected to be somewhat larger than a diameter of adapter **100** at top surface **104**, the difference being at least 2 mm, and more preferably 6 to 8 mm. This loose tolerance is specified to take into account the variation in placement of the OEM retention device to which the adapter **100** is connected. Where the OEM retention device, such as a hook (see below), is not radially symmetrical, this degree of "float" may also vary with the asymmetry of the OEM retention device.

[0063] In one embodiment the adapter body **102** is made up of at least two separate pieces, and as shown in FIG. **8**, may consist of two identical pieces **300***a* and **300***b* that each substantially define a half cylinder. The two pieces **300***a* and **300***b* are securely attachable to each other. Each of the pieces **300***a, b* includes a portion of the engagement lip or ridge **202**, such as half of it. In an alternative embodiment the body **102** may consist of more than two pieces in a variety of shapes that are securely attachable to each other, with each piece making up a part of the engagement ridge **202**. In the illustrated embodiment the first fastener **105** is an annulus which is divided into halves or **180** degree sectors, so that when the pieces **300***a,b* are fastened together, a complete annulus of engaging material will result. See also FIG. **10**.

[0064] As shown in FIGS. **8** and **9**, a pair of mating or interlocking members **402** and **404** is included in each of the pieces **300***a* and **300***b*. In the illustrated embodiment, the pair of interlocking members **402** and **404** consists of a serrated projection or finger **402** and a serrated channel **404**. The serrated projection **402** of one piece is adapted to be slidably received into the serrated channel **404** of the other piece when the two pieces are joined together in a horizontal direction

around the retention post **124**. The serrations or teeth **403** on the projection **402**, and the serrations or teeth **405** within the projection-receiving channel **404**, preferably are of the shark-tooth form, such that the force necessary to pull them apart is much greater than the force necessary to put them together. The shark-tooth serrations **403** will easily cam across the teeth **405** in the channel **404** when a projection **402** is inserted into a channel **404**, but the reverse will not be true. The teeth or serrations **403**, **405** preferably are elongate and are disposed to be in parallel to the axis X, such that they will maximally resist being pulled apart at an angle to that axis.

[0065] On each piece, the interlocking members **402**, **404** are radially spaced from the axis and extend in a direction parallel to and spaced from that axis. Projections or fingers **402** and channels **404** are disposed below the upper engagement surface **104**, radially outwardly from the structure defining cavity **110**, and preferably above the engagement ridge **202**. The projection **402** of piece **302***a* will be inserted into a channel **404** of piece **302***b* on one side of the axis X, while simultaneously the projection **402** of piece **302***b* will be inserted into channel **404** of piece **302***a* on the other side of the axis X; the axis is interposed between the two vectors or lines of closing (not shown) of the fastening pairs **402**, **404**. This spaced-apart placement ensures that the piece **300***a* will be securely fastened to piece **300***b* around the retention post **124**.

[0066] In one embodiment each finger or projection **402** is slightly elastic. This elasticity can be taken advantage of by placing the serrations **403** on the free end of the elongate projection **402**, and by extending the projection **402** at an angle which is slightly nonparallel to and inward of the long dimension of the mating channel **404**. In this way, a projection **402**, when inserted into a channel **404**, will have its teeth **403** forced or spring-biased against the teeth **405** of the channel **404**. This enhances securement.

[0067] According to one aspect of the invention and as illustrated in FIGS. **8** and **9**, at least two access holes **406** may open onto the general upper surface **104**. The access holes **406** open on respective channels **404**, at locations which are closer to the entrances of the channels **404** than are their serrations or teeth **405**. Access holes **406** are positioned such that a screwdriver blade or other tool admitted into an access hole **406** will permit the tool to pry the spring-biased projection or finger **402** of the other piece from the teeth **405** in the channel **404**, permitting the user to decouple piece **300***a* from piece **300***b*. But as seen in FIG. **10**, there intentionally is no other way to remove the attachment device **100** from the retention post **124** without destroying the attachment device **100**; as assembled, the fingers or projections **402** are shrouded by the external side wall **125** of the device **100**. This prevents the adapter **100** from becoming inadvertently separated from the OEM retention device **124** to which it is affixed.

[0068] Each of the pieces **300***a,b* also has a pair of guides or processes to aid in the coregistration and assembly of the device **100**. The guides also help prevent inadvertent disassembly when the two pieces of the device are twisted torsionally and perpendicularly from the axis X. The first of these, guide **408**, is a process which extends roughly in parallel to but spaced outwardly from finger **402**. The radially external surface of guide **408** is continuous with exterior surface **125**. The guide **408** fits into a pocket **410** on the other of the two pieces **300***a,b*. Pocket **410** is in the nature of a depression formed in the otherwise continuous curved exterior surface **125**.

[0069] The other guide or process **412** is best seen in FIG. **9**. This guide or process **412** is a continuation of the wall partially constituting channel **404**. Process **412**, upon assembly to the other piece **300***a* or **300***b*, slides along wall **414** of that other piece, even as finger teeth **403** begin to engage channel teeth **405**.

[0070] The cavity **110** is dimensioned to enclose the OEM retention post head **214**. As seen in FIG. **10**, the retention post head **214** sits within the cavity **110**.

[0071] The adapter **100** shown in FIGS. **2** and **4-10** fairly closely fits an OEM retention post **124** of a predetermined type. But adapters or retention devices could be fabricated according to the invention wherein cavities **110** will accommodate any of several different retention post heads, hooks or enlargements of different kinds, so long as the retention post or hook has a terminal head that is larger in axial cross section than a neck or shaft to which is attached. As such, a retention device according to the invention could be used as an adapter to any of several (OEM) vehicle floor cover retention systems, obviating the need to make custom apertures in the mats or trays for different OEM makes or models.

[0072] FIGS. **11**A and **11**B illustrate a retention device **1100** which is not an adapter to an OEM retention device but rather is meant to be used where no such OEM devices exist. As before, device **1100** has a body **1102** which is puck or pillbox-shaped, and which has an upstanding sidewall **125** that preferably is roughly vertical and that can be right cylindrical or slightly inversely frustoconical. An upper surface **104** of the body **1102** is finished with hook and loop material or hook and loop topography **105** as a fastener; other, previously mentioned fastening expedients could be employed instead or in addition. A generally planar bottom surface **1104** has extending downwardly therefrom a central screw **1106** that, as shown in FIG. **11**B, is meant to screw into the carpet pile and backing **1108** of a vehicle foot well. Alternatively the central screw **1106** can be replaced with other means to fasten device **1100** to the carpet and preferably its backing; two alternatives will be described below. Device **1100** can be injection molded of suitably tough plastic. It is preferred that body **1102** have a diameter that is a little smaller than the diameter of socket **122** of floor cover **120**, to provide some tolerance in placement of the device **1100**. This device **1100** can be furnished with a mat or floor tray **120** having the same size socket **122** as before.

[0073] In the embodiment shown in FIGS. **12**A and **12**B, a device or adapter **1200** has a body **1202** with two halves **1204** and **1206** that are hinged at sidewall **125**. The engagement ridge or lip **202** will close around an OEM retention post shaft **216**; in this embodiment, the head **1208** of the OEM retention device **1209** can be of irregular shape. The hinge **1210** can be a "living hinge" of relatively thin plastic and is approximately parallel to the device axis. Device body **1202**, when closed, will form an annular upper surface **104** which, as before, may be populated with hook and loop material **105**. Body **1202** forms a cylindrical cavity **110** which is tall enough to house the OEM retention device head **1208**. Halves **1204** and **1206** are kept closed by means such as a ratchet clasp **1212** on half **1204** which, when closed, will engage teeth **1214** formed on exterior surface **125** near an opposite split end **1216** of half **1206**.

[0074] FIGS. **13**A and **13**B show the structure and installation of another embodiment **1300**. This device has a solid puck or pillbox-shape body **1302** which, as before, presents a cylindrical or slightly inverse frustoconical surface **125** to

sidewall **123** of socket **122** (FIG. **13**B). A top surface **104** is provided with a first fastener **105** such as hook-and-loop material or a magnet. A "T" shaft **1304** downwardly extends from the center of a general lower surface of the body **1302**. The end of shaft **1304** remote from body **1302** is terminated in an elongate, horizontally extending bar **1306** which will fit through an elongate slot **1308** in the foot well floor (FIG. **13**B) in substitution for the OEM floor mat retention device usually inserted therein. The body **1302** is then turned 90 degrees by the user, and the "T" crossbar **1306** thereupon rotates within a disc-like cavity **1310** below slot **1308**. Once device **1300** is so installed, it is ready to receive a socketed vehicle floor cover **120**, as before. A diameter of the body **1302** preferably is about **4**mm less than a diameter of the socket **122**.

[0075] In the embodiment shown in FIGS. **14**A-**14**C, the device or adapter **1400** has a puck-shaped body **1402** with a cylindrical or slightly inverse frustoconical sidewall **125**. A top surface **104** of the body **1402** is formed as an annulus and is fitted with a fastener **105** of one or more of the kinds previously described. A cylindrical cavity **1404** extends from its opening on top surface **104** vertically downward to a bottom **1406**. The bottom or floor **1406** is closed except for a central hole **1408**, meant to receive a shaft **1413** of a hook-like OEM retention device **1410**, and a sector **1412**, which is wide enough to admit a hook **1414** that extends from the top of the OEM retention device shaft **1413**. To fasten the adapter **1400** in place, the user rotates body **1402** until the hook **1414** is no longer above the sector **1412**.

[0076] In the embodiment shown in FIGS. **15**A-**15**B, the device or adapter **1500** has a puck-like body **1502** that presents an upstanding sidewall **125** that is either cylindrical or somewhat inversely frustoconical, as before. A top surface **104** of the solid body **1502** may include a first fastener **105** of one or more previously described kinds. Downwardly depending from a center of general lower surface **1504** of body **1502** is an at least bifurcated snap-fit foot **1506**, here divided by axially disposed channel or slot **1508** into longitudinal parts or halves **1510**, **1512**. In other embodiments there can be more channels and more longitudinally divided segments (not shown). Each longitudinal segment **1510**, **1512** terminates in an enlarged end **1514**. The material (such as plastic) from which the body and/or foot **1506** is formed is selected to have some elasticity, such that a radial inward force directed on either enlarged end **1514** will inwardly depress that end toward the axis and the other such end **1514**, temporarily decreasing the diameter of the ends **1514** considered as a whole. The enlarged ends **1514** may each have a chamfered or tapered surface **1515** so that they will easily cam through circular opening **1518** formed above a relatively enlarged cavity **1520**, which had been formed in a vehicle foot well floor **1522** by the original equipment manufacturer to receive a predetermined OEM floor mat retention device. The user pushes the foot **1506** through the hole **1518**, inwardly compressing the foot segments **1514**, which will spring back to occupy cavity **1520** after they pass the constriction. The adapter **1500** is then ready to receive a socketed floor cover **120**.

[0077] FIG. **16** shows another retention device **1600** according to the invention which is not an adapter. Device **1600** has a body **1602** with a sidewall **1604** which is cylindrical or (as shown) slightly reverse frustoconical. A fastener, such as a layer or topography **1606** of hook-and-loop material, is mounted or molded on into a top surface **1608** of the body **1602**. Body **1602** can be solid without a cavity. A pair of angularly spaced-apart helical tines **1610**, **1612** extend in helical paths from a general bottom surface **1614** of the body **1602**. In this embodiment, there are two such helical tines, but, as FIG. **17** shows, more tines can be supplied as is convenient. The tines **1610**, **1612** can be fashioned of steel wire and may have upper ends embedded or in-molded into the body. Similar carpet connectors are disclosed in the Applicants' U.S. Pat. Nos. 6,385,812 and 6,412,142, the entire disclosure and drawings of which are incorporated herein by reference. The tines **1610**, **1612** can follow helical paths, as shown, or can terminate in straight segments, as depicted in U.S. Pat. No. 6,412,142. Alternatively the tines **1610**, **1612** can be fashioned of hard plastic. In operation, the user simply screws the body **1602**, and with it the tines **1610**, **1612**, in a counterclockwise direction so that the tines **1610**, **1612** pierce the carpet and bite into the backing (not shown) underneath. The height of body sidewall **1604** is chosen to be an effective physical stop to a respective floor cover socket sidewall **123**, as has been previously described.

[0078] FIG. **17** is a bottom view of a variation of device **1600**. In this embodiment, there are provided four equally angularly spaced apart tines **1700**, **1702**, **1704**, **1706** rather than two.

[0079] FIGS. **18**A and **18**B illustrate a feature which is particularly suited to those devices described above which are meant to be rotated by hand in their installation, either into the carpet or to be attached to a preexisting OEM device. A body sidewall **1800** may be formed as a surface of rotation around the body's axis, and preferably will be generally circularly cylindrical or somewhat reverse frustoconical as before, but won't be completely so. Instead, the sidewall **1800** will have angularly spaced-apart depressions **1802** formed into it to provide purchase to the fingers of a human hand. Preferably there should be multiple ones of the depressions **1802**, such as at least two, to fit to a thumb and an opposing finger. There can be more depressions than this (not shown) depending on the size of the body **1804**. The depressions can take the form of concavities as shown. Other finger-engaging surfaces can instead be supplied, all of which will be departures from surfaces of rotation around the axis X of the body **1804**. But the departures should not be so severe that the primary function of the body, i.e., being a physical stop to the lateral translation of a socket sidewall, would be compromised. The sidewalls of the device bodies shown in FIGS. **11**A-B, **13**A-B and **14**A-B could all bear depressions similar to depressions **1802**, as each of these embodiments is meant to be axially twisted by the human hand.

[0080] FIG. **19** shows an affixation/retention device **1900** which has three parts: a handgrip member **1904**, a vehicle floor cover retention member **1901** and a carpet affixation member **1910**. In some embodiments, the affixation/retention device **1900** may be formed as one piece. The vehicle floor cover retention member **1901** has an annular upper surface **104** which, as before, may be populated with hook and loop material or topography **105**. The illustrated retention member **1901** has an upstanding sidewall **1913** that is approximately parallel with axis X; in the illustrated embodiment sidewall **1913** has a small positive draft for mold release purposes, as better seen in FIG. **20**. A height of the retention member **1901**, as measured from its free end or top surface **104** to upper face **1902** of handgrip member **1904**, should be preselected to be less or equal to a depth of the floor cover socket **122**A or B which it is intended to fit. Retention member **1901** is equivalent in function to the adapters **100**A, B, device **1100**, etc. of

previously described embodiments and engages the floor cover sockets **122**A, B in the same way. Retention member **1901** can be disposed on axis X of device **1900**.

[0081] The handgrip member **1904** has a substantially plate-shaped body with a noncircular margin **1906**. The handgrip member **1904** has a first, upper face **1902** and a second, lower face **2110** (See FIG. **20**B). In the illustrated embodiment, the handgrip member **1904** has a series of sides **1906***a*, **1906***b*, **1906***c*, **1906***d*, **1906***e*, **1906***f* that extend between and join the faces **1902** and **2110**. The sides **1906***a*, **1906***b*, **1906***c*, **1906***d*, **1906***e*, **1906***f* together form a hexagon. The handgrip member **1904** may be in other than a hexagonal form, and may have a nonpolygonal or irregular margin, but providing the handgrip member **1904** in a square, hexagonal or octagonal form forms opposed sides and therefore permits the installation of the device **1900** into a textile layer either by the human hand or a tool. Handgrip member **1904** lies in a plane which is substantially orthogonal to axis X.

[0082] In this embodiment, the body of the handgrip member **1904** is a composite of a metal plate **2100** and an overmolded thermoplastic portion **1914** which, for example, can be acrylonitrile butadiene styrene terpolymer (ABS) or glass filled nylon. In the illustrated embodiment, the vehicle floor cover retention member **1901** attaches to the handgrip member **1904** via a center post **2002** (See FIG. **20**). As seen in FIG. **20**, once connected (or as integrally molded), the vehicle floor cover retention member **1901** sits on the upper or first face **1902** of the handgrip member **1904**. In the illustrated embodiment, the hollow post **2002** extends upwardly from the approximate center of the handgrip member **1904**. The post **2002** has wedges or other integrated widened features **2004** on its outer surface over which the vehicle floor cover retention member **1901** slides. The cavity **1912** of the vehicle floor cover retention member **1901** is dimensioned to enclose the center post **2002**. The cylindrical cavity **1912** is wide enough to receive the post **2002** but, as stated above, the passageway formed by the engagement ridge **2012** is smaller than the widened features of the post **2004**. Accordingly when the vehicle floor cover retention member **1901** is slid over the post **2002**, it cannot be lifted off by even a large amount of axial force, resulting in a snap-fit. Alternative embodiments may have a looser tolerance providing some variance in the post **2002** size or shape. In the illustrated embodiment, the largest radius of the vehicle floor cover retention member **1901** is smaller than the smallest radius of the handgrip member **1904**. While retention member **1901** is dimensioned to be received into a floor cover socket **122** A or B (see FIG. **4**), the noncircular margin **1906** of the handgrip member is dimensioned to be grasped and turned by a human hand. A radius R from the axis X (FIG. **20**) to the vertices of the noncircular margin **1906** may be chosen to be in the range of about 0.5 to 2.5 inches and in one embodiment is 0.93 inches.

[0083] A carpet affixation member **1910** downwardly depends from the lower surface **2110** of the handgrip member **1904**. The carpet affixation member **1910** is adapted to be twisted into the carpeting of a vehicle foot well in a predetermined rotational direction **2116** (See FIG. **23**). In the illustrated embodiment, the carpet affixation member **1910** consists of three tines **2010** (See FIG. **21**B). The tines **2010** are angularly spaced apart from each other around axis X and are formed on roughly helical paths. Other embodiments may have one or more different processes forming the affixation member **1910** which prefereably are integrally formed with the metal plate **2100** and stamped from the workpiece creating plate **2100**.

[0084] FIG. **21**A shows an upper side of the stamped metal plate **2100** of the handgrip member **1904**. The metal plate **2100** of the handgrip member **1904** may be round (as shown) or it may have a different shape. At least one embayment **2108** is formed adjacent the lateral outer margin **2109** of the metal plate **2100**. The embayment **2108** is preferably formed by stamping to create a hump **2114** that defines the embayment **2108**. Alternatively, metal may be removed from plate **2100** within each embayment **2108**, leaving open indentations. There may be several embayments **2108** which may be distributed around the axis at equal angular intervals. In the illustrated embodiment the three embayments **2108** are offset from each other by approximately 120 degrees. Within the area of the embayments **2108**, the lower surface of the metal plate **2100** departs from the horizontal plane in which a remainder of the plate **2100** resides, and which will be coplanar with lower face **2110** after molding.

[0085] In the illustrated embodiment, a hexagonal hole **2104** is disposed on the axis of the metal plate **2100** of the handgrip member **1904**. The hexagonal hole **2104** is sized such that it accepts an Allen wrench. Other embodiments may have noncircular central orifices of different shapes which may receive different tools such as a slotted or Philips head screwdriver. The tools may be used to turn handgrip member **1904** and the carpet affixation member **1910** into the carpeting in the predetermined rotational direction **2116**. Additional holes **2106** may be disposed to go through the metal plate **2100** for use in the alignment in mold tooling.

[0086] FIG. **21**B illustrates tines **2010** that downwardly depend from a lower face **2103** of the metal plate **2100**. The carpet affixation member **1910** should have at least one attachment member **2010** (such as at least one of the illustrated tines), but may have several such as the three shown in FIG. **21**B. The attachment members **2010** may be integrally formed from and stamped from the metal plate **2100** and extend downwardly from the lower face **2110**. The affixation members **2010** are substantially disposed on a roughly helical path and are a substantial distance from the axis X of the handgrip member **1904**. The affixation members **2010** illustrated in FIG. **21**B are sharpened metal tines with pointed tips **2114** which can be inserted into the vehicle carpeting.

[0087] The undersides of the embayments **2108** are also shown in FIG. **21**B. The edges are sloped, while the top of the embayment **2108** is substantially flat.

[0088] FIG. **22**A shows the first face **1902** of the completed hand grip member **1904**. The overmolding forms a plastic component **1914** of the handgrip member **1904**. The plastic component **1914** forms the noncircular margin **1906** of the member **1904** and in this embodiment, laterally surrounds the metal plate **2100**. In this embodiment, the lateral outer margin **2109** of the metal plate **2100** is inwardly spaced from the overmolded noncircular margin **1906** of the handgrip member **1904**.

[0089] FIG. **22**B shows the lower face **2110** of the overmolded handgrip member **1904**. As seen in FIG. **22**B, the lower face **2103** of the metal plate **2100** does not form any portion of the general lower surface **2110** of the handgrip member **1904** within the area of each embayment **2108**; within the area of the embayment **2108**, the plastic component **1914** is overmolded on both the lower surface **2103** and upper surface **2102** of the metal plate **2100**. The downwardly

disposed affixation member **1910**, here comprising tines **2010**, is not overmolded. Anti-backout wedges **2008** are formed on the lower face **2110**. In the embodiment shown in FIG. **22**B, the anti-backout wedges **2008** are positioned near the respective vertices of each hexagon angle. The number of wedges **2008** and placement of wedges **2008** may vary with different embodiments. As illustrated in this embodiment, each wedge **2008** has a leading edge **2222** and a trailing edge **2224**, the leading edge of the wedge **2222** being angularly spaced relative to the axis X from the trailing edge of the wedge **2224** in the predetermined rotational direction **2116**. The trailing edge **2224** has a depth which is measured from the second face **2110**. That depth is greater than the depth between the leading edge **2222** and the second face **2110**. In some embodiments the depth between the leading edge **2222** and the second face **2110** may be zero, as shown.

[0090] Once the handgrip member **1904** and carpet affixation member **1910** are twisted in rotational direction **2116**, into the carpet, the wedges **2008** will resist any torque on the device **1900** in a direction opposite the predetermined rotational direction **2116**. In the illustrated embodiment the anti-backout wedge **2008** and plastic component **1914** of the handgrip member **1904** are integrally molded of plastic. Other embodiments may have backout wedges **2008** in different configurations and made of different materials.

[0091] In operation, the vehicle floor cover retention member or puck **1901** may be snapped into the center post **2002** (FIG. **23**) to create a complete retention device or assembly **1900**. This assembly may take place in the factory. During the course of installing a mat or tray into his or her vehicle, the user locates where the retention devices should go, and then simply screws each affixation/retention device **1900** in a clockwise direction so that the tines **2010** pierce the foot well carpet and bite into the backing underneath. The tip **2014** of the tine **2010** is manually inserted and twisted into the floor of the vehicle foot well. As the user presses and rotates the handgrip member **1904** of the affixation/retention device **1900** around the center axis X, the tines **2010** pierce the carpet layer so that the upper face **1902** of member **1904** becomes flush with the carpet surface.

[0092] FIG. **23** demonstrates the vehicle floor cover retention member **1901** snapping on to the handgrip member **1904**.

[0093] In summary, a relatively passive vehicle floor cover retention system uses device bodies or adapters with upstanding side walls that are received in respective floor cover sockets. The devices or adapters can be of various kinds developed to replace or augment OEM retention devices of various kinds, and act as physical stops against lateral motion of the floor mat or tray. While illustrated embodiments of the present invention have been described in the above description and illustrated in the appended drawings, the present invention is not limited thereto but only by the scope and spirit of the appended claims.

1. A vehicle floor cover retention system, comprising:

a vehicle floor cover for installation in a vehicle foot well, the vehicle floor cover having a general lower surface, at least one socket formed into the general lower surface and having a closed ceiling spaced upwardly from the general lower surface, at least one sidewall of the socket extending by a predetermined depth from the general lower surface to the ceiling, the socket having a top socket diameter at the ceiling and a bottom socket diameter at the general lower surface such that the top socket diameter is less than the bottom socket diameter; and

for each socket, a respective retention device disposed to upwardly extend from the vehicle foot well and having a free end, a body of the retention device having at least one upstanding sidewall, a depth of the sidewall of the socket being preselected to be more than or equal to a height of the sidewall of the retention device body as measured from a general surface of the vehicle foot well to the free end of the retention device body, the device having a greatest diameter that is less than the top and bottom socket diameters;

the socket adapted to receive the retention device when the floor cover is placed in the vehicle foot well, the sidewall of the retention device presenting a physical stop to the sidewall of the socket to mitigate lateral movement of the vehicle floor cover within the vehicle foot well.

2. A vehicle floor cover retention system, comprising:

a vehicle floor cover for installation in a vehicle foot well, the vehicle floor cover having a general lower surface, at least one socket formed into the general lower surface and having a closed ceiling spaced upwardly from the general lower surface, at least one sidewall of the socket extending by a predetermined depth from the general lower surface to the ceiling; and

for each socket, a respective adapter disposed to upwardly extend from the vehicle foot well and having a free end, a body of the adapter having at least one upstanding sidewall, a depth of the sidewall of the socket being preselected to be more than or equal to a height of the sidewall of the adapter body as measured from a general surface of the vehicle foot well to the free end of the adapter body;

the socket adapted to receive the adapter when the floor cover is placed in the vehicle foot well, the sidewall of the adapter presenting a physical stop to the sidewall of the socket to mitigate lateral movement of the vehicle floor cover within the vehicle foot well; and

a connector adapted to affix the adapter to an original equipment manufacturer (OEM) vehicle floor mat retention device installed by the original equipment manufacturer in the vehicle foot well.

3. The system of claim **2**, wherein the connector of the adapter is formed by a cavity disposed to be radially interior to the sidewall of the adapter body, the cavity sized to house an enlarged head of an OEM vehicle floor mat retention post, a lower end of the cavity defined by an engagement ridge, the engagement ridge extending radially inwardly from a general inner sidewall of the cavity and adapted to receive a shaft of the OEM vehicle floor mat retention post, the shaft extending between the vehicle foot well surface and the enlarged head.

4. The system of claim **3**, wherein the adapter is formed as two separate pieces which are brought together around the OEM retention post to affix the adapter to the OEM retention post.

5. The system of claim **4**, wherein the adapter is formed as first and second pieces hinged to each other at the sidewall of the adapter body, the first and second pieces hingedly closed on each other around the OEM floor mat retention post to affix the adapter to the OEM retention post.

6. The system of claim **3**, wherein the enlarged head of the OEM retention post is a hook which is asymmetrical around an axis of the post, the adapter body having an axis, the engagement ridge defining an access hole extending from the axis of the adapter body to the general inner sidewall of the cavity in the adapter body but angularly extending only

through a portion of the bottom of the adapter body cavity, the adapter adapted to be twisted about the axis such that the hook of the OEM retention post is above the engagement ridge.

7. The system of claim **2**, wherein the connector has a shaft which extends downwardly on an axis of the adapter body, the shaft having an end remote from the adapter body, an elongate bar joined to the last said end and horizontally extending form the axis in opposite directions, the elongate bar adapted to be received through a slot formed in the vehicle foot well and into a cavity below the slot, the retention device rotated to fasten the retention device to the vehicle foot well.

8. The system of claim **2**, wherein the connector has a shaft which extends downwardly on an axis of the retention device body and which terminates in an enlarged end, the shaft being axially split into two parts, the parts being capable of elastic deformation toward the axis, the connector adapted to being inserted through a hole in the vehicle foot well and into a cavity disposed below the hole, the parts of the enlarged end of the shaft elastically deforming toward the axis as the enlarged end is inserted through the hole and springing radially outwardly once the enlarged end is in the last said cavity to thereby connect the adapter to the vehicle foot well.

9. The system of claim **2**, wherein the sidewall of the body of the retention device generally conforms to a surface of rotation around a body axis, plural angularly spaced-apart depressions being formed in the sidewall of the body to provide purchase points for a thumb and at least one finger of a human hand so that a user may manually twist the retention device about its body axis.

10-24. (canceled)

25. A vehicle floor cover retention system, comprising:

a vehicle floor cover for installation in a substantially carpeted vehicle foot well, the vehicle floor cover having a general lower surface, at least one socket formed into the general lower surface and having a closed ceiling spaced upwardly from the general lower surface, at least one sidewall of the socket extending by a predetermined depth from the general lower surface to the ceiling;

for each socket, a respective affixation/retention device;

a substantially plate-shaped handgrip member of the affixation/retention device formed around an axis to be substantially orthogonal thereto, a noncircular handgrip margin of the handgrip member radially spaced from the axis, the handgrip member having a lower face and an upper face;

a vehicle floor cover retention member of the affixation/retention device upstanding from the upper face of the handgrip member and sized to be received in a respective socket, the retention member disposed on the axis, a largest radius orthogonal to the axis of the vehicle floor cover retention member being smaller than a smallest radius orthogonal to the axis of the handgrip member; and

a carpet affixation member of the affixation/retention device downwardly depending from the lower surface of the handgrip member, the carpet affixation member formed around the axis and adapted to be twisted into carpeting of the vehicle foot well in a predetermined rotational direction by action of the human hand on the handgrip surface of the handgrip member.

26. The system of claim **25**, wherein a body of the vehicle floor cover retention member has a free end upwardly spaced from the upper face of the handgrip member and at least one upstanding sidewall extending between the upper face of the handgrip member and the free end of the retention member, a depth of the sidewall of the socket being preselected to be more than or equal to a height of the sidewall of the retention member; and

the sidewall of the retention member presenting a physical stop to the sidewall of the socket to mitigate lateral movement of the vehicle floor cover within the vehicle foot well.

27. The system of claim **25**, and further including a post integrally formed with the handgrip member on the axis to upwardly vertically extend from the upper surface of the handgrip member, a sidewall of the post having an enlargement, the vehicle floor cover retention member being annular and adapted to snap-fit over the enlargement on the post of the handgrip member.

28. The system of claim **25**, wherein the handgrip member has a metal plate and a plastic portion overmolded onto the metal plate, the carpet affixation member of the device comprising at least one tine integrally formed with and downwardly depending from the metal plate.

29. The system of claim **28**, wherein the affixation member includes a plurality of tines angularly spaced from each other and integrally formed with and downwardly extending from the metal plate on roughly helical paths.

30. The system of claim **27**, wherein a center of the post and the handgrip member are hollow and define an axial passage, the handgrip member further having a metal plate, at least one tine of the vehicle carpet affixation member integrally formed with and downwardly depending from the metal plate, a noncircular central orifice formed in the plate on the axis and adapted to receive a tool introduced through the axial passage for turning the device in the predetermined rotational direction.

31. The system of claim **30**, wherein the noncircular central orifice of the metal plate is adapted to receive an Allen wrench.

32. A device for fastening an object to a carpeted floor of a vehicle, comprising:

a substantially flat handgrip member formed around an axis and having a noncircular handgrip margin radially spaced from the axis, the handgrip member having a lower face which in use faces the carpeted floor of the vehicle;

at least one carpet affixation member joined to the flat handgrip member and downwardly depending therefrom, the carpet affixation member adapted to be twisted into the carpeted floor of the vehicle in a predetermined rotational direction around the axis; and

at least one anti-backout wedge formed on the lower face of the handgrip member to downwardly depend therefrom, the wedge having a leading edge and a trailing edge, the leading edge of the wedge being angularly spaced relative to the axis from the trailing edge of the wedge in the predetermined rotational direction, the trailing edge having a first depth measured from the lower face of the handgrip member, the leading edge having a second depth measured from the lower face of the handgrip member, the first depth being greater than the second depth such that, once the carpet affixation member has been twisted into the carpeted floor of the vehicle, the wedge will resist any torque on the device in a direction opposite the predetermined rotational direction.

33. The device of claim **32**, wherein the handgrip member includes a metal plate and a plastic portion overmolded onto

the metal plate, at least one tine of the carpet affixation member integrally formed with and downwardly extending from the plate in a roughly helical path.

34. The device of claim **33**, wherein said at least one anti-backout wedge and the plastic portion of the handgrip member are integrally molded of plastic.

35. The device of claim **32**, wherein the second depth is zero.

36. The device of claim **33**, wherein the carpet affixation member includes a plurality of tines angularly spaced apart from each other relative to the axis and extending downwardly from the lower face of the handgrip member on roughly helical paths.

37. The device of claim **32**, wherein a plurality of anti-backout wedges are disposed on the lower face to be angularly spaced apart from each other relative to the axis.

38. A device for retention of a mat or tray to a foot well of a vehicle, comprising:

a composite handgrip member formed around an axis and having a noncircular handgrip margin radially spaced from the axis, a lower face of the handgrip member substantially residing in a plane perpendicular to the axis and extending to the handgrip margin, the handgrip member including a metal plate and a plastic component overmolded around the metal plate to at least partially form the handgrip margin, a general lower surface of the metal plate partially constituting the lower face of the handgrip member, a lateral outer margin of the metal plate being radially inwardly spaced from the handgrip margin through at least some of the circumference of the handgrip margin;

at least one radially inwardly extending embayment formed in the plane adjacent the lateral outer margin of the metal plate and having an area, the metal plate not forming any portion of the lower face of the handgrip member within the area of the embayment, a lower surface of the plastic component forming the lower face of the handgrip member within the area of the embayment; and

a vehicle carpet affixation member of the device joined to and extending downwardly from the general lower surface of the handgrip member and adapted to be axially twisted into a carpeted surface of a vehicle foot well.

39. The device of claim **38**, wherein multiple embayments are formed adjacent the lateral outer margin of the metal plate, the embayments being angularly spaced from each other relative to the axis.

40. The device of claim **39**, wherein the embayments are distributed around the axis at equal angular intervals.

41. The device of claim **38**, wherein the lower surface of the metal plate extends across the embayment and departs from the plane within the area of the embayment.

42. The device of claim **41**, wherein within the area of the embayment, the plastic component is overmolded both on the lower surface of the metal plate and on the upper surface of the metal plate.

43. The device of claim **41**, wherein the metal plate is formed from a workpiece of substantially uniform thickness and is stamped to create a hump that defines the embayment.

44. The device of claim **38**, wherein the plastic component laterally surrounds the metal plate through **360** degrees relative to the axis.

45. The device of claim **38**, wherein the vehicle carpet affixation member includes at least one process integrally formed with the metal plate.

46. The device of claim **45**, wherein the process is a sharpened metal tine.

47. The device of claim **45**, wherein the process is stamped from a workpiece of substantially uniform thickness, the workpiece also creating the metal plate.

48. The device of claim **45**, wherein the vehicle carpet affixation member includes a plurality of angularly spaced apart processes downwardly extending from the lower face of the handgrip member.

49. The device of claim **38**, and further including a vehicle floor cover retention member joined to and upwardly extending from the upper face of the handgrip member.

50. The device of claim **49**, wherein the handgrip member includes a post upwardly extending along the axis of the device from the upper face of the handgrip member, the post having an enlargement, the vehicle floor cover retention member being annular and adapted to snap-fit over the enlargement on the post.

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