



(51) International Patent Classification:
B60N 2/56 (2006.01)

(21) International Application Number:
PCT/US2019/063919

(22) International Filing Date:
02 December 2019 (02.12.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/776,157 06 December 2018 (06.12.2018) US

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(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: SINGLE PIECE PLENUM

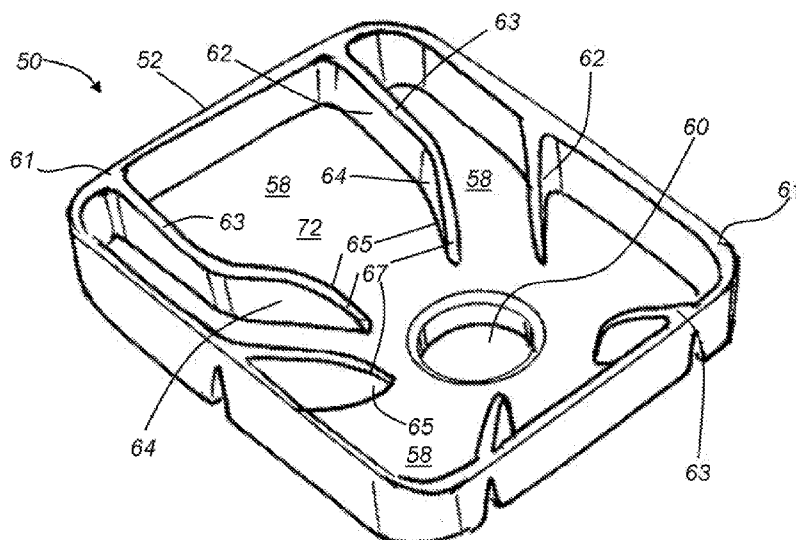


Fig. 3

(57) Abstract: An air distribution system that includes a plenum. The plenum has a bottom wall, a peripheral wall connected to the bottom wall and extending around a periphery of tire plenum to define one or more open spaces in the plenum, and one or more connection recesses in the bottom wall adapted to connect to a blower. A top surface of the peripheral wall is configured to contact a bottom surface of a cushion of a vehicle seat to enclose the one or more open spaces.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

SINGLE PIECE PLENUM

FIELD

[001] These teachings relate generally an air distribution system, and more particularly to a plenum that connects a blower to a cushion of a vehicle seat and assists in distributing fluid to areas of a vehicle seat such as a bolster and/or leg region.

PRIORITY

[002] This application claims the benefit of US 62/776,157 filed December 06, 2018, the entire contents of which is incorporated by reference herein for all purposes.

BACKGROUND

[003] For many years, industry has been concerned with designing improved conditioning or air distribution systems for articles of manufacture such as seats, steering wheels, automotive vehicles, or other transportation vehicles. Examples of such conditioning systems are disclosed in U.S. Patent Nos. 5,626,386; 6,291,803; and 7,607,739; and U.S. Patent Application Publication No. 2016/0114709 all of which are expressly incorporated herein by reference for all purposes.

[004] Many systems include a conditioner with a blower that is located on a bottom of a vehicle seat and air is moved from a remote location to an insert to distribute air. Some systems include an extended tail that extends from a location on top of the seat to a location behind or under the seat where the blower is located. These systems include a blower that is connected to the seat frame and the tail connects the insert to the blower. Some systems have attempted to connect a blower and insert to a back side of a seat and distribute fluid from the back side of the seat.

[005] What is needed is a conditioner or air distribution system that connects to a cushion of a vehicle seat, and the cushion and the single piece plenum form an open space therebetween. What is needed is a plenum with baffles that distribute, guide, or direct a fluid within the plenum. It would be desirable to have a plenum that includes walls that form a perimeter around the plenum. What is needed is a plenum that includes baffles that taper in a direction towards the blower.

SUMMARY

[006] These teachings provide a conditioner or air distribution system that connects to a cushion of a vehicle seat, and the cushion and the single piece plenum form an open space therebetween. These teachings provide a plenum with baffles that distribute, guide, or direct a fluid within the plenum. The plenum includes walls that form a perimeter around the plenum. The plenum that includes baffles that taper in a direction towards the blower. The plenum is a single layer or pan that connects to a bottom surface of a cushion and the bottom surface of the cushion forms a top layer or surface of the plenum.

[007] The present teachings include: a distribution system comprising: (a) one or more plenums each including: (i) a rear or bottom wall; (ii) one or more open spaces; (iii) a peripheral wall connected to the rear wall and extending around a periphery of the plenum to define the one or more open spaces; and (iv) one or more connection recesses in the rear wall adapted to connect to one or more blowers; wherein the peripheral wall is configured to contact a cushion of a vehicle seat to enclose the one or more open spaces so that the plenum directs air from the one or more blowers through the cushion.

[008] The present teachings provide an air distribution system that connects to a back side of a cushion and the cushion and the single piece plenum form an open space. The present teachings provide a plenum with baffles that distribute a fluid within the plenum. The present teachings provide a plenum that includes walls that form a perimeter around the plenum. The present teachings provide a plenum that includes baffles that taper as the baffles extend towards the blower.

BRIEF DESCRIPTION OF THE DRAWINGS

[009] Fig. 1 is a side view of an air distribution system connected to a cushion of a vehicle seat and supported by the seat suspension.

[0010] Fig. 2 is cross-sectional view of a cushion of a vehicle seat and a distribution system connected to the vehicle seat.

[0011] Fig. 3 a perspective view of a plenum.

[0012] Fig. 4 is a cross-sectional view of a blower connected to a plenum.

[0013] Fig. 5 is cross-sectional view of a cushion of a vehicle seat and a distribution system connected to the vehicle seat.

DETAILED DESCRIPTION

[0014] The present teachings are predicated upon providing an improved conditioning system suitable for integration into a vehicle. For example, the conditioning system may be integrated into or attached to carriers (e.g., members, structures, panels, floors, walls, cushions, seat suspensions, or the like) of various articles of manufacture such as buildings, furniture, transportation vehicles, (e.g., boats, trains, airplanes, motorcycles, all-terrain vehicles, busses, snowmobiles, or otherwise) or the like. Alternatively, the conditioning system may be integrated into or attached to various components of transportation vehicles such as seats, benches, panels, footwells, floor mats, or other components. Preferably, the conditioning system is integrated into a vehicle seat. More preferably, the conditioning system is integrated on a rear side (e.g., B-side of a vehicle seat).

[0015] The conditioning system is particularly suitable for integration into a seat of an automotive vehicle. More particularly, the conditioning system is suitable for integration with the seat portion with or without bolsters, back portion with or without bolsters, head rest portion, or a combination thereof. The conditioning system may be located between two layers of the seat. The conditioning system may be located under a fabric layer (e.g. cloth, leather, synthetic leather, or the like) and under a cushion or backrest (e.g. a foam support for the user). In one aspect, the present teachings employ a structure that makes it particularly suited for use beneath a perforated leather seat cover or perforated synthetic leather seat cover. The present conditioning system is particularly attractive for use in combination with a conditioned seat (e.g. a ventilated, actively cooled (such as by use of a thermoelectric device or module), or actively heated seat). The conditioning system may be integrated with the seat foam support by way of moulding, gluing, or other attachment methods. Preferably, the conditioning system includes a distribution system and the distribution system is connected to a seat suspension without use of any adhesives, gluing, or both. More preferably, the conditioning system is included underneath the cushion of the seat and the cushion assists in distributing air from the conditioning system to an occupant, predetermined locations, or both. The conditioning system may be located proximate to a seat but free of any connection features that extend from the connection system to the cushion. The conditioning system may include one or more blowers and one or more inserts (i.e., plenums); one or more heaters, one or more thermoelectric devices, or a combination thereof.

[0016] A conditioned seat may include one or more air movers (air movers and blowers are used interchangeably herein). The one or more air movers may move air through one or

more inserts that are located within or are located behind the backrest cushion, seat cushion, or both. The one or more plenums may distribute the air from the air mover. The one or more air movers may push air, pull air, both, or switch between pushing and pulling air. The one or more air movers may be an axial fan, a radial fan, or both. Preferably, the one or more air movers are a radial fan. The one or more air movers may include a Thermoelectric Device (TED). The TED may heat air as it enters the air mover or as it leaves the air mover. The TED may cool air as the air enters the air mover or as the air leaves the air mover. The one or more air movers may include a heating device, a cooling device, or both (i.e. a thermoelectric device (TED)). The TED may be used to heat air and/or cool air that is blown onto the user. The air mover and TED may be placed in the seat in many different configurations or in communication with a vehicle seat insert. For example, the TED and/or air mover may be used in any manner or any configuration with an insert described in any of U.S. Patent Nos. RE38,128; 4,923,248; 6,629,724; 6,676,207; 6,857,697; 6,869,139; 6,869,140; 6,976,734; 7,083,227; 7,213,876; 7,338,117; 7,356,912; 7,475,938; 7,506,938; and 7,587,901 or U.S. Patent Application Publication No. 2009-0218855 the teachings of which are expressly incorporated by reference herein for all purposes. The TED and heater may both produce heat at the same time; however, it is contemplated that the TED or heater may be used separately. The heater may be used to produce heat in an active heating system in place of a TED. The heater, preferably, may not be used when the TED is used to cool the user. The air mover and TED may be used in conjunction with an insert disclosed herein so that air may be directed evenly and consistently to the user. The air may be blown through the insert, a heater, perforations in the seat cover (e.g. trim layer), holes or perforations in a cushion, or a combination thereof. Some examples air permeable seats and heating device are U.S. Patent No. 6,064,037 and 6,869,140 both of which are incorporated by reference herein for all purposes. The TED may blow hot air while the heater contemporaneously heats the seat; thereby, providing both conduction heating and convection heating.

[0017] The conditioning system may be used in conjunction with an occupant sensor. An occupant sensor may be used on any seat in conjunction with a conditioning system. Preferably, an occupant sensor may only be used on passenger seats. The occupant sensor may be any type of occupant sensor that senses a passenger in a vehicle seat. The occupant sensor may be a membrane sensor, a capacitive sensor, a force sensor, a mass sensor, or a combination thereof. A microprocessor may monitor the occupant sensor for a passenger. For example, the microprocessor may be attached to an occupant sensor and when the occupant sensor measures that the seat is free of an occupant the conditioning system may remain off

even if all of the other conditions are met such as the conditioning system being turned on. The occupant sensor may be in contact with a plenum. Preferably, the occupant sensor is located on a top of a cushion and the plenum is located under the cushion. The conditioning system may include one or more distributions systems.

[0018] The one or more distribution systems function to guide a fluid towards or away from an occupant contact region. The one or more distribution systems preferably are located in or under a bun, a backrest, or both of a vehicle seat. The distribution system may include one or more blowers, one or more plenums, one or more, or both. The distribution system may distribute air or vacuum (pull air) to one or more locations of interest. The distribution system may evenly distribute air or vacuum. The location of the blower, the location of baffles, configuration of a plenum, or a combination thereof may move fluid so that the fluid evenly moves from or to the occupant. The distribution system may unevenly distribute air or vacuum. For example, the plenum, air mover, holes, baffles, or a combination thereof may be configured to direct more or less air to or from one or more locations of interest.

[0019] The plenum functions to fluidly connect an air mover to a cushion and assist in transporting fluid through the cushion. Preferably, the plenum functions to fluidly connect a blower to a rear side of a cushion. The plenum may be an insert, a bag, a portion of a bag, or a combination thereof. Preferably, the plenum is a single piece. The plenum may be rigid. The plenum may be flexible. The plenum may be a film. The plenum may be plastic. The plenum may be molded, blow molded, injection molded, extruded, or a combination thereof. The plenum may be free of a top, free of a top layer, free of a top wall, or a combination thereof. The plenum may be open. The plenum may include an open space that is formed between a peripheral wall and a rear wall, which may also be referred to herein as a bottom or back wall. The plenum may have an open space that is closed off by being sandwiched between a cushion and a seat suspension so that the cushion forms the top wall. The plenum may be one solid piece. The plenum may extend only under a body of a cushion. The plenum may extend under both the body and the bolsters of the cushion. The plenum may have a peripheral wall that varies in height depending on a section of the plenum that the peripheral wall extends under. For example, the peripheral wall may be taller under the bolster than the peripheral wall under the body of the cushion. The plenum may be free of a fixed connection to a cushion. The plenum may be free of any fasteners that extend between the plenum and the cushion. The plenum may be sandwiched between the cushion and the seat suspension. The plenum may create an open space. Preferably, the plenum creates an open space so that fluid is movable along a rear side of the cushion. The plenum may resist

crushing when an occupant sits in a vehicle seat. The plenum may have an open space that is self-supporting or that supports all or a portion of the cushion. The plenum may have an open space that is free of additional material to maintain the openness of the open space. The plenum may include one or more baffles, one or more walls, or both that assist in directing the flow of air between a cushion and an air mover. The plenum may be made of or include a polymer, plastic, metal, a thermoset, an elastomer, high density polyethylene (HDPE), acrylonitrile butadiene styrene (ABS), or, a combination thereof. The plenum may be vacuum formed, injection molded, made of a single piece, or a combination thereof. The plenum may include one or more sections or regions. The plenum may only include a body. The plenum may include a body and an extension.

[0020] The body of the plenum function to move air into a main portion or body of a cushion (e.g., a portion of the cushion that is located under or behind a back, butt, thighs, or a combination thereof of an occupant). The body of the plenum may be a main portion of a plenum. The body of the plenum may include or be connected to a blower. The body of the plenum may form the open space. The plenum may only include a body. The body may be a region bounded by the peripheral wall. The body may be located inside a peripheral wall and be subdivided by one or more baffles. The body may be a single continuous piece. The body may include one or more sections and the one or more sections may be movable relative to each other. For example, the body may include a main portion that is located below an occupant and two sections that are connected to the body and extend under thighs of the occupant where the two sections are movable relative to each other. The body may be a portion that is free of extension outside of a main portion of a cushion. For example, the body may be bounded on one or more sides by a bolster, head rest, bite line, or a combination thereof. The body may be connected to one or more extensions. The body may be free of contact with extensions. The body and the extensions may be separate pieces. Preferably, the body and the extensions are connected together.

[0021] The one or more extensions may function to provide fluid communication to a location of a cushion or seat located outside of a main portion of a body of the seat or cushion. A plurality of extensions may be connected to a body. The extensions may be fixed to the body and may be immobile relative to each other. The one or more extensions may be movable relative to the body. The body, plenum, distribution system, or a combination thereof may be free of extensions. The one or more extensions may extend under or into a bolster, under a thigh, between a thigh and a knee, to a location under an occupant's arm, a location behind an occupant's neck, a location behind an occupant's head, a region of the

cushion proximate to a leg contact region of an occupant, or a combination thereof. The one or more extensions may be located within the peripheral wall. The one or more extensions may be located within a separate peripheral wall that is connected to an extends from the peripheral wall around the body of the plenum. The one or more extensions may be in fluid communication with the body of the plenum. The one or more extensions may have an open space that is fluidly connected to the open space of the body. The one or more extensions may have an open space that is fluidly disconnected from the open space of the body. The one or more extensions and the body may be one unitary piece, may include a common rear wall, or both. There may be two or more extensions, three or more extensions, or even four or more extensions. The extensions may extend from opposing sides of the body. The extensions may include one or more connection recesses. The extensions may be free of one or more connection recesses. The one or more extensions may be movable relative to the body. The connection recesses may be located in the rear wall of the body and may supply fluid to the extensions.

[0022] The air may enter or exit the plenum through the rear wall. The rear wall functions to connect the blower to the conditioning system, the distribution system, the plenum, or a combination thereof. The rear wall may form one side of an open space. The rear wall may extend parallel to a rear of a cushion. The rear wall may be planar. The rear wall may be concave. For example, the rear wall may be dish shaped where a portion of the wall extends away from the cushion. A portion of the rear wall may be concave so that a blower may be located within the concave portion. The concave portion of the rear wall may allow a portion of the blower to be located within a plane that is closer to the cushion than the rear wall is located to the cushion. The rear wall may be free of any holes or recesses. Preferably, the rear wall only includes connection recesses that connect to or receive one or more blowers. The blower housing may include one or more housing connectors that extend into contact with the rear wall, a concave wall of the rear wall, or both. The blower housing may house an impeller. The blower housing may connect to bottom wall, a concave wall, or both. The rear wall may extend behind a body of a cushion, a bolster of a cushion, a head rest, or a combination thereof. The rear wall may be one continuous piece. The rear wall may be segregated into one or more sections by one or more baffles. For example, the rear wall may be segregated into a body and one or more extensions, one or more walls, or both. The rear wall may be divided to include one or more open spaces. The rear wall may be fluid impermeable. The rear wall may support one or more peripheral walls, one or more baffles, include a concave wall, or a combination thereof.

[0023] The concave wall may function to create a void, a recess, a space, or a combination thereof that receives all or a portion of the blower so that the blower and plenum are low profile, a portion of the blower height is located within the plenum, or both. The concave wall may form a right angle with a plane of the bottom layer. The concave wall may be located in a plane between the cushion and the bottom wall of the plenum. The concave wall may be located in a plane so that a portion of the blower is located closer to the cushion than the rear wall is located to the cushion. The concave wall may extend at an angle greater than 90 degrees with the bottom layer. The concave wall may extend towards the connection recess. The concave wall may be arcuate. The concave wall may be a series of interconnected angles. The concave wall may include one or more curves, bends, or both. The concave wall may form a recess within the bottom layer that has a shape that is a full or half square, rectangle, circle, diamond, pentagon, hexagon, octagon, or a combination thereof. The concave wall may be located between the top layer and the bottom layer. One or more blower connection features may be located within or proximate to the concave wall.

[0024] The peripheral wall may function to create an open space. The peripheral wall may function to support the rear wall, be connected to the rear wall, or both. The peripheral wall may extend around a periphery of the rear wall. The peripheral wall may support the rear wall a distance from a rear of a cushion. The peripheral wall may create a seal between the rear wall and the cushion. At least a portion of the peripheral wall (i.e., a top surface) may be in contact with a cushion to enclose an open space between the plenum and the cushion. At least a portion of the peripheral wall (i.e., a top surface) may be free of contact with a cushion. The peripheral wall may locate the rear wall a distance from the cushion. The peripheral wall may contact the cushion. The peripheral wall may be one continuous wall. The peripheral wall be two or more walls that are located proximate to each other. The peripheral wall may extend around an exterior region of the rear wall. The peripheral wall may extend around a terminal edge of the rear wall. For example, the peripheral edge may define a volume of the open space. The peripheral edge may extend to the bolsters, a head rest, a body, or a combination thereof of a cushion. The peripheral edge may have a height. The height of the peripheral edge may be sufficiently high so that when an occupant sits within the cushion and the cushion is compressed the peripheral edge assists in maintaining an open space. The height of the peripheral wall may be substantially uniform along a length of the peripheral wall. A height of the peripheral wall may vary along a length of the peripheral wall. The height of the peripheral wall may be located at a top edge of the peripheral wall. The top edge of the peripheral wall may contact the cushion. The peripheral

wall may have a height of about 1 cm or more, about 2 cm or more, about 3 cm or more, about 4 cm or more, about 5 cm or more, or about 6 cm or more. The peripheral wall may have a height of about 12 cm or less, about 10 cm or less, or about 8 cm or less. The peripheral wall may mirror the shape of the rear wall. Thus, if the rear wall is square the peripheral wall may have a square shape. The shape of the peripheral wall may be geometric, symmetrical, asymmetrical, square, rectangular, "H" shaped, "U" shaped, a trapezoid, triangular, "I" shaped, "T" shaped, or a combination thereof. The peripheral wall preferably is a single wall. The peripheral wall may be located proximate to or connected to one or more baffles.

[0025] The one or more baffles may function to distribute air within the open space, distribute air to the cushion or blower, provide uniform distribution of air, or a combination thereof. The one or more baffles may create a path between the one or more cushion holes and the blower so that fluid passes through each of the cushion holes and not only the holes closest to the blower. The plenum may include one or more baffles. The plenum may include a plurality of baffles. The one or more baffles may be a portion of the rear wall, the peripheral wall, or both that extend into the open space to create a fluid barrier. The one or more baffles may be added into open space before the plenum is placed proximate to the cushion. The one or more baffles (i.e., a top surface thereof) may contact the cushion and divide the plenum into one or more open spaces, create one or more open spaces, or both. The one or more baffles (i.e., a top surface thereof) may be free of contact or spaced apart from a bottom surface of the cushion. The one or more baffles may be curved, substantially straight, teardrop shaped, have a curved portion, have a straight portion, or a combination thereof. The one or more baffles may radiate outwards away from the blower. The one or more baffles may be located proximate to the blower and assist in distributing air between the blower and the one or more ventilation holes. For example, the baffles may assist the blower in moving an equal amount of air through a ventilation hole that is located within 10 cm of the blower as the blower moves through a ventilation hole that is between 25 cm and 40 cm away. The one or more baffles may be shaped in a way to assist the flow of air from the blower to the one or more cushion holes in an even fluid speed. The one or more baffles may be connected to the peripheral wall. The one or more baffles may be free of directly contacting or connecting with the peripheral wall. The one or more baffles may extend inward from the peripheral wall. The one or more baffles may be discrete from the peripheral wall. The one or more baffles may be formed from part of the rear wall. The one or more baffles may be a portion of the rear wall that extends inward. The rear wall at the baffles may

include a recess. The baffles may direct a fluid between the body of the plenum and the extension of the plenum. The baffles may contact a rear side of the cushion and create one or more channels of open space that fluid may move through. The baffles may have a height that is substantially the same as the height of the peripheral wall. The baffles may have a height that reduces along a length of the baffle. The height of the baffles may reduce as the baffles extend toward the peripheral wall, toward the blower, or both. The height of the baffles may be sufficiently tall to maintain an open space when an occupant is located within the cushion. The baffles may be arranged in a spiral shape or pattern when viewed from above. The baffles may include tapered portions that curve or point towards the connection recess. The height may taper as the baffles extend towards the air mover.

[0026] The taper may function to direct air between the air mover and the cushion holes. The taper may assist in equally distributing air within an open space of the plenum. The baffles may taper towards the one or more connection recesses. The taper may extend into the one or more connection recesses. The taper may be a reduction in height of the baffle. The taper may reduce a height of the baffle until the baffle terminates, terminates into the rear wall, or both. The one or more baffles may turn at an angle as the one or more baffles taper. The taper may be on a curved segment, a straight segment, a curve, or a combination thereof. The taper may reduce a maximum height of the baffles by about 0.25 or more, about 0.5 or more, or about 0.75 or more. The taper may reduce a maximum height of the baffles so that the baffles are eliminated. The taper may extend towards a connection recess and terminate proximate to the connection recess. The taper may extend all the way to the connection recess.

[0027] The connection recess may be a hole within the plenum that is in communication with a blower. The connection recess and the rear wall may be coplanar. The connection recess may receive all or a portion of a blower. The connection recess may receive air from a blower, air from the cushion, or both. The connection recess may assist in creating positive pressure within the open space of the plenum. The connection recess may assist in creating negative pressure within the open space of the plenum. The connection recess may include a flange or a blower connection feature that a blower connects to so that the blower and plenum are in fluid communication.

[0028] The blower connection feature may function to create an air seal between the blower and rear wall. The blower connection feature may be shaped like a funnel, cylinder, or combination thereof. The blower connection feature may include a flange, be a flange, or both that a blower connects. The blower connection feature include a flange, a concave wall,

or both. Preferably, the blower connection feature is one or more fasteners that connect a blower to the plenum. The blower connection feature may be a threaded member that extends through a portion of a housing of a blower and into the plenum. The blower connection feature may connect the blower to a rear wall of the plenum so that the blower is aligned with the connection recess. The blower connection feature may suspend the blower from the plenum. The blower connection feature may function to direct air to the open space and further to the cushion holes.

[0029] The open space may function to create an open area between the cushion and the rear wall. The open space may prevent the rear wall and the cushion from being moved into contact. Preferably, the open space may be maintained by the peripheral wall, the baffles, or both contacting the cushion. The open space may be free of additional material. The open space may be void or devoid of any material. The open space may resist compression by one or more baffles or walls extending therethrough. The open may be an absence of material that is located between the cushion and the rear wall. The open space may include one or more features such as a baffle or a connection layer that extend therethrough. The open space may be in fluid communication with the blower and air may move from the blower to the open space or from the open space to the blower.

[0030] The blower functions to push air, pull air, or both. The blower may be movable with the cushion, the plenum, or both as an occupant sits on the cushion or leaves the cushion. The blower may be an axial fan. Preferably, the blower may be a radial fan. The blower may include one or more impellers that move air through the blower, the blower housing, the plenum, or a combination thereof. The blower housing may be connected to the rear wall of the plenum. The blower housing may include one or more housing connectors that are in contact with the concave wall, the bottom wall, or both of the plenum. The blower includes an inlet and an outlet. The inlet may be on the bottom side or the top side. Preferably, the inlet is in the bottom side of the blower. The inlet or the outlet is connected to the plenum via the attachment ring, a clip, a blower connection feature, or a combination thereof so that air may be pushed or pulled into the plenum. The blower may be connected to a rear wall of the plenum by one or more flanges. The inlet and outlet may allow air to move into and out of the housing.

[0031] The housing functions to connect the blower within a system, direct air to a predetermined location, pressurize air, or a combination thereof. The housing may connect the blower to a seat, a cushion, a frame, a blower connection feature, a plenum, or a combination thereof. The housing may be rigid. The housing may be flexible. The housing

may include rigid regions and flexible regions. The housing may include one or more integral parts (e.g., a part that is formed with the housing) that connect the housing, the blower, or both to a cushion, a plenum, or both. The housing may include parts that are added to the housing after the housing is formed and the parts may assist in connecting the housing, the blower, or both to the cushion, a plenum, or both. The housing may include one or more parts (e.g., clips, eyelets, or bands). The housing may be located within one or more flanges of a plenum.

[0032] The one or more flanges may extend outward from the plenum so that the blower may connect to the plenum. The one or more flanges may concave and may extend inward. The one or more flanges may receive all or a portion of a blower. The one or more flanges may create a recess that the blower extends into so that a profile (e.g., thickness) of the plenum and the blower is reduced relative to a maximum thickness of the plenum and a maximum thickness of the blower. The flange may curve inward toward the connection recess. The flange may be a wall that tapers inward towards a cushion, into an open space, or both. The flange may be annular. The flange may be a single flange. The flange may be a plurality of parts that extend from the plenum. The flange may contact the housing, the blower, a housing connector, or both.

[0033] The one or more housing connectors function to prevent movement of the blower relative to the plenum. The one or more housing connectors may align the blower with the connection recess. The one or more housing connectors may space the blower apart from the plenum. The one or more housing connectors may be an extension of the housing. The one or more housing connectors may be located between the plenum and the housing. The one or more housing connectors contact a flange and prevent lateral movement of the blower relative to the rear wall, the flange, or both. The one or more housing connectors may maintain the blower and the plenum relative to the cushion.

[0034] The one or more cushions may function to support an occupant, a conditioning system, or both. The one or more cushions may extend over a bottom or a back of a frame to form a portion of a vehicle seat. The one or more cushions may be made of an open cell foam, a closed cell foam, or both. The one or more cushions may be located between a trim layer and a frame. The one or more cushions may be located between an occupant and a conditioning system, a plenum, a blower, or a combination thereof. The cushion may include one or more supports, one or more seat suspensions, or both that assist in connecting a plenum, a blower, or both to the cushion. One or more cushions of the seat may include ventilation, active cooling, active heating, or a combination thereof. The seat may include

one or more air movers (i.e. blower) in fluid connection to the one or cushions so that air may be blown onto the user or so that air may be pulled away from the user. The cushion may be connected to or part of a conditioning system, support, a seat suspension, or a combination thereof. The cushion may be a back cushion, a seat cushion, or both. The cushion may be made of foam. The cushion may be located above suspension, a support, or both. The cushion may have a forward surface that an occupant contacts and a rear side or “b” side. The cushion may have cushion holes that extend from a forward side to a rear side of a cushion.

[0035] The cushion holes may allow fluid to transport between a forward surface and a rear side of the cushion. The cushion holes may have a cross-section that increases or decreases between the forward side and the rear side. The cushion holes may have a constant cross-section from the forward side and the rear side. The cushion holes may align with an open space of the plenum. The cushion holes may be located in a body of the cushion, a bolster of a cushion, a head rest, or a combination thereof.

[0036] The body of the cushion may function to support an occupant. The body of the cushion may be a central portion of the cushion. A body of a seat may be located below an occupant's butt, thighs, or both. A body or a backrest may be located behind a back of an occupant. The body may include a bolster on one or more sides.

[0037] The bolsters of the cushion may be an area of a cushion located outside of the body. The bolsters may be a periphery of the cushion. The bolsters may contact an outside of a leg, an arm, or both. The bolsters may extend out of a plane from the body of the cushion so that the bolsters assist in retaining an occupant within a vehicle seat.

[0038] The rear of the cushion may be in communication with the distribution system, the plenum, or both. The rear may be covered by the plenum. The rear of the cushion and the plenum may form an open space. The rear of the cushion may include one or more cushion holes. The rear of the cushion may be supported by the plenum, the seat suspension, or both.

[0039] The seat suspension may movably support the plenum and the cushion. The seat suspension may be spaced apart from the cushion by the plenum. The seat suspension be connected to a support, the vehicle, or both. The seat suspension may be wires, springs, flexible materials, or a combination thereof that support the cushion relative to the seat support.

[0040] The seat support connects the cushion, conditioning system, or both to a vehicle. The seat support may be movable within a seat. The seat support may be a primary part of a vehicle seat that connects the cushion to the vehicle.

[0041] Fig. 1 illustrates a side view of a portion of a vehicle seat 1 that includes an air distribution system 48 and a cushion 20. The cushion 20 includes a support portion 22 or a-side, a rear side 24 or b-side, and one or more cushion holes 26 that extend through a thickness of the cushion 20. The air distribution system 48 includes a plenum 50 that is attached to, in contact with, or rests upon the bottom or b-side 24 of the cushion, to a seat suspension 28 of the seat 1, or a seat support 19 that is connected to a vehicle. The plenum 50 comprises one or more ventilation holes 54 that are at least partially aligned with or in fluid communication with the one or more cushion holes 26. The air distribution system 48 includes a blower 80 is connected to the plenum 50. During use, the blower 80 is configured to move air between an occupant in the seat 1 or cushion 20 and the blower 80 via the plenum 50, the one or more ventilation holes 54, and the one or more cushion holes 26.

[0042] Fig. 2 is a cross-sectional view of a cushion 20 and plenum 50. The cushion 20 includes a support portion 22 and bolsters 21. The plenum 50 includes a body 66 and extensions 68. The plenum 50 includes a peripheral wall 52 that extends at least partially around a perimeter of the body 66 and extends in a direction away from a bottom wall 72 of the plenum 50 towards a bottom surface 17 of the cushion 20. The extensions 68 extend from each side or edge of the body 66. The plenum 50 includes one or more baffles 62 located within the peripheral wall 52. Each of the baffles 62 have a top surface 63, a portion of which is in contact with a bottom surface 17 of the cushion 20 to create an open space 58 between the bottom wall 72 of the plenum 50 and the bottom surface 17 the cushion 20 so that fluid can move between the plenum 50 and cushion 20. The baffles 62 have a tapered portion 65, illustrated in Fig. 3, that are not in contact with or free of contact with the bottom surface 17 of the cushion 20.

[0043] Fig. 3 is a perspective view of a plenum 50. The plenum 50 includes a perimeter or peripheral wall 52 that extends around a perimeter of the bottom wall 72. A plurality of baffles 62 or fins extend away from the bottom wall 72 and extend inwardly from the peripheral wall 52 towards a connection recess 60 for connecting to a blower or air mover to the plenum 50. The baffles 62 include a taper 65 at one end that is not connected to the peripheral wall 52 that tapers in a direction of a connection recess 60 for receiving a blower (not shown). The baffles 62 have a curved or bent portion 64 that curves or bends towards the connection recess 60 to assist with distributing air flow to or from the air mover connected to the recess 60. The distal end of the taper 65 of the baffles 62 is spaced apart from the connection recess 60 meaning that there is a gap between the connection recess 60 and where the distal end of the taper 65 terminates. The baffles 62 have a top surface 63 in a

region that is not tapered or does not include the taper 65. The peripheral wall 52 has a top surface 61. The top surfaces 61, 63 of the peripheral wall 52 and baffles 62 are configured to contact or connect to a bottom surface 17 of the cushion 22 thereby enclosing the plenum 50 and the one or more open spaces 58. The top surface 67 of the baffles 62 in a region of the taper 65 is spaced apart from or free of contacting the bottom surface 17 of the cushion 22. Each of the open spaces 58 are defined between the bottom surface 17 of the cushion, the bottom wall 58 of the plenum the peripheral wall 52 and one or more baffles 62.

[0044] Fig. 4 illustrates a blower 80 connected to a wall of a plenum 50. The plenum 50 includes a flange 55 that receives or connects with the blower 80 so that a portion or all of blower 80 is recessed with respect to the lower wall 72 and is thus low-profile or inset into the plenum 50. The blower 80 includes a blower housing 84 connected to the plenum 50 by blower connection features 82. The blower housing 84 also includes a housing connector 86 that contacts the plenum 50 and as shown the flange 55.

[0045] Fig. 5 is a cross-sectional view of a cushion 20 of a vehicle seat and plenum 50. The cushion 20 includes a body portion 20 and bolsters 21. The plenum 50 includes a body 66 that creates an open space 58. As shown, the plenum 50 includes baffles 62 that have a top surface 63 that are in contact with the cushion 20 and create an open space 58 so that fluid can move between the plenum 50 and cushion 20.

[0046] The explanations and illustrations presented herein are intended to acquaint others skilled in the art with the invention, its principles, and its practical application. Those skilled in the art may adapt and apply the invention in its numerous forms, as may be best suited to the requirements of a particular use. Accordingly, the specific embodiments of the present invention as set forth are not intended as being exhaustive or limiting of the teachings. The scope of the teachings should, therefore, be determined not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. The disclosures of all articles and references, including patent applications and publications, are incorporated by reference for all purposes. Other combinations are also possible as will be gleaned from the following claims, which are also hereby incorporated by reference into this written description.

[0047] The use of the terms "comprising" or "including" to describe combinations of elements, ingredients, components or steps herein also contemplates embodiments that consist essentially of or consist of the elements, ingredients, components or steps.

[0048] Plural elements, ingredients, components or steps can be provided by a single integrated element, ingredient, component or step. Alternatively, a single integrated element, ingredient, component or step might be divided into separate plural elements, ingredients, components or steps. The disclosure of "a" or "one" to describe an element, ingredient, component or step is not intended to foreclose additional elements, ingredients, components or steps.

CLAIMS

- 1) An air distribution system comprising:
a plenum comprising:
 - i. a bottom wall;
 - ii. a peripheral wall connected to the bottom wall and extending around a periphery of the plenum to define one or more open spaces in the plenum;
and
 - iii. one or more connection recesses in the bottom wall adapted to connect to a blower;wherein a top surface of the peripheral wall is configured to contact a bottom surface of a cushion of a vehicle seat to enclose the one or more open spaces.
- 2) The air distribution system of claim 1, wherein the plenum includes one or more baffles.
- 3) The air distribution system of claim 2, wherein the one or more baffles include a top surface that contacts the bottom surface of the cushion.
- 4) The air distribution system of claims 2 or 3, wherein at least one of the one or more baffles include a taper that reduces a height of the one or more baffles relative to the bottom wall.
- 5) The air distribution system of claim 4, wherein the taper extends in a direction towards the one or more connection recesses.
- 6) The air distribution system of any of claims 4-5, wherein the taper reduces in height until the at least one of the one or more baffles terminates.
- 7) The air distribution system of any of claims 2-6, wherein at least one of the one or more baffles include a curved or bent portion that curves or bends in a direction of the one or more connection recesses.

8) The air distribution system of any of the preceding claims, wherein the plenum includes a body and one or more extensions.

9) The air distribution system of claim 8, wherein the body and the one or more extensions are connected together.

10) The air distribution system of claim 8, wherein the body and the one or more extensions are separate pieces.

11) The air distribution system of any of claims 8 through 10, wherein the one or more extensions extend into a bolster of the cushion, in a region of the cushion proximate to a leg contact region of an occupant, or both.

12) The air distribution system of claim 8 or claim 11, wherein the one or more extensions are movable relative to the body.

13) The air distribution system of any of the preceding claims, wherein the one or more connection recesses and the rear wall are coplanar.

14) The air distribution system of any of the preceding claims, wherein the bottom wall includes a concave wall including the connection recess so that at least a portion of a blower is located in a plane that is closer to the cushion than the bottom wall is located to the cushion when the plenum is connected to the cushion.

15) The air distribution system of claim 14, wherein the blower includes a blower housing that is connected to the bottom wall of the plenum.

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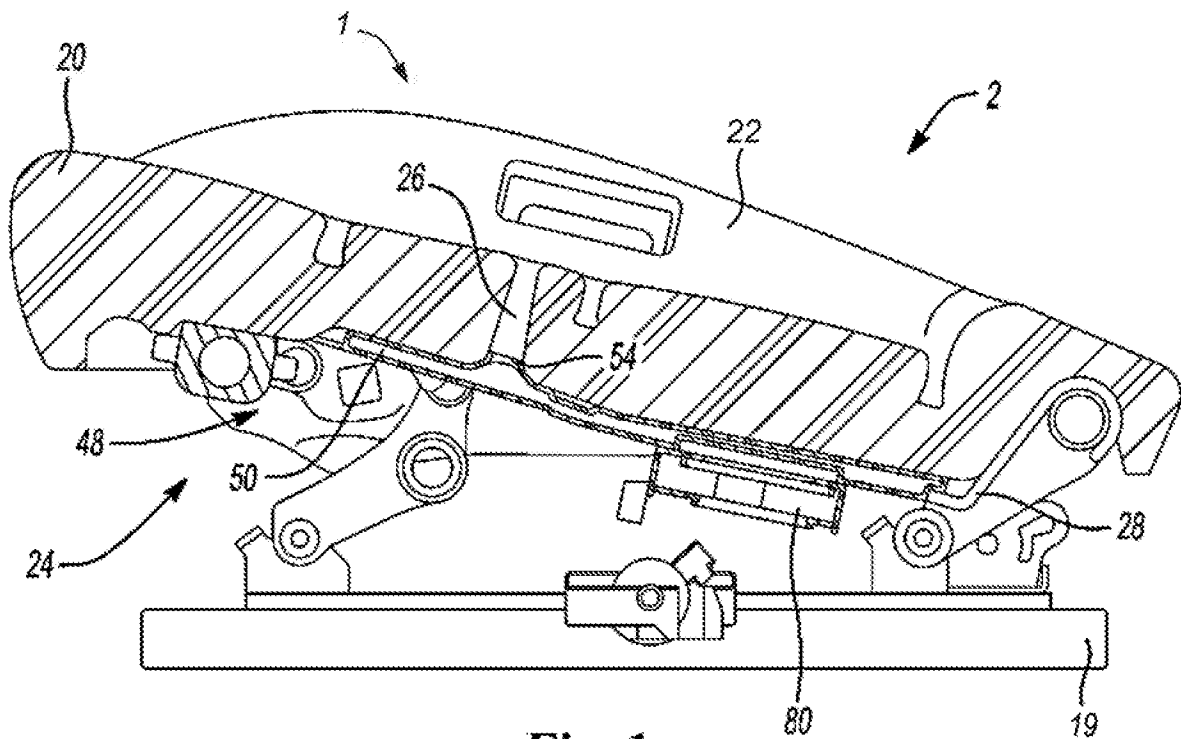


Fig. 1

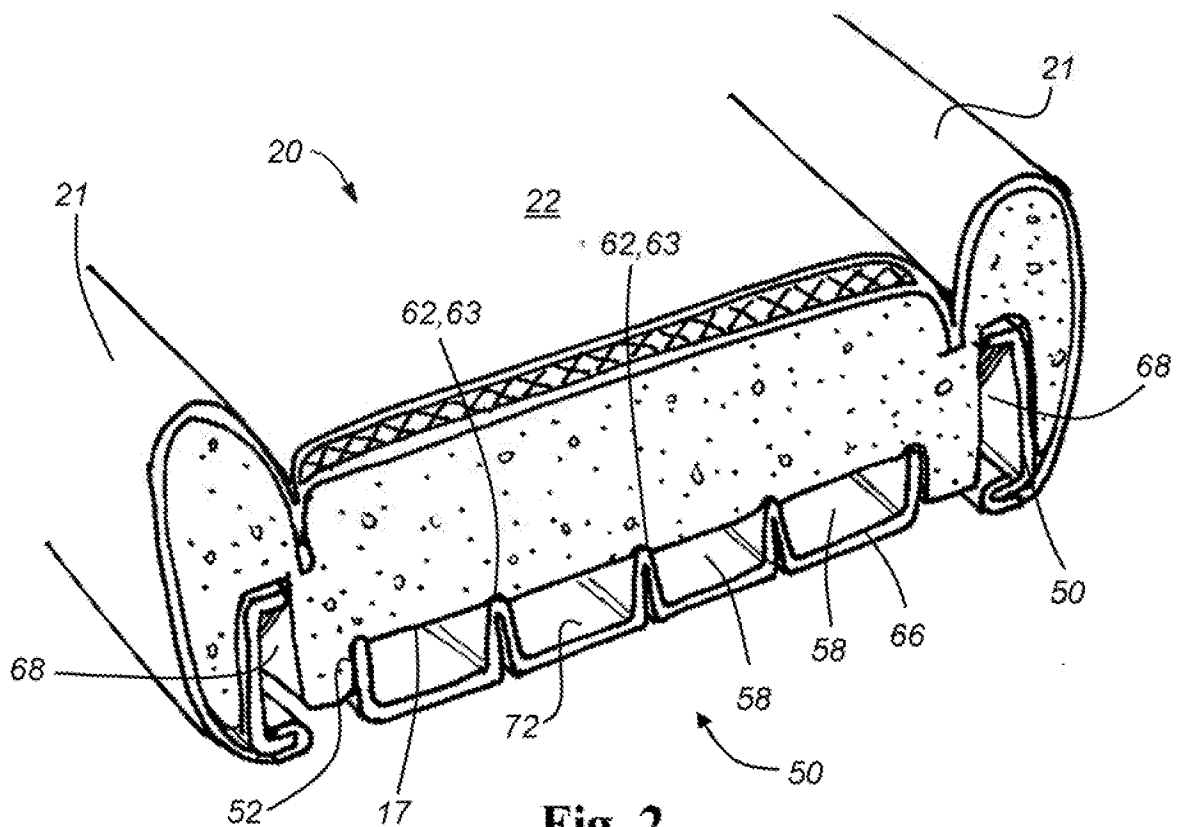


Fig. 2

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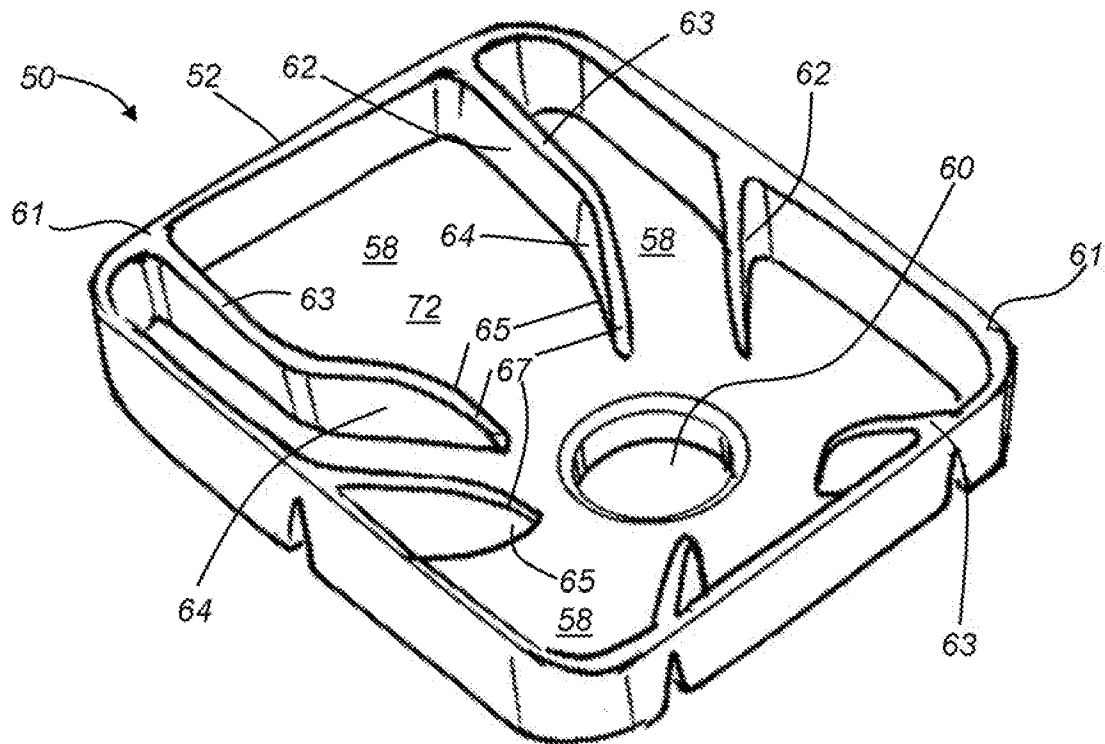


Fig. 3

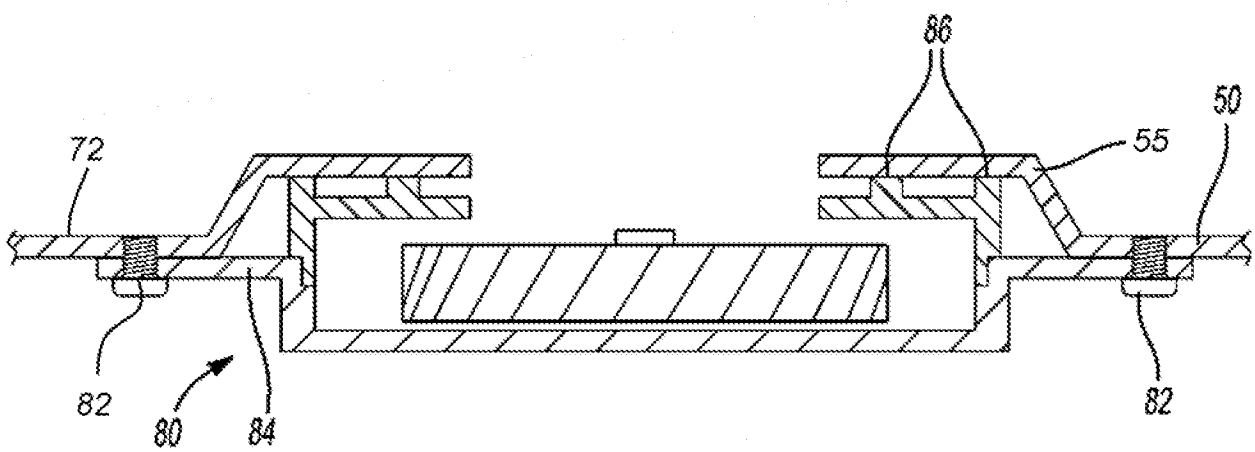


Fig. 4

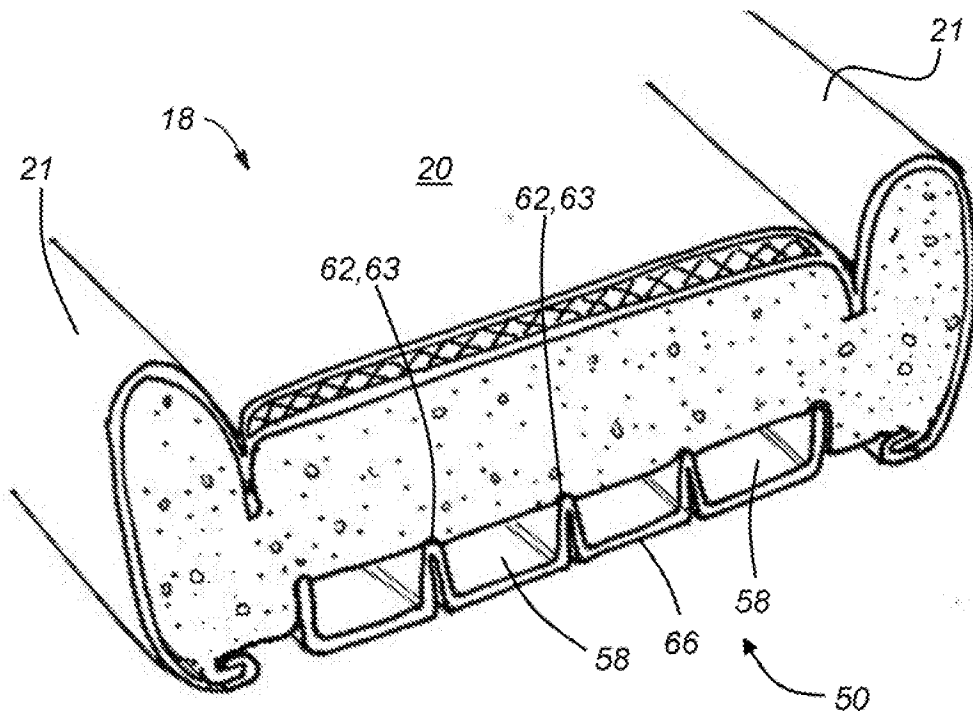


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2019/063919

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B60N2/56
 ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	figures 2,4	2,3, 7-12,14, 15
A	-----	4-6
Y	US 2011/109128 A1 (AXAKOV DMITRI [CA] ET AL) 12 May 2011 (2011-05-12)	2,3,7
A	figures 1,2,8,18,22	1
Y	----- US 2005/264086 A1 (LOFY JOHN [US] ET AL) 1 December 2005 (2005-12-01)	8-11
A	figures 1,3-5	1
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

7 February 2020

Date of mailing of the international search report

21/02/2020

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2019/063919

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