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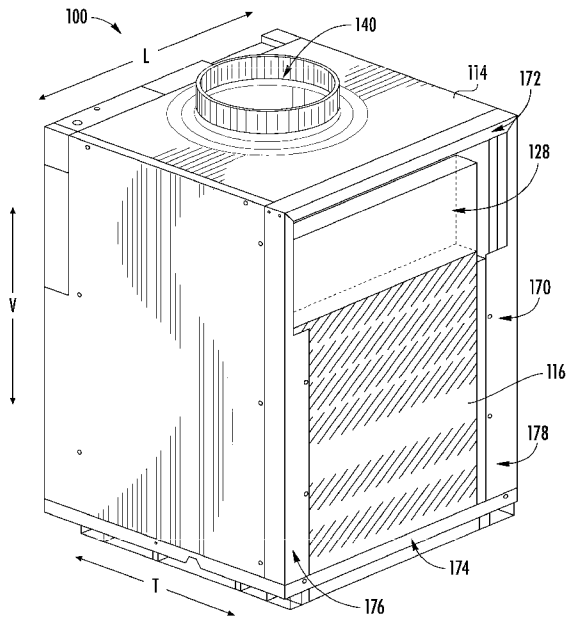

Fig 3

(57) Abstract: An air conditioning appliance may have a telescoping plenum attached to a housing of the air conditioning appliance. The telescoping plenum may be receivable within a wall channel defined by a structure wall along an axial direction. The telescoping plenum may include an interior portion and an exterior portion. The interior portion may include a duct wall and an outer flange extending radially outward from the duct wall. The interior portion may sealingly engage the housing along the axial direction in a plane perpendicular to the axial direction.

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AIR CONDITIONING APPLIANCE AND TELESCOPING AIR PLENUM WITH FACE SEAL

FIELD OF THE INVENTION

The present subject matter relates generally to air conditioning appliances, and more particularly to air plenums for air conditioning appliances.

BACKGROUND OF THE INVENTION

Air conditioner or air conditioning appliance units are conventionally utilized to adjust the temperature within structures such as dwellings and office buildings. In particular, one-unit type room air conditioner units, such as single-package vertical units (SPVU), or package terminal air conditioners (PTAC) may be utilized to adjust the temperature in, for example, a single room or group of rooms of a structure. A typical one-unit type air conditioner or air conditioning appliance includes an indoor portion and an outdoor portion. The indoor portion generally communicates (e.g., exchanges air) with the area within a building, and the outdoor portion generally communicates (e.g., exchanges air) with the area outside a building. Accordingly, the air conditioner unit generally extends through, for example, an outer wall of the structure. Generally, a fan may be operable to rotate to motivate air through the indoor portion. Another fan may be operable to rotate to motivate air through the outdoor portion. A sealed cooling system including a compressor is generally housed within the air conditioner unit to treat (e.g., cool or heat) air as it is circulated through, for example, the indoor portion of the air conditioner unit. One or more control boards are typically provided to direct the operation of various elements of the particular air conditioner unit.

Some conventional air conditioning appliances include a plenum for directing air to or from an outdoor portion of the air conditioning appliance. When installed, the plenum may be positioned through a wall of the building or structure. The wall may be an outer wall such that the plenum extends from an interior portion of the building to an exterior portion of the building. Thus, a portion of the plenum will often extend to and be visible from an area outside of the building. However, it is generally preferable (e.g., for aesthetics, support, sizing, performance, etc.) to minimize the amount of plenum exposed to the exterior environment.

The lack of standard wall sizes (e.g., thickness) makes sizing plenums difficult. Although multi-piece plenums sizes have been attempted to accommodate a range of walls, these structures present several drawbacks. For example, such plenums typically sealingly engage a housing of the air conditioner along a radial direction, e.g., with a wipe seal which is deformed as the plenum and the housing are installed together. Thus, such sealing arrangements may result in increased difficulty of installation due to the need to ensure proper alignment of the housing and the plenum and the resistance of the seal to deformation. Additionally, the seal may be damaged or worn out during installation.

As a result, further improvements to air conditioners may be advantageous. In particular, it would be useful to provide a multi-piece plenum with features for improved ease of installation and reliable sealing between the plenum and the remainder of the air conditioner.

BRIEF DESCRIPTION OF THE INVENTION

Aspects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the invention.

In one exemplary aspect of the present disclosure, a single-package air conditioner unit is provided. The single-package air conditioner unit may include a housing, an outdoor heat exchanger assembly, an indoor heat exchanger assembly, a compressor, and a telescoping plenum. The housing may define an outdoor portion and an indoor portion. The outdoor portion of the housing defines a first sealing surface in a plane defined by the vertical direction and the lateral direction. The outdoor heat exchanger assembly may be disposed in the outdoor portion and include an outdoor heat exchanger and an outdoor fan. The indoor heat exchanger assembly may be disposed in the indoor portion and comprising an indoor heat exchanger and an indoor fan. The compressor may be in fluid communication with the outdoor heat exchanger and the indoor heat exchanger to circulate a refrigerant between the outdoor heat exchanger and the indoor heat exchanger. A telescoping plenum may be attached to the housing and receivable within a wall channel defined by a structure wall along an axial direction. The telescoping plenum may include an interior portion and an exterior portion. The interior portion may include a duct wall and an outer

flange extending radially outward from the duct wall to contact an internal surface of the structure wall. The exterior portion may include a duct wall having a flange-less outer surface to selectively pass through the wall channel along the axial direction. The exterior portion may be in slidable engagement with the interior portion to move along the axial direction. The telescoping plenum may also include a second sealing surface defined on the interior portion. The second sealing surface is parallel to the first sealing surface and configured to sealingly engage the first sealing surface.

In another exemplary aspect of the present disclosure, a telescoping plenum for an air conditioning appliance is provided. The telescoping plenum is receivable within a wall channel defined by a structure wall along an axial direction. The telescoping plenum may include an interior portion and an exterior portion. The interior portion may include a duct wall and an outer flange extending radially outward from the duct wall to contact an internal surface of a structure wall. The exterior portion may include a duct wall having a flange-less outer surface to selectively pass through the wall channel along the axial direction. The exterior portion may be in slidable engagement with the interior portion to move along the axial direction. The telescoping plenum may also include a sealing surface defined on the interior portion in a plane perpendicular to the axial direction.

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures.

FIG. 1 provides a front perspective view of an air conditioning appliance according to one or more exemplary embodiments of the present disclosure.

FIG. 2 provides a partially-transparent elevation view of the exemplary air conditioner unit of FIG. 1.

FIG. 3 provides a rear perspective view of a housing of the air conditioning

appliance of FIG. 1.

FIG. 4 provides a perspective view of a plenum of the air conditioning appliance of FIG. 1.

FIG. 5 provides a section view of an exemplary seal as may be used with the air conditioning appliance of FIG. 1 according to one or more exemplary embodiments of the present disclosure.

FIG. 6 provides a section view of another exemplary seal as may be used with the air conditioning appliance of FIG. 1 according to one or more additional exemplary embodiments of the present disclosure.

DETAILED DESCRIPTION

Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

As used herein, the terms "includes" and "including" are intended to be inclusive in a manner similar to the term "comprising." Similarly, the term "or" is generally intended to be inclusive (i.e., "A or B" is intended to mean "A or B or both"). The terms "upstream" and "downstream" refer to the relative flow direction with respect to fluid flow in a fluid pathway. For example, "upstream" refers to the flow direction from which the fluid flows, and "downstream" refers to the flow direction to which the fluid flows.

Turning now to the figures, FIGS. 1 and 2 illustrate an exemplary air conditioner appliance (e.g., air conditioner 100). As shown, air conditioner 100 may be provided as a one-unit type air conditioner 100, such as a single-package vertical unit. Air conditioner 100 includes a package housing 114 supporting an indoor portion 112 and an outdoor portion 110.

Generally, air conditioner 100 defines a vertical direction V, lateral direction L, and transverse direction T. Each direction V, L, T is perpendicular to each

other, such that an orthogonal coordinate system is generally defined.

In some embodiments, housing 114 contains various other components of the air conditioner 100. Housing 114 may include, for example, a rear opening 116 (e.g., with or without a grill or grate thereacross) and a front opening 118 (e.g., with or without a grill or grate thereacross) may be spaced apart from each other along the transverse direction T. The rear opening 116 may be part of the outdoor portion 110, while the front opening 118 is part of the indoor portion 112. Components of the outdoor portion 110, such as an outdoor heat exchanger 120, outdoor fan 124, and compressor 126 may be enclosed within housing 114 between front opening 118 and rear opening 116. In certain embodiments, one or more components of outdoor portion 110 are mounted on a basepan 136, as shown.

During certain operations, air 1000 may be drawn to outdoor portion 110 through rear opening 116. Specifically, an outdoor inlet 128 defined through housing 114 may receive outdoor air 1000 motivated by outdoor fan 124. Within housing 114, the received outdoor air 1000 may be motivated through or across outdoor fan 124. Moreover, at least a portion of the outdoor air 1000 may be motivated through or across outdoor heat exchanger 120 before exiting the rear opening 116 at an outdoor outlet 130. It is noted that although outdoor inlet 128 is illustrated as being defined above outdoor outlet 130, alternative embodiments may reverse this relative orientation (e.g., such that outdoor inlet 128 is defined below outdoor outlet 130) or provide outdoor inlet 128 beside outdoor outlet 130 in a side-by-side orientation, or another suitable discrete orientation.

As shown, indoor portion 112 may include an indoor heat exchanger 122, a blower fan 142, and a heating unit 132. These components may, for example, be housed behind the front opening 118. A bulkhead 134 may generally support or house various other components or portions thereof of the indoor portion 112, such as the blower fan 142. Bulkhead 134 may generally separate and define the indoor portion 112 and outdoor portion 110 within housing 114. Additionally or alternatively, bulkhead 134 or indoor heat exchanger 122 may be mounted on basepan 136 (e.g., at a higher vertical position than outdoor heat exchanger 120), as shown.

During certain operations, air 1002 may be drawn to indoor portion 112 through front opening 118. Specifically, an indoor inlet 138 defined through

housing 114 may receive indoor air 1002 motivated by blower fan 142. At least a portion of the indoor air 1002 may be motivated through or across indoor heat exchanger 122 (e.g., before passing to bulkhead 134). From blower fan 142, indoor air 1002 may be motivated (e.g., across heating unit 132) and returned to the indoor area of the room through an indoor outlet 140 defined through housing 114 (e.g., above indoor inlet 138 along the vertical direction V). Optionally, one or more conduits (not pictured) may be mounted on or downstream from indoor outlet 140 to further guide air 1002 from air conditioner 100. It is noted that although indoor outlet 140 is illustrated as generally directing air upward, it is understood that indoor outlet 140 may be defined in alternative embodiments to direct air in any other suitable direction.

Outdoor and indoor heat exchanger 120, 122 may be components of a thermodynamic assembly (i.e., sealed system), which may be operated as a refrigeration assembly (and thus perform a refrigeration cycle) or, in the case of the heat pump unit embodiment, a heat pump (and thus perform a heat pump cycle). Thus, as is understood, exemplary heat pump unit embodiments may be selectively operated perform a refrigeration cycle at certain instances (e.g., while in a cooling mode) and a heat pump cycle at other instances (e.g., while in a heating mode). By contrast, exemplary A/C exclusive unit embodiments may be unable to perform a heat pump cycle (e.g., while in the heating mode), but still perform a refrigeration cycle (e.g., while in a cooling mode).

The sealed system may, for example, further include compressor 126 (e.g., mounted on basepan 136) and an expansion device (e.g., expansion valve or capillary tube—not pictured), both of which may be in fluid communication with the heat exchangers 120, 122 to flow refrigerant therethrough, as is generally understood. The outdoor and indoor heat exchanger 120, 122 may each include coils 146, 148, as illustrated, through which a refrigerant may flow for heat exchange purposes, as is generally understood.

As will be further described in detail below, a telescoping plenum 200 may be provided to direct air to or from housing 114. When installed, telescoping plenum 200 may be selectively attached to (e.g., fixed to or mounted against) housing 114 (e.g., via a suitable mechanical fastener, adhesive, gasket, etc.) and extend through a structure wall 150 (e.g., an outer wall of the structure within which air conditioner 100 is installed). In particular, telescoping plenum 200 extends along an axial direction X (e.g., parallel to the transverse direction T)

through a hole or channel 152 in the structure wall 150 that passes from an internal surface 154 to an external surface 156.

The operation of air conditioner 100 including compressor 126 (and thus the sealed system generally), blower fan 142, outdoor fan 124, heating unit 132, and other suitable components may be controlled by a control board or controller 158. Controller 158 may be in communication (via for example a suitable wired or wireless connection) to such components of the air conditioner 100. By way of example, the controller 158 may include a memory and one or more processing devices such as microprocessors, CPUs or the like, such as general or special purpose microprocessors operable to execute programming instructions or micro-control code associated with operation of air conditioner 100. The memory may be a separate component from the processor or may be included onboard within the processor. The memory may represent random access memory such as DRAM, or read only memory such as ROM or FLASH.

Air conditioner 100 may additionally include a control panel 160 and one or more user inputs 162, which may be included in control panel 160. The user inputs 162 may be in communication with the controller 158. A user of the air conditioner 100 may interact with the user inputs 162 to operate the air conditioner 100, and user commands may be transmitted between the user inputs 162 and controller 158 to facilitate operation of the air conditioner 100 based on such user commands. A display 164 may additionally be provided in the control panel 160, and may be in communication with the controller 158. Display 164 may, for example be a touchscreen or other text-readable display screen, or alternatively may simply be a light that can be activated and deactivated as required to provide an indication of, for example, an event or setting for the air conditioner 100.

FIG. 3 provides a rear perspective view of the housing 114 of the air conditioning appliance 100 in isolation, e.g., without the plenum 200 attached. As may be seen in FIG. 3, the housing 114, in particular the outdoor portion 110 thereof, defines a first sealing surface 170. The first sealing surface 170 lies in a lateral-vertical plane, e.g., a plane defined by the vertical direction V and the lateral direction L. The lateral-vertical plane is thus perpendicular to the transverse direction T and the axial direction X. The first sealing surface 170 extends around and encloses the outdoor inlet 128 and outdoor outlet 130 on all sides. For example, as may be seen in FIG. 3, the first sealing surface 170 may

include an upper segment 172 positioned above the outdoor inlet 128 and the outdoor outlet 130 along the vertical direction V, a lower segment 174 positioned below the outdoor inlet 128 and the outdoor outlet 130 along the vertical direction V, a first side 176 segment extending along the vertical direction V from the upper segment 172 to the lower segment 174, and a second side segment 178 extending along the vertical direction V from the upper segment 172 to the lower segment 174. The upper segment 172 may extend along the lateral direction L. The upper segment 172 may encompass the outdoor inlet 128 and the outdoor outlet 130 along the lateral direction, e.g., the upper segment 172 may extend over a greater lateral distance than the outdoor inlet 128 and the outdoor outlet 130 and may be positioned relative to the outdoor inlet 128 and the outdoor outlet 130 such that the outdoor inlet 128 and the outdoor outlet 130 are entirely overlapped by the upper segment 172 along the lateral direction L. The lower segment 174 may also extend along the lateral direction L and encompass the outdoor inlet 128 and the outdoor outlet 130 along the lateral direction L, where "encompass" is used in the same sense with respect to the lower segment 174 as defined above with respect to the upper segment 172. The first side segment 176 and the second side segment 178 may be positioned opposite one another along the lateral direction L such that the outdoor inlet 128 and the outdoor outlet 130 are between the first side segment 176 and the second side segment 178 along the lateral direction L.

Turning now especially to FIGS. 2 and 4, an exemplary telescoping plenum 200 will be described in greater detail. FIG. 4 provides a perspective view of telescoping plenum 200 in isolation and with an interior portion 210 and an exterior portion 212 separated for clarity. In particular, FIG. 4 provides a front perspective of the plenum 200 including a second sealing surface 272 thereof which corresponds to and is configured to mate, e.g., sealingly engage, with the first sealing surface 170 of the housing 114 which is illustrated in FIG. 3 and described above. The second sealing surface 272 is parallel to the first sealing surface 170, e.g., the second sealing surface 272 also lies in a plane perpendicular to the transverse and axial directions T and X. Thus, the first sealing surface 170 and the second sealing surface 272 may thereby provide sealing engagement between the housing 114 and the plenum 200 along the axial direction X in a plane perpendicular to the axial direction X. In some embodiments, the first and second sealing surfaces 170 and 272 may directly abut each other and thereby be

coplanar when the plenum 200 is assembled to the housing 114. In additional embodiments, the first and second sealing surfaces 170 and 272 may be spaced apart on opposite sides of a seal or gasket 300 (described in more detail below with respect to FIGS. 5 and 6) such that the first and second sealing surfaces 170 and 272 are in separate parallel planes when the plenum 200 is assembled to the housing 114. The second sealing surface 272 will be described in more detail below.

Although shown as separated in FIG. 4, it is noted that the assembled telescoping plenum 200 provides interior portion 210 and exterior portion 212 in sliding engagement (e.g., such that exterior portion 212 is movable along the axial direction X on interior portion 210). For instance, at least one of interior portion 210 and exterior portion 212 may be selectively nested within each other (e.g., such that the nested member is surrounded about the axial direction X, at least in part, by the receiving member). In some such embodiments, interior portion 210 is selectively nested within exterior portion 212, as shown in FIGS. 1 and 2.

Interior portion 210 of telescoping plenum 200 includes a duct wall 216 that is formed about the axial direction X (e.g., when mounted through wall channel 152). Duct wall 216 may be formed according to any suitable hollow shape, such as conduit having a rectangular profile (shown), defining an air channel 214 to guide air therethrough. Moreover, duct wall 216 may be formed from any suitable non-permeable material (e.g., steel, aluminum, or a suitable polymer) for directing or guiding air therethrough.

When assembled, interior portion 210 is selectively attached to housing 114. Specifically, interior portion 210 may be mounted proximal to outdoor portion 110 or distal to indoor portion 112. In some such embodiments, interior portion 210 is fixed to or mounted against housing 114 (e.g., via one or more suitable mechanical fasteners, adhesives, gasket, etc.) about at least a portion of rear opening 116. The duct wall 216 of interior portion 210 may surround, for instance, outdoor outlet 130. Additionally or alternatively, the duct wall 216 of interior portion 210 may surround outdoor inlet 128.

In certain embodiments, interior portion 210 further includes an outer flange 220 that extends in a radial direction (e.g., perpendicular to the axial direction X) from duct wall 216. Specifically, outer flange 220 extends radially outward (e.g., away from at least a portion of the axial direction X or the duct wall 216 of

interior portion 210). Outer flange 220 may thus avoid interference an airflow or flow path within air channel 214.

Outer flange 220 may extend radially outward from all or, alternatively, merely a portion of, duct wall 216. For instance, as shown in the exemplary embodiments, outer flange 220 extends from a top end 222 of the duct wall 216 of interior portion 210. In the illustrated embodiments, outer flange 220 also extends from both sides 230, 232 of the duct wall 216 of interior portion 210. It is understood, however, that alternative embodiments, may provide outer flange 220 at another (e.g., one or more) suitable locations along the profile of the duct wall 216 of interior portion 210. Optionally, an internal plate 221 may extend radially inward from duct wall 216 (e.g., at or from the bottom end 238), such that a sub-portion (i.e., less than a whole) of air channel 214 is obstructed.

When assembled, outer flange 220 may be placed against (e.g., in contact—direct or indirect) with an internal surface 154 of the structure wall 150. Thus, outer flange 220 may be located in or pressed into engagement with the internal surface 154 as at least a portion of duct wall 216 of interior portion 210 extends through wall channel 152 (e.g., while housing 114 is held opposite the duct wall 216 of interior portion 210, such as within an interior or indoor area of the structure).

Exterior portion 212 of telescoping plenum 200 includes a duct wall 218 that is formed about the axial direction X (e.g., when mounted through wall channel 152). Duct wall 218 may be formed according to any suitable hollow shape, but is generally formed to complement the shape of the duct wall 216 of interior portion 210. For instance, the duct wall 218 of exterior portion 212 may be formed as a similar shape of the duct wall 216 of interior portion 210, but with a unique size. In some such embodiments, the profile dimensions (e.g., vertical length and lateral width) of exterior portion 212 are larger than the dimensions of interior portion 210, such that interior portion 210 can be selectively nested within exterior portion 212. In certain selectable positions, the duct wall 218 of exterior portion 212 may further define and extend air channel 214 from interior portion 210 (e.g., to guide air therethrough). Similar to interior portion 210, the duct wall 218 of exterior portion 212 may be formed from any suitable non-permeable material (e.g., steel, aluminum, or a suitable polymer) for directing or guiding air therethrough.

When assembled, exterior portion 212 is selectively movable relative to

interior portion 210. For instance, exterior portion 212 may be mounted in slidable engagement with interior portion 210 (e.g., to move along the axial direction X as directed or positioned by an installer). Thus, as the distance (e.g., axial or transverse distance) between housing 114 and interior portion 210 remains generally fixed, the distance (e.g., axial or transverse distance) between housing 114 and exterior portion 212 may be selectively varied.

As shown, the duct wall 218 of exterior portion 212 has an inner surface directed toward air channel 214 or interior portion 210, as well as an outer surface 246 directed away from air channel 214 or interior portion 210. In certain embodiments, outer surface 246 is provided as a flange-less outer surface 246. For example, the outer surface 246 may be flange-less at least in that the outer surface 246 does not include a flange or any other projection which extends radially outward therefrom. At the outer surface 246, the duct wall 218 of exterior portion 212 may thus be generally parallel to, for example, axial direction X or transverse direction T and free of any flanges or obstruction thereon (e.g., as provided in conventional plenums). The flange-less outer surface 246 may extend from a front end 248 of exterior portion 212 to a rear end 250 of exterior portion 212.

When assembled, exterior portion 212, including flange-less outer surface 246, may extend through (e.g., selectively pass through) wall channel 152 along the axial direction X. Advantageously, exterior portion 212 may pass through wall channel 152 (e.g., move relative thereto) without striking or contacting either the internal surface 154 or external surface 156 of structure wall 150). In some such embodiments, the rear end 250 is selectively held or positioned outside of wall channel 152, such as beyond the external surface 156 thereof (e.g., in an ambient environment opposite of housing 114 relative to structure wall 150). Optionally, a caulk bead 252 (i.e., adhesive or sealant caulk) may be positioned on or along at least a portion of the flange-less outer surface 246 and join outer surface 246 to the external surface 156 of structure wall 150 (e.g., about or outside from wall channel 152).

In some embodiments, telescoping plenum 200 includes a divider wall 256 within air channel 214. When assembled, divider wall 256 defines a separate upper passage 258 and lower passage 260. For instance, divider wall 256 may extend along the lateral direction L from one lateral side of telescoping plenum 200 to the other lateral side. Generally, upper passage 258 and lower passage

260 may divide or define two discrete air flow paths for air channel 214. For instance, upper passage 258 may be defined within telescoping plenum 200 between divider wall 256 and interior portion 210 or exterior portion 212. Similarly, lower passage 260 may be defined within telescoping plenum 200 between divider wall 256 and interior portion 210 or exterior portion 212 (e.g., below upper passage 258 along the vertical direction V). When assembled, upper passage 258 and lower passage 260 may be fluidly isolated by divider wall 256 (e.g., such that air is prevented from passing directly between passages 258 and 260 through divider wall 256, or another portion of telescoping plenum 200). Upper passage 258 may be positioned upstream from outdoor inlet 128. Lower passage 260 may be positioned downstream from outdoor outlet 130.

As mentioned above, the telescoping plenum 200 may define a second sealing surface 272. The second sealing surface 272 may surround and enclose the air channel 214 on all sides, such as both the upper passage 258 and the lower passage 260 of the air channel 214. For example, as may be seen in FIG. 4, the second sealing surface 272 may include an upper segment 274 positioned above the upper passage 258 and the lower passage 260 along the vertical direction V, a lower segment 276 positioned below the upper passage 258 and the lower passage 260 along the vertical direction V, a first side 278 segment extending along the vertical direction V from the upper segment 274 to the lower segment 276, and a second side segment 280 extending along the vertical direction V from the upper segment 274 to the lower segment 276. The upper segment 274 may extend along the lateral direction L. The upper segment 274 may encompass the upper passage 258 and the lower passage 260 along the lateral direction, e.g., the upper segment 274 may extend over a greater lateral distance than the upper passage 258 and the lower passage 260 and may be positioned relative to the upper passage 258 and the lower passage 260 such that the upper passage 258 and the lower passage 260 are entirely overlapped by the upper segment 274 along the lateral direction L. The lower segment 276 may also extend along the lateral direction L and encompass the upper passage 258 and the lower passage 260 along the lateral direction L, where "encompass" is used in the same sense with respect to the lower segment 276 as defined above with respect to the upper segment 274. The first side segment 278 and the second side segment 280 may be positioned opposite another along the lateral direction L such that the upper passage 258 and the lower passage 260 are between the first side segment 278

and the second side segment 280 along the lateral direction L. In some embodiments, the upper segment 274, the first side segment 278, and the second side segment 280 of the second sealing surface 272 may be defined on the outer flange 220 of the interior portion 210. Additionally, the lower segment 276 of the second sealing surface 272 may be at least partially defined on the internal plate 221, e.g., the lower segment 276 may extend laterally across the internal plate 221 and may extend past the internal plate 221 onto the outer flange 220 at at least one end of the lower segment 276.

As shown, divider wall 256 may include a separate interior divider panel 262 and exterior divider panel 264. In some such embodiments, interior divider panel 262 is fixed to interior portion 210, and exterior divider panel 264 is fixed to exterior portion 212. As exterior portion 212 moves relative to interior portion 210 (e.g., sliding along the axial direction X), so too may exterior divider panel 264 move relative to interior divider panel 262. When assembled, exterior divider panel 264 may rest on or beneath interior divider panel 262. Exterior divider panel 264 may be axially slidable along interior divider panel 262 (e.g., such that exterior and interior divider panels 264, 262 act as a single air-guiding wall).

In certain embodiments, interior divider panel 262 is fixed to the duct wall 216 of interior portion 210. For instance, interior divider panel 262 may be fixed (e.g., via a suitable mechanical fastener, adhesive, weld, solder, etc.) to an inner surface 240 of the duct wall 216 at a first or second side 230, 232 of telescoping plenum 200. In some embodiments, interior divider panel 262 spans the entire lateral width from the first side 230 to the second side 232 of interior portion 210.

In optional embodiments, exterior divider panel 264 is fixed to the exterior portion 212 (e.g., via a suitable mechanical fastener, adhesive, weld, solder, etc.), e.g., at an inner lip of the exterior portion 212. Although the exterior portion 212 may include an inner lip, e.g., a lip which may extend radially inward from the duct wall 218 of interior portion 210, the outer surface 246 will still be a flange-less surface in such embodiments because the outer surface 246 will be without any outwardly projecting flanges.

During installation, exterior portion 212 may be selectively and advantageously moved on interior portion 210 through the wall channel 152 along the axial direction X until a desired position is reached (e.g., until the rear

end of exterior portion 212 is located in an ambient environment and spaced apart from the external surface 156 of the structure wall 150). One of more fasteners (e.g., mechanical fasteners—such as screws, nuts, or clips—adhesives, etc.) may be used to secure the relative position of exterior portion 212 to interior portion 210. For instance, one or more set screws may extend through (and join) interior divider panel 262 and exterior divider panel 264. The caulk bead 252 may later be applied to the flange-less outer surface 246, sealing and securing telescoping plenum 200 to the structure wall 150.

As mentioned, the first and second sealing surfaces 170 and 272 may be sealingly engaged via a seal 300. In particular, the seal 300 may be a compression seal, such as the exemplary embodiments illustrated in FIGS. 5 and 6. FIGS. 5 and 6 provide section views of exemplary embodiments of the seal 300 as may be used with the air conditioning appliance 100. Those of ordinary skill in the art will recognize that the seal 300 is at least linearly coextensive with the first sealing surface 170 on the housing 114 and the second sealing surface 272 on the plenum 200. For example, the seal 300 may include a plurality of segments which are each linearly coextensive with a respective one of the segments of each sealing surface 170 and 272 described above, e.g., the seal 300 may include an upper segment which is coextensive with the upper segments 172 and 274 along the lateral direction L, etc. Thus, the section views of FIGS. 5 and 6 may be a section taken in any transverse (or axial) plane. For example, the section views of FIGS. 5 and 6 may be taken in a lateral-transverse plane defined by the lateral direction L and the transverse direction T, e.g., the section of FIGS. 5 and 6 may be through a portion or segment of the seal 300 lying along either of the first side segment 176, 278, or the second side segment 178, 280 of the first and/or second sealing surfaces 170, 272. As another example, the section views of FIGS. 5 and 6 may be taken in a vertical-transverse plane defined by the vertical direction V and the transverse direction T, e.g., the section of FIGS. 5 and 6 may be through a portion of the seal 300 lying along either of the upper segment 172, 274, or the lower segment 174, 276 of the first and/or second sealing surfaces 170, 272.

In some embodiments, the compression seal 300 may be a bellows gasket, e.g., as illustrated in FIG. 5. For example, the bellows gasket 300 may include a first bellows 302 and a second bellows 304 opposite the first bellows 302 about a hollow interior 308 of the bellows gasket 300. The bellows gasket 300 may

extend along the transverse direction T between a first side 306 and a second side 310. The first side 306 may be adhered to one of the first sealing surface 170 of the housing 114 and the second sealing surface 272 of the plenum 200. A magnet 312 may be disposed at the second side 310, such as within the interior 308 of the bellows gasket 300 as illustrated in FIG. 5. The magnet 312 may attach the bellows gasket 300 to the other of the first sealing surface 170 of the housing 114 and the second sealing surface 272 of the plenum 200. For example, the first side 306 of the gasket 300 may be adhered to the second sealing surface 272 and the magnet 312 may attach the second side 310 of the gasket 300 to the first sealing surface 170. The bellows gasket 300 may be formed of any suitably durable and flexible material, such as a flexible PVC (polyvinylchloride) material.

In some embodiments, the compression seal 300 may include a foam material, such as the foam block 314 which is illustrated in FIG. 6. As may be seen in FIG. 6, the foam block 314 may have a rectangular cross-sectional shape, such as a square shape. The foam block 314 may extend along the transverse direction T between a first side 316 and a second side 318, e.g., the first side 316 and the second side 318 may be exterior sides of the foam block 314 such that the foam block 314 extends from the first side 316 to the second side 318 and is bounded by the first side 316 and the second side 318 along the transverse direction T (and also the axial direction X). The first side 316 of the foam block 314 may abut one of the first sealing surface 170 and the second sealing surface 272 and the second side 318 of the foam block 314 may abut the other of the first sealing surface 170 and the second sealing surface 272. For example, the first side 316 of the foam block 314 may be adhered to the second sealing surface 272 of the plenum 200 and the foam block 314 may be compressed between the first sealing surface 170 and the second sealing surface 272 along the axial direction X to provide sealing engagement between the first sealing surface 170 and the second sealing surface 272 along the axial direction X when the plenum 200 is assembled to the housing 114.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art.

Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

CLAIMS

1. A single-package air conditioner unit defining a mutually-perpendicular vertical direction, lateral direction, and transverse direction, the single-package air conditioner unit comprising:

a housing defining an outdoor portion and an indoor portion, the outdoor portion of the housing defining a first sealing surface in a plane defined by the vertical direction and the lateral direction;

an outdoor heat exchanger assembly disposed in the outdoor portion and comprising an outdoor heat exchanger and an outdoor fan;

an indoor heat exchanger assembly disposed in the indoor portion and comprising an indoor heat exchanger and an indoor fan;

a compressor in fluid communication with the outdoor heat exchanger and the indoor heat exchanger to circulate a refrigerant between the outdoor heat exchanger and the indoor heat exchanger; and

a telescoping plenum attached to the housing and receivable within a wall channel defined by a structure wall along an axial direction, the telescoping plenum comprising:

an interior portion comprising a duct wall and an outer flange extending radially outward from the duct wall to contact an internal surface of the structure wall;

an exterior portion comprising a duct wall having a flange-less outer surface to selectively pass through the wall channel along the axial direction, the exterior portion being in slidable engagement with the interior portion to move along the axial direction; and

a second sealing surface defined on the interior portion, the second sealing surface parallel to the first sealing surface and configured to sealingly engage the first sealing surface.

2. The single-package air conditioner unit of claim 1, wherein the first sealing surface is sealingly engaged with the second sealing surface via a compression seal.

3. The single-package air conditioner unit of claim 2, wherein the compression seal comprises a foam material.

4. The single-package air conditioner unit of claim 2, wherein the compression seal comprises a bellows gasket.

5. The single-package air conditioner unit of claim 2, wherein the compression seal is bonded to the second sealing surface of the telescoping plenum by an adhesive.

6. The single-package air conditioner unit of claim 1, further comprising an outdoor inlet and an outdoor outlet in the outdoor portion, wherein the first sealing surface comprises:

an upper segment extending along the lateral direction and positioned above the outdoor inlet and the outdoor outlet along the vertical direction, the upper segment encompassing the outdoor inlet and the outdoor outlet along the lateral direction,

a lower segment extending along the lateral direction and positioned below the outdoor inlet and the outdoor outlet along the vertical direction, the lower segment encompassing the outdoor inlet and the outdoor outlet along the lateral direction,

a first side segment extending along the vertical direction from the upper segment to the lower segment, and

a second side segment positioned opposite the first side segment along the lateral direction such that the outdoor inlet and the outdoor outlet are between the first side segment and the second side segment, the second side segment extending along the vertical direction from the upper segment to the lower segment.

7. The single-package air conditioner unit of claim 1, wherein the telescoping plenum further comprises an upper passage and a lower passage, wherein the second sealing surface comprises:

an upper segment extending along the lateral direction and positioned above the upper passage and the lower passage along the vertical direction, the upper segment encompassing the upper passage and the lower passage along the lateral direction,

a lower segment extending along the lateral direction and positioned below

the upper passage and the lower passage along the vertical direction, the lower segment encompassing the upper passage and the lower passage along the lateral direction,

a first side segment extending along the vertical direction from the upper segment to the lower segment, and

a second side segment positioned opposite the first side segment along the lateral direction such that the upper passage and the lower passage are between the first side segment and the second side segment, the second side segment extending along the vertical direction from the upper segment to the lower segment.

8. The single-package air conditioner unit of claim 7, wherein the upper segment, the first side segment, and the second side segment of the second sealing surface are defined on the outer flange of the interior portion.

9. The single-package air conditioner unit of claim 7, wherein the telescoping plenum further comprises an internal plate extending radially inward from the duct wall of the interior portion, wherein the lower segment of the second sealing surface is at least partially defined on the internal plate.

10. The single-package air conditioner unit of claim 1, wherein the interior portion is selectively nested within the exterior portion.

11. The single-package air conditioner unit of claim 1, further comprising a divider wall defining an upper passage and a lower passage within the telescoping plenum.

12. A telescoping plenum for an air conditioning appliance, the telescoping plenum being receivable within a wall channel defined by a structure wall along an axial direction, the telescoping plenum comprising:

an interior portion comprising a duct wall and an outer flange extending radially outward from the duct wall to contact an internal surface of the structure wall;

an exterior portion comprising a duct wall having a flange-less outer surface to selectively pass through the wall channel along the axial direction, the exterior

portion being in slidable engagement with the interior portion to move along the axial direction; and

a sealing surface defined on the interior portion in a plane perpendicular to the axial direction.

13. The telescoping plenum of claim 12, further comprising a compression seal sealingly engaged with the sealing surface.

14. The telescoping plenum of claim 13, wherein the compression seal comprises a foam material.

15. The telescoping plenum of claim 13, wherein the compression seal comprises a bellows gasket.

16. The telescoping plenum of claim 13, wherein the compression seal is bonded to the sealing surface of the telescoping plenum by an adhesive.

17. The telescoping plenum of claim 12, wherein the telescoping plenum defines a mutually-perpendicular vertical direction, lateral direction, and transverse direction, the telescoping plenum further comprising an upper passage and a lower passage, wherein the sealing surface comprises:

an upper segment extending along the lateral direction and positioned above the upper passage and the lower passage along the vertical direction, the upper segment encompassing the upper passage and the lower passage along the lateral direction,

a lower segment extending along the lateral direction and positioned below the upper passage and the lower passage along the vertical direction, the lower segment encompassing the upper passage and the lower passage along the lateral direction,

a first side segment extending along the vertical direction from the upper segment to the lower segment, and

a second side segment positioned opposite the first side segment along the lateral direction such that the upper passage and the lower passage are between the first side segment and the second side segment, the second side segment extending along the vertical direction from the upper segment to the lower

segment.

18. The telescoping plenum of claim 17, wherein the upper segment, the first side segment, and the second side segment of the sealing surface are defined on the outer flange of the interior portion.

19. The telescoping plenum of claim 17, further comprising an internal plate extending radially inward from the duct wall of the interior portion, wherein the lower segment of the sealing surface is at least partially defined on the internal plate.

20. The telescoping plenum of claim 12, wherein the interior portion is selectively nested within the exterior portion.

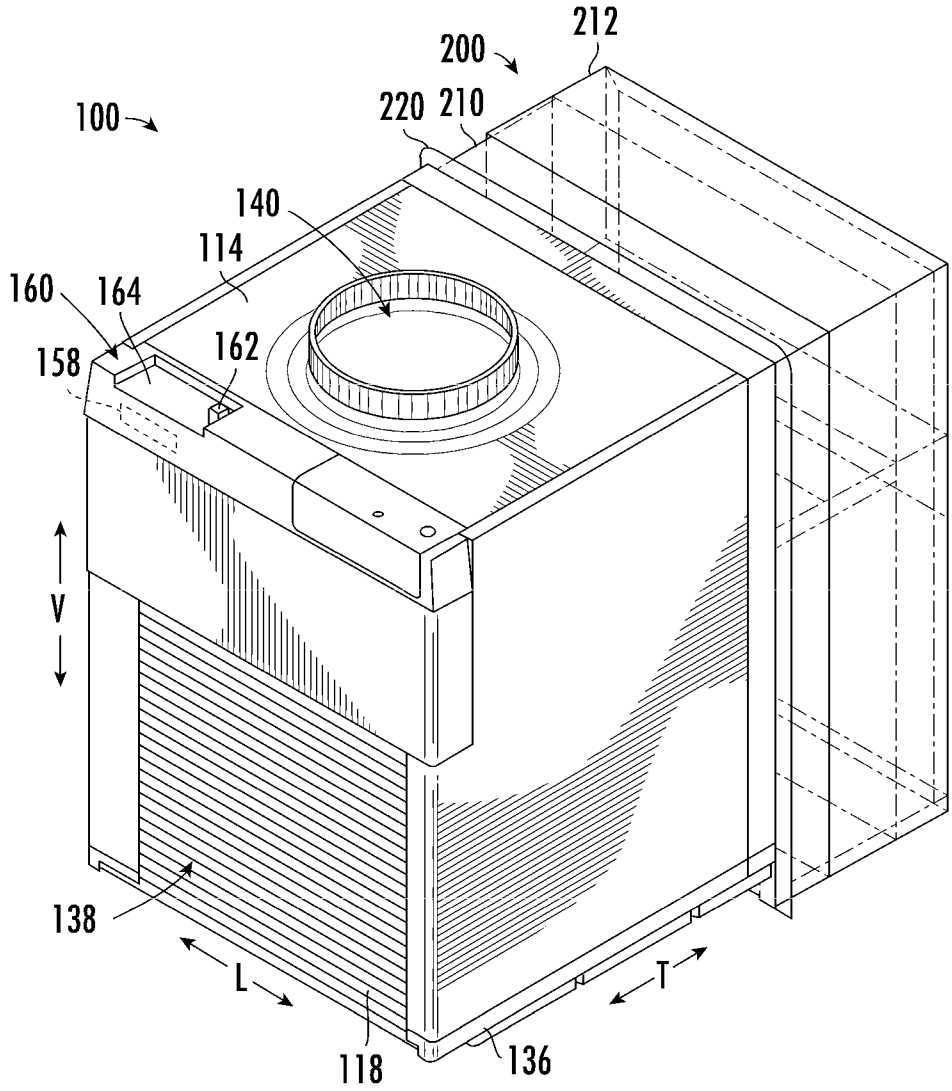

Fig 1

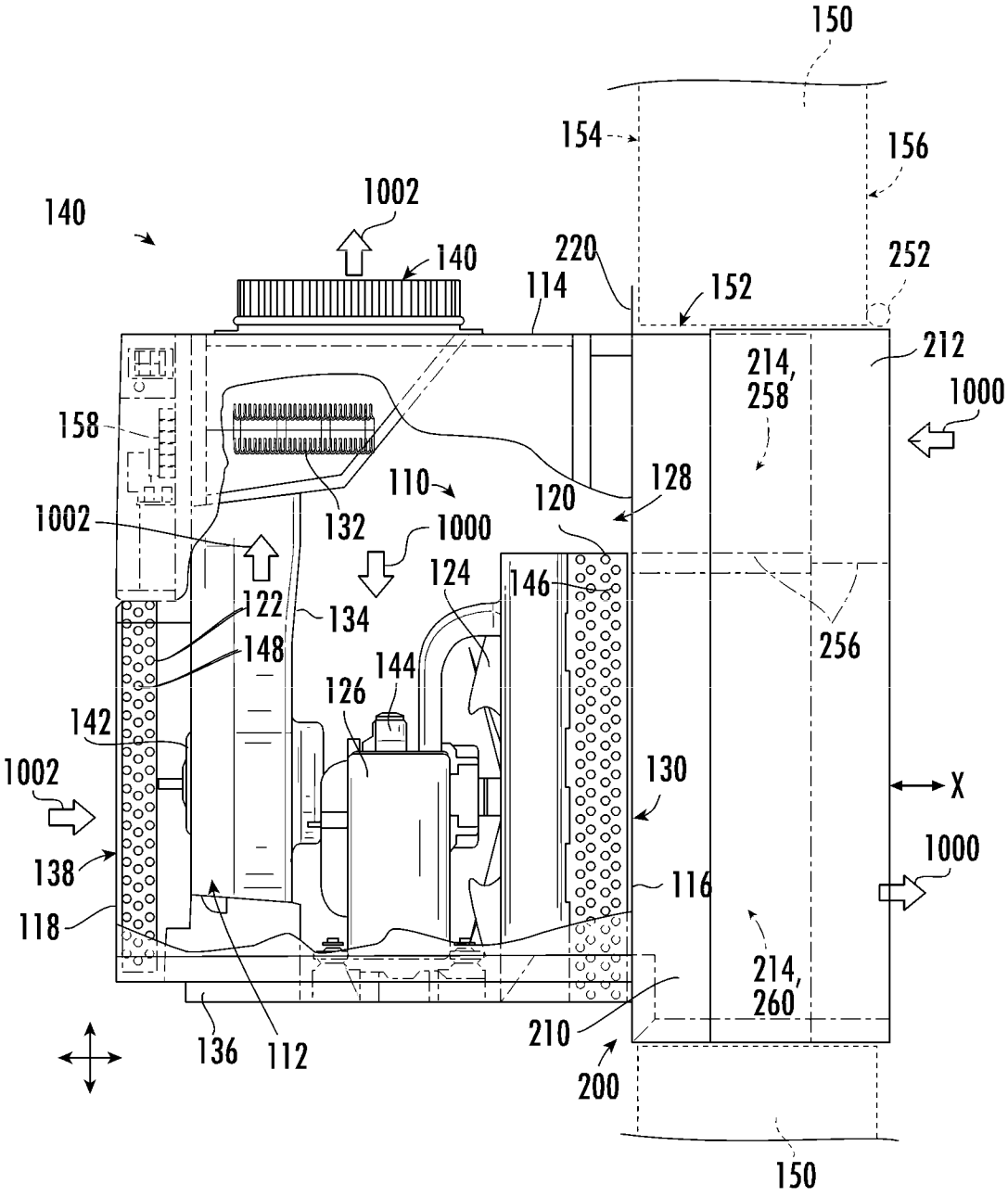
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Fig 2

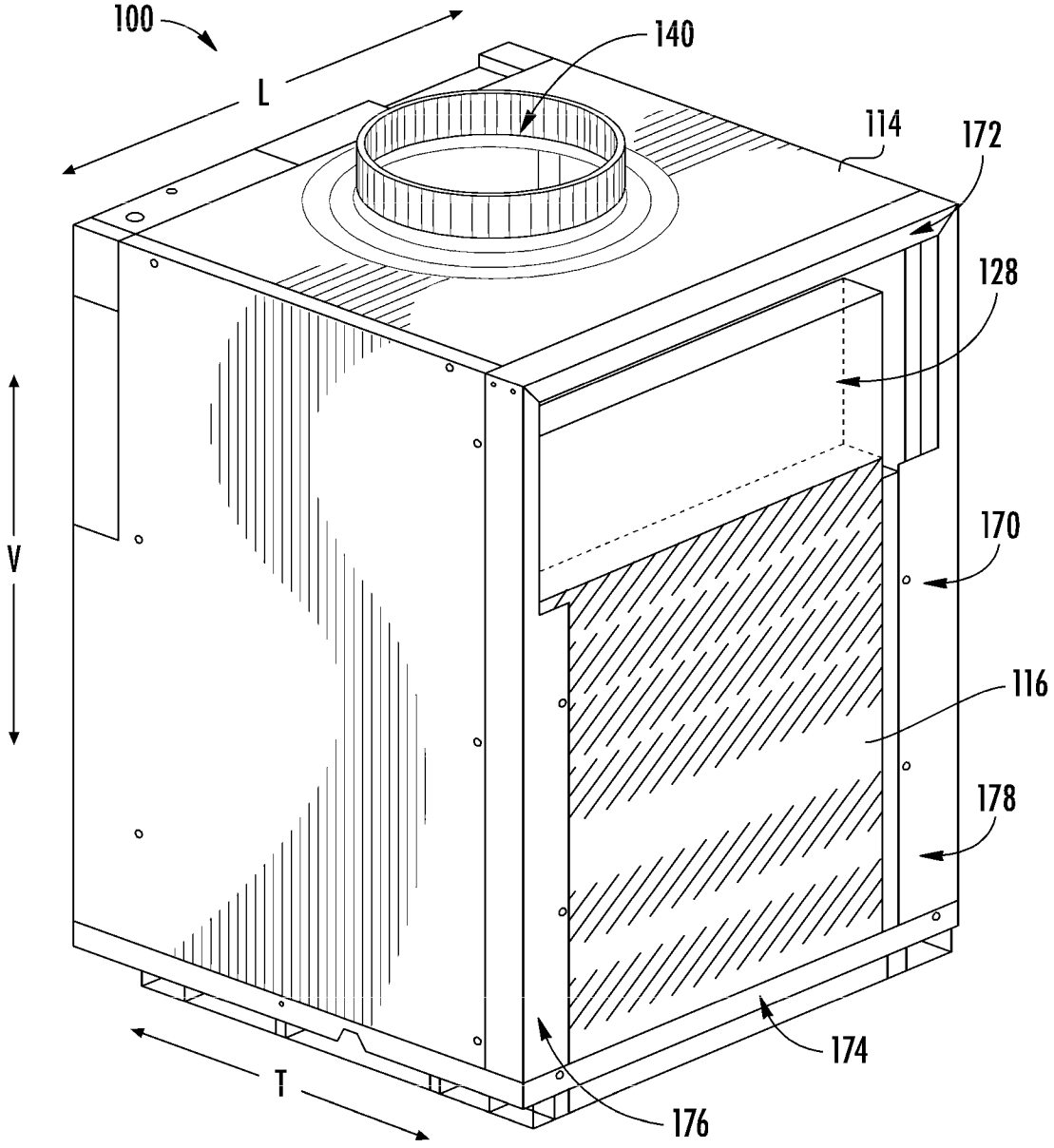

Fig 3

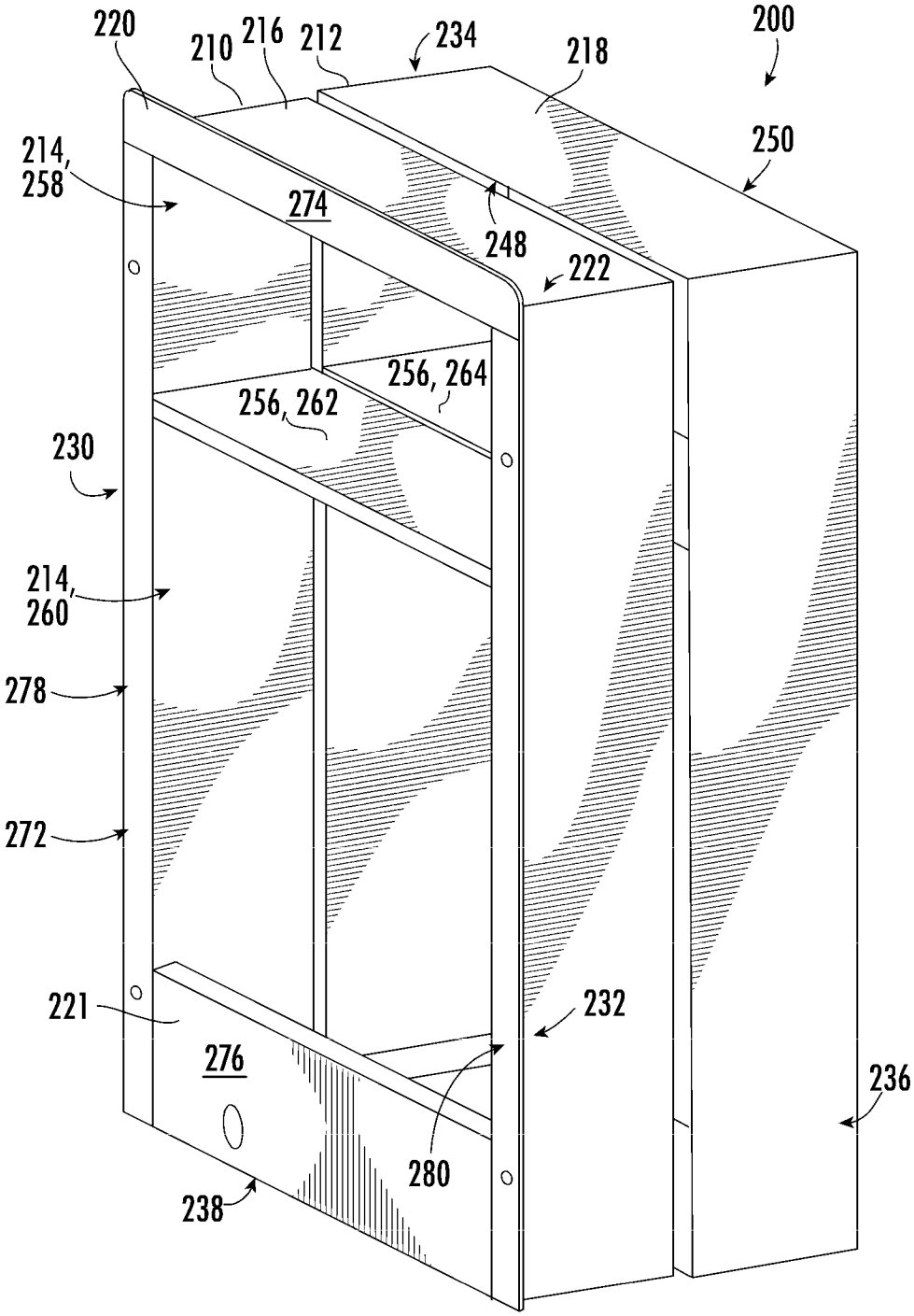
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Fig. 4

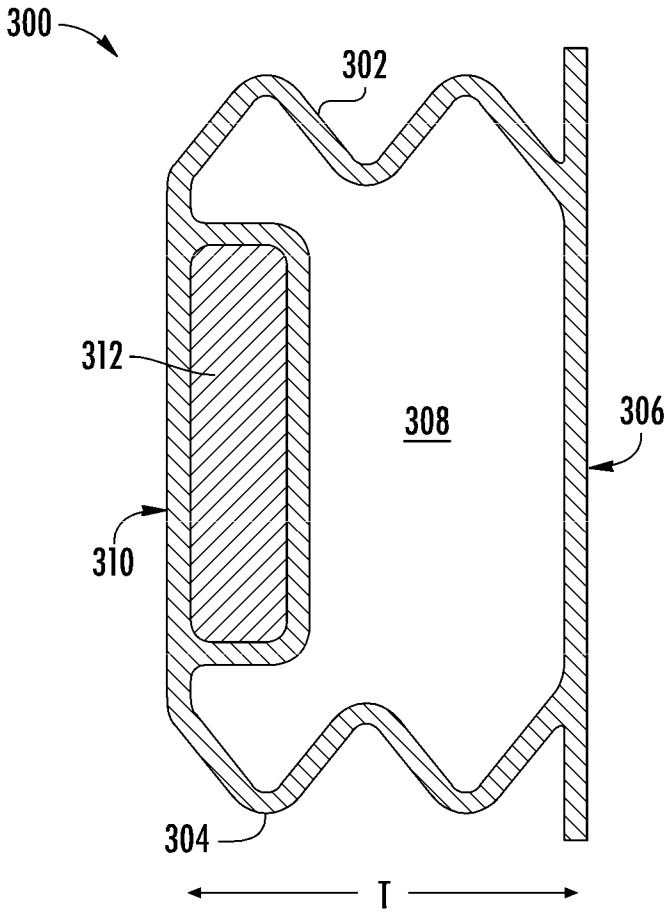

Fig. 5

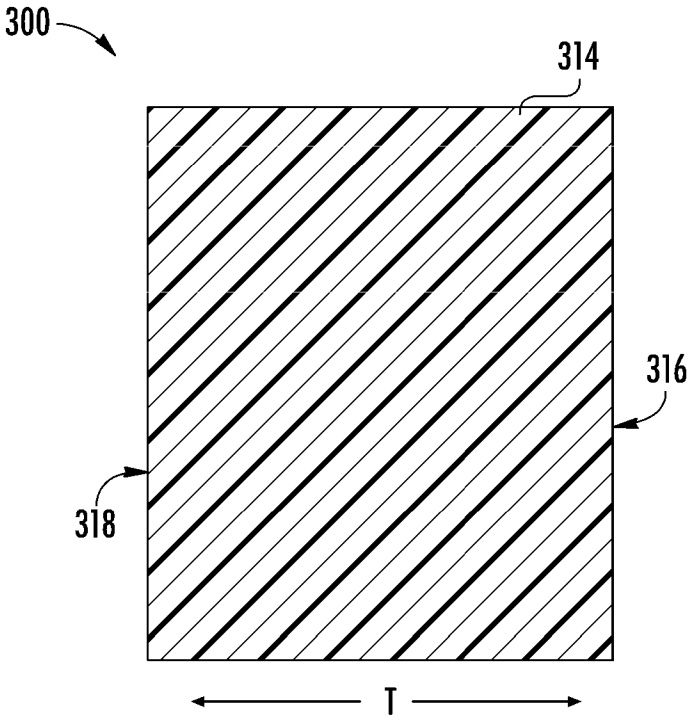

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/102309

A. CLASSIFICATION OF SUBJECT MATTER

F24F 7/10(2006.01)i; F24F 13/00(2006.01)i

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)

F24F

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)

CNABS,CNKI,DWPI,VEN:air condition+, shell, sealing surface, telescoping plenum, wall, duct, flange, slidable, divider wall, passage, panel, interior, exterior

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 205579844 U (LIU, Baojun) 14 September 2016 (2016-09-14) description, paragraphs 0012 to 0015 and figure 1	1-20
Y	CN 104515243 A (JIANZHU ELECTRICAL MACHINERY IND CO LTD) 15 April 2015 (2015-04-15) description, paragraphs 0030 to 0036 and figures 2 to 4	1-20
A	CN 106642493 A (LIANG, Xiaojun) 10 May 2017 (2017-05-10) the whole document	1-20
A	CN 104764134 A (ZU, Linhai) 08 July 2015 (2015-07-08) the whole document	1-20
A	EP 0117527 A2 (BECHER REINHARD) 05 September 1984 (1984-09-05) the whole document	1-20
A	US 6766832 B2 (BENJAMIN M D et al.) 27 July 2004 (2004-07-27) the whole document	1-20

☐ 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
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"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	Date of mailing of the international search report
09 October 2020	**15 October 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **LIU,Huaitao** Telephone No. **62084782**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/102309

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		DE 3306563 A1	11 October 1984
US 6766832 B2	27 July 2004	US 2003116213 A1	26 June 2003