OVEN HINGE DAMPER COOLING SYSTEM

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Filed: Jun. 1, 2012

Publication Classification

Int. Cl.
F24C 15/02 (2006.01)
F28D 15/00 (2006.01)

U.S. Cl.
USPC .......................... 126/194; 165/104.11

ABSTRACT

An oven includes an oven cavity, an oven door providing access to the oven cavity, and a dampening hinge member pivotably coupling the oven door to the oven. A channel encloses the dampening hinge member and provides a flow of air to the dampening hinge member.
FIG. 3
OVEN HINGE DAMPER COOLING SYSTEM

BACKGROUND

[0001] The present disclosure generally relates to appliances, and more particularly to a cooling system for a hinge damper of an oven.

[0002] Damped hinge assemblies for appliance doors, such as ovens, are known. A damped hinge assembly generally includes a body defining a bore and a piston slidably received in the bore. A rod is connected to the piston and projects outward from the bore. The damper is a fluid (i.e., liquid or gas) damper such as a hydraulic oil/gas spring or pneumatic spring. A damping fluid, such as such as air, gas, hydraulic oil or other liquid, is contained in the bore and acts on the piston to dampen sliding movement of the piston in at least one direction in the bore. A spring is located in the bore and acts on the piston to bias the piston toward one end of the bore.

[0003] Most dampers are sensitive to high temperatures. If the temperatures are not cool enough, the damper cannot be used or it will fail. When a damper is used in conjunction with a door of an oven cavity, the damper is typically mounted in close proximity to the walls of the oven cavity. This area of the oven is typically completely enclosed, with little or no air flow through it. The only means for cooling the damper is to try and minimize radiation and conduction from the hot walls of the oven cavity to the damper using insulation. Due to the sensitivity of dampers to high temperatures, the use of insulation may not be sufficient to keep the temperatures low enough to prevent degradation or complete loss of the performance of the damper.

[0004] Accordingly, it would be desirable to provide a system that addresses the problems identified above.

BRIEF DESCRIPTION OF THE INVENTION

[0005] As described herein, the exemplary embodiments overcome one or more of the above or other disadvantages known in the art.

[0006] One aspect of the exemplary embodiments relates to an oven. In one embodiment, the oven includes an oven cavity, an oven door providing access to the oven cavity, and a dampering hinge member pivotably coupling the oven door to the oven. A channel is configured to enclose the dampreneur hinge member and provide a flow of air to the dampering hinge member.

[0007] Another aspect of the exemplary embodiments relates to a cooling system for a dampreneur hinge member of a door of an oven, the oven including an oven cavity and an enclosure surrounding the oven cavity, the enclosure including an outer side panel. In one embodiment, a channel member is disposed adjacent to the outer side panel. The channel member and the outer side panel define a substantially sealed air channel therebetween. The dampreneur hinge member is disposed within the air channel. Each end portion of the channel member includes an opening that is configured to allow air to flow through the air channel and around the dampreneur hinge member.

[0008] A further aspect of the exemplary embodiments relates to a cooling system for a dampreneur hinge member of a door of an oven for an oven cavity. In one embodiment, the cooling system includes an enclosure defining a substantially sealed air channel, the dampreneur hinge member being disposed within the air channel. The enclosure includes at least one inlet opening and at least one outlet opening configured to allow cooling air to flow through the air channel and around the dampreneur hinge member.

[0009] These and other aspects and advantages of the exemplary embodiments will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. Moreover, the drawings are not necessarily drawn to scale and unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein. In addition, any suitable size, shape or type of elements or materials could be used.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS OF THE DISCLOSURE

[0010] Referring to FIG. 1, an exemplary cooking appliance incorporating aspects of the disclosed embodiments, in the form of an oven, is generally designated by reference numeral 100. The aspects of the disclosed embodiments are directed to an enclosure or channel enclosing a door hinge dampreneur mechanism used in an oven. The enclosure includes openings at the top and bottom that allow cool air to be drawn in and pass over and around the door hinge dampreneur mechanism. The air flow over the hinge dampreneur mechanism cools the dampreneur. Although the aspects of the disclosed embodiments will generally be described herein with respect to a cooking appliance, the aspects of the disclosed embodiments can also be applied to other types of ovens that include a door hinge dampreneur mechanism.

[0020] The oven 100 shown in FIG. 1 generally includes an outer body 2, which includes a top panel 11, a bottom panel (not shown) and left and right side panels 12. For purposes of this illustration, only the left side of the oven is shown, but it will be understood that the right side of the oven 100 will include a corresponding side panel 12 and structures. An oven
cavity 20 (not shown) is generally disposed within the boxlike structure formed by the top panel 11, bottom panel and side panels 12 in combination with the front opening access door 8. The front opening access door 8 enables access to the oven cavity 20.

[0021] The oven 100 can also include one or more control devices, such as knobs 4 and/or a control panel 6 mounted on or in the backsplash assembly 10 to adjust the oven temperature or operate the oven. Although the control devices are generally described herein as knobs and/or control panel in alternate embodiments, the control device can comprise any suitable control mechanism, such as a slideable switch or electronic control.

[0022] FIG. 2 is a side perspective view of the oven 100 of FIG. 1, with the top and side portions of the outer body 2 removed to show the outer top wall 21 and outer side wall 22 of the oven cavity 20, the outer side wall 22 also being referred to generally as the oven cavity wall. Also shown in FIG. 2 is the left side hinge mechanism 23 for the door 8. The hinge mechanism 23 couples to the door 8 in a manner that is generally known. In this embodiment, the hinge mechanism 23 includes a door hinge damper, or dampening hinge mechanism 24.

[0023] FIG. 3 illustrates one embodiment of the air channel or enclosure 30 that is formed around the damper mechanism 24. In this embodiment, the air channel 30 is disposed on an internal side 36 of the oven cavity 20 and the outer body 2. The air channel 30 is configured to substantially enclose the damper mechanism 24 and allow for the passage of air from one end 33 to the other end 34 of the air channel 30. In this example, an end portion 31 of the side panel 12 closest to the door 8 is formed to extend over and around at least a portion of the damper mechanism 24. As shown in FIG. 3, in this embodiment, the end portion 31 is a two piece member, one piece formed by the side panel 12, and another piece formed by a front member 25 of the outer body 2 of the oven 100. The side panel 12 and the front member 25 are configured to be joined together to form the end portion 31. Although the example in FIG. 3 shows the end portion 31 as a two piece member, in alternate embodiments, the end portion 31 is a single piece channel member. For example, the end portion 31 can extend as part of the side panel 12 and be formed into an enclosure that extends substantially completely over and around the damper mechanism 24. Alternatively, the front member 25 can be formed into an enclosure that extends substantially completely around and over the damper mechanism 24 and then mates with the side panel 12 to form a substantially contiguous sidewall. The air channel 30 is generally made of metal or other heat reflective material, which shields the damper mechanism 24 from radiated heat emanating from the oven wall 22 and oven cavity 20.

[0024] As shown in FIG. 3, in one embodiment, the air channel 30 includes at least one primary cool air intake opening 32. The primary cool air intake opening 32 is disposed below the position of the damper 24 in the air channel 30. In one embodiment, a size of the opening 32 is approximately 0.625 inches wide by 0.875 inches tall. In alternate embodiments, the opening 32 can be any suitable size that can be accommodated on the air channel 30. In one embodiment the air channel 30 is open on each end 33, 34.

[0025] In one embodiment, the air channel 30 is configured to draw cool air in through the primary cool air intake opening 32 and over the damper mechanism 24. The air travels in an upwards direction in the air channel 30 and out the open end 34. In one embodiment, cool air can also be drawn in through the open end 33 of the air channel 30.

[0026] FIG. 4 is a side view of the oven 100 with the left outer side panel 12 removed to illustrate the airflow path 40 through the air channel 30. The cool air 41 enters the air channel 30 shown in FIG. 3 through one or more of the primary cool air intake opening 32 or open end 33. The air travels upwards, over the damper member 24. The hot air is expelled out from the top opening 34 of the air channel 30. The air entering the air channel 30 is heated and rises, and then passively expelled due to the natural buoyancy of the hot air. In one embodiment, air can also be pulled through the air channel 30 in a forced airstream created by a fan 42.

[0027] FIG. 5 is a cross-sectional view looking down at the damper mechanism 24 in the air channel 30 of FIG. 3 along the line A-A. In this example, an inner channel wall or inner channel member 52 is disposed between the sidewall 22 of the oven cavity 20 and the internal or inner side 36 of outer sidewall 12. As shown in FIG. 5, the outer sidewall 12 and the front member 25 are connected or otherwise joined together to form the end portion 31. In the example of FIG. 5, the channel member 52 is bent or angled at one end 54 to substantially close off or seal the channel member 30 with respect to the side panel 12. In the example of FIG. 5, the channel member 52 is bent in a substantially "L" shape. In alternate embodiments, the channel member 52 can be formed in any suitable configuration to substantially define and/or seal off the air channel 30 as well as provide thermal protection from the heat of the oven cavity 20. In one embodiment, the outer side panel 12 could include members that extend away from the outer side panel 12 and engage the channel member 52 to define the air channel 30 around the hinge damper device 24.

[0028] A heat resistant gasket (not shown) could be included on each of the ends of the channel member 52 that are in proximity to the outer side panel 12 to form a substantially airtight seal and constrain the airflow 40 to and within the air channel 30. In one embodiment, an insulation member 56 can be disposed between the oven cavity sidewall 22 and the inner channel wall member 52. In the example shown in FIG. 5, a heat sink 58 is also disposed around the hinge damper mechanism 24. One or both of the insulation member 56 and the heat sink 58 can be used to further reduce the radiation heat transfer from the oven wall 22 to the hinge damper mechanism 24.

[0029] FIG. 6 illustrates one embodiment of the present disclosure where the damper 24 is disposed in an air duct or channel 60 that is disposed on an external side 38 of the outer side panel 12. In this embodiment, as illustrated in FIG. 6, the air is drawn up and around the damper 24 as illustrated by airflow 61.

[0030] Referring to FIG. 7, in one embodiment, the air channel 60 is a three-sided member or channel, where the external side 38 of the outer side panel 12 forms a wall 62 of the air channel 60. Alternatively, referring to FIG. 8, the air channel can be a four-sided or completely enclosed member, with a wall 64 of the air channel 60 being disposed adjacent to, and/or in contact with, the external side of the outer side panel 12.

[0031] A pneumatic or hydraulic damper is used as a "soft-close" or "soft-open" feature of an oven door and hinge. However, the heat from the oven can cause the damper to become too hot, which leads to degradation or complete loss of performance of the damper. The aspects of the disclosed embodiments provide an enclosure around a hinge damper
mounted near a wall of an oven cavity. The enclosure guides cooling air over the damper. The cooling air, heated by the damper, rises up and away from the damper, and reduces the radiation heat transfer from the oven to the damper. A heat sink can also be thermally coupled to one or more of the enclosure or damper to further reduce the radiation heat transfer. The aspects of the disclosed embodiments reduce costs of the damper by enabling the use of lower cost dampers that have not been fortified to work on high temperature environments. Additionally, the quality and reliability of these lower cost dampers can be improved by providing a lower temperature working environment.

Thus, while there have been shown, described, and pointed out, fundamental novel features of the invention as applied to the exemplary embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. Moreover, it is expressly intended that all combinations of those elements and/or method steps, which perform substantially the same function in substantially the same way to achieve the same results, are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

What is claimed is:

1. An oven comprising:
an oven cavity;
an oven door providing access to the oven cavity;
a dampening hinge member pivotally coupling the oven door to the oven; and
a channel enclosing the dampening hinge member, the channel being configured to provide a flow of air to the dampening hinge member.

2. The oven of claim 1, further comprising an outer side panel and wherein the outer side panel comprises an end portion, the end portion of the outer side panel defining the channel between the outer side panel and the oven cavity, and providing the flow of air over and around the dampening hinge member.

3. The oven of claim 2, wherein the end portion of the outer side panel includes an opening, the opening configured to draw air into the channel.

4. The oven of claim 3, wherein the opening in the end portion is disposed below a location of the dampening hinge member in the channel.

5. The oven of claim 1, wherein the channel comprises an open upper end and an open lower end, the channel configured to draw air in from the open lower end and expel the air out the open upper end.

6. The oven of claim 1, further comprising an outer side panel with an end portion, and a channel wall member disposed between the oven cavity and the end portion of the outer side panel defining the channel therebetween, the dampening hinge member being disposed between the end portion of the outer side panel and the channel wall member.

7. The oven of claim 6, further comprising an insulation member disposed between the oven cavity and the channel wall member.

8. The oven of claim 1, further comprising a heat sink in thermal communication with the dampening hinge member.

9. The oven of claim 1, further comprising a fan communicatively coupled to the channel and configured to force the airflow over and around the dampening hinge member.

10. The oven of claim 1, wherein the channel extends from a lower portion of the oven to an upper portion of the oven.

11. The oven of claim 1, further comprising an outer side panel and wherein the channel is disposed on an external surface of the outer side panel.

12. The oven of claim 1, further comprising an outer side panel and wherein a wall of the channel is formed by the outer side panel.

13. A cooling system for a dampening hinge member of a door of an oven, the oven comprising an oven cavity and an enclosure surrounding the oven cavity, the enclosure comprising an outer side panel, the cooling system comprising:
a channel member disposed adjacent to the outer side panel;
the channel member and outer side panel defining therebetween a substantially sealed air channel, the dampening hinge member being disposed within the air channel; and
each end portion of the channel member including an opening, the opening configured to allow air to flow through the air channel and around the dampening hinge member.

14. The cooling system of claim 13, wherein the channel member is disposed between the oven cavity and the outer side panel, an end portion of the outer side panel and the channel member defining the substantially sealed air channel, the dampening hinge member being disposed within the air channel; and
the end portion of the outer side panel including an opening, the opening configured to allow air to be drawn into the air channel.

15. The cooling system of claim 14, wherein a top of the air channel includes an opening to allow air to exit the air channel.

16. The cooling system of claim 15, wherein the dampening hinge member is positioned in the air channel above the opening.

17. The cooling system of claim 15, wherein an inner surface of the end portion of the side panel engages the channel member to form the substantially sealed air channel.

18. The cooling system of claim 13, wherein the channel member is disposed on an external surface of the outer side panel.

19. A cooling system for a dampening hinge member of a door of an oven, the oven comprising an oven cavity, the cooling system comprising:
an enclosure defining a substantially sealed air channel, the dampening hinge member being disposed within the air channel; and
the enclosure including at least one inlet opening and at least one outlet opening configured to allow cooling air to flow through the air channel and around the dampening hinge member.

20. The cooling system of claim 19, wherein the at least one inlet opening is disposed beneath the hinge member and the at least one outlet opening is disposed above the hinge member.