A heating vent conduit with a heater unit is disclosed, being primarily utilized to heat a room independently of other rooms. The heating vent conduit can be controlled a personal thermostat, which depending on the selected temperature will regulate a heating element within the heating vent conduit. The heating vent conduit is designed to be easily installed on existing ventilation systems by replacing the end boot at vent outlets, and will allow for individual preference and comfort by allowing independent room temperature, while lowering energy costs by reducing the main heater’s workload.
HEATING VENT CONDUIT

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/682,010, entitled VENT CONDUIT WITH INDEPENDENT HEATER, filed on Aug. 10, 2012, which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a heating unit and, more specifically, to a heating vent conduit for installation in a ventilation system as commonly found in buildings.

BACKGROUND

[0003] Great unwanted temperature variances exist between rooms or offices located through the same house or building, respectively. This temperature variance exists due in part to the properties of air, whereby hotter air is less dense and thus rises, while in comparison, colder air is denser and thus tends to remain at lower altitudes. Consequently, rooms or offices located at high altitudes tend to be warmer while rooms or offices located at low altitudes tend to remain cooler.

[0004] This phenomenon is also illustrated due to the fact that the further rooms or offices are spatially located from a furnace or air conditioner (or any other device that distributes air), the longer said air takes to travel to these destinations and thus will either warm up or cool off, reducing its efficiency when it arrives at its destination through the ventilation.

[0005] Centralized heating or air conditioning systems attempt to regulate the overall temperature of a house or building. As such, the centralized heater or air conditioner will send a constant flow of air to a main vent conduit, which will distribute equally the air to all rooms. This poses the obvious problem that rooms located at high or low altitudes do not benefit as equally compared to other rooms that more centrally located, and as previously mentioned, the further the rooms are from the centralized unit, the more the air is affected by ambient temperatures.

[0006] Devices exist, such as United States Patent Application No. 2011/0237175 (Buseyne et al.) that teaches a device for heating, cooling and ventilating systems. Buseyne's device is a centralized unit that receives air from another source, and redistributes air to nearby rooms. Every blowing orifice has its own unit for heating or treating the air before sending it off along the ventilation system before it reaches its destination. However, Buseyne's unit has major drawbacks. First, it is once again (albeit spatially closer to the main unit) a centralized system, such that the heaters that are located by the blowing orifice are still distant from the ultimate destinations. As such, air still has time to cool off or warm up before arriving at its destination. Secondly, this device must completely replace existing ventilation at a central hub in order to install and control.

[0007] Another major problem that exists in the field is the fact that these independent heating systems cannot be independently controlled from the room itself. Indeed, there is usually a main thermostat that controls the overall heating, and thus users in their respective rooms or offices cannot benefit from being able to select a desired temperature for themselves.

[0008] Consequently, a device is needed that can overcome the problems as described above. The present invention discloses a vent conduit with an independent heater that can overcome said problems. The present vent conduit can be installed on existing ventilation in the home or office by replacing the existing end boot at the blowing orifice, and has an independent heater that can control temperatures specifically per room as the air flows directly in said room. When multiple vent conduits with independent heaters are installed in the same home or building, each heater can be independently calibrated such that the height of the room or office, or the distance of said room or office from the main heater becomes irrelevant. Indeed, each room or office can be cooled or warmed independently of another depending on the desired and preferred temperature of the specific occupant and based on the heater’s specific calibration (as set by the occupier). In order for the occupier to adjust the temperature of each independent heater, sensors (thermostats) are fitted in each room or office and are easily accessible by said occupier. To facilitate temperature exchange, each independent heater can communicate with the existing blower of the home or building and send a request to activate the blower in order to maintain desired temperature in said room or office. Further, the independent heaters each contain a specific heating unit with a heating element, which can be easily removed to allow for cleaning and maintenance.

[0009] In essence, this overall solution creates a situation whereby each room is independently heated, based on personal preferences, with each occupier being able to calibrate his or her heater. Additionally, different types of physical configurations exist in order to be fitted to the most common types of end boot configurations and to maximize applicability from various buildings and homes.

SUMMARY OF THE INVENTION

[0010] The present invention provides a heating vent conduit with a heating unit.

[0011] In a first aspect, the present invention provides a heating vent conduit, comprising a vent boot having an inlet boot aperture and an outlet boot aperture for connecting to a vent outlet. The heating vent conduit also has a base plate and a housing cover fastened to the vent boot on a first extremity of the housing cover and an inlet panel on a second extremity of the housing cover. The heating vent conduit also has an interchangeable, independent heater unit secured on the base plate and located within the housing cover and a thermostat remotely connected to the heating vent conduit to enable control of the heater unit wherein the heating vent conduit is fitted onto an existing ventilation conduit to enable independent control of heat at a vent outlet.

[0012] In a second aspect, the present invention provides a heater unit comprising a heater housing, at least one ceramic mount fastened on the heater housing, at least one heating element secured within the at least one ceramic mount wherein the heater unit is installed in a heating vent conduit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The embodiments of the present invention will now be described by reference to the following figures. These figures are illustrative and are not intended to be limiting.

[0014] FIG. 1 is a perspective view of a heating vent conduit according to a first embodiment of the present invention;

[0015] FIG. 2 is a perspective view of a heating vent conduit without a housing cover or heater unit according to a first embodiment of the present invention;

[0016] FIG. 3 is a perspective view illustrative of a housing cover for a heating vent conduit according to a first embodiment of the present invention;
[0017] FIGS. 4a and 4b are perspective views illustrative of a heater unit for a heating vent conduit according to a first embodiment of the present invention;

[0018] FIG. 4c is a perspective view illustrative of a variant of a heater unit for a heating vent conduit according to a first embodiment of the present invention;

[0019] FIG. 4d is a perspective view of a heater unit and structural member for a heating vent conduit according to a first embodiment of the present invention;

[0020] FIG. 5 is a perspective view illustrative of a heating vent conduit with an installed heater unit and without a housing cover according to a first embodiment of the present invention;

[0021] FIG. 6a is a perspective view illustrative of a heating vent conduit with an installed heater unit and without a housing cover or base plate according to a first embodiment of the present invention;

[0022] FIG. 6b is a side view of a heating vent conduit without a housing cover according to a first embodiment of the present invention;

[0023] FIG. 7 is a perspective view of a vent boot according to a first embodiment of the present invention;

[0024] FIG. 8 is a cross-sectional side view illustrative of a heating vent conduit complete with accompanying wiring according to a first embodiment of the present invention;

[0025] FIG. 9 is a top view illustrative of a heating vent conduit complete with accompanying wiring according to a first embodiment of the present invention;

[0026] FIG. 10 is a perspective view of a room with an installed heating vent conduit, connected to both a blower and thermostat according to a first embodiment of the present invention;

[0027] FIG. 11 is a perspective view illustrative of a heating vent conduit according to a second embodiment of the present invention;

[0028] FIG. 12 is a lower perspective view illustrative of a heating vent conduit according to a third embodiment of the present invention;

[0029] FIG. 13 is an upper perspective view illustrative of a heating vent conduit according to a third embodiment of the present invention;

[0030] FIG. 14 is a perspective view illustrative of a heating vent conduit without the front panel according to a third embodiment of the present invention;

[0031] FIG. 15 is a first perspective view illustrative of a heater unit for a heating vent conduit according to a second embodiment of the present invention for a heater unit; and

[0032] FIG. 16 is a second perspective view illustrative of a heater unit for a heating vent conduit according to a second embodiment of the present invention for a heater unit.

DETAILED DESCRIPTION

[0033] The following embodiments are merely illustrative and are not intended to be limiting. It will be appreciated that various modifications and/or alterations to the embodiments described herein may be made without departing from the invention and any modifications and/or alterations are within the scope of the contemplated invention.

[0034] The terms “coupled” and “connected”, along with their derivatives, may be used herein. It should be understood that these terms are not intended as synonyms for each other. Rather, in particular embodiments, “connected” may be used to indicate that two or more elements are in direct physical or electrical contact with each other. “Coupled” may be used to indicated that two or more elements are in either direct or indirect (with other intervening elements between them) physical or electrical contact with each other, or that the two or more elements co-operate or interact with each other (e.g. as in a cause and effect relationship).

[0035] With reference to FIG. 1 and according to one embodiment of the present invention, a heating vent conduit 10 is shown. The heating vent conduit 10 is generally comprised of a housing cover 15 and a vent boot 20. One extremity of the housing cover 15 is fastened to an inlet panel 17 by means of rivets, while the opposite extremity of the housing cover 15 is comprised of connecting members (not shown) that slide into first and second clamps (not shown) located on the front panel 45 of the vent boot 20. The housing cover 15 is fastened to the vent boot 20 on a first extremity of the housing cover 15 and an inlet panel 17 is fastened on a second extremity of the housing cover 15. The connection between the housing cover 15 and the vent boot 20 is meant to allow for air to flow unrestrictedly from an inlet aperture 35 of the inlet panel 17, through to the housing cover 15, into an inlet boot aperture (not shown) of the vent boot 20 and ultimately out of the outlet boot aperture 30 of the vent boot 20. The heating vent conduit 10 can be secured within a wall, ceiling, or other accommodating structure which supports ventilation systems. The heating vent conduit 10 can be fastened to the structure by means of first housing securing bracket 25 and second housing securing bracket (not shown), as well as first and second boot securing brackets, 40, 42. A worker skilled in the relevant art would appreciate that many types of fastening means could be utilized in order for the heating vent conduit to be stabilized within a ventilation system, and that first and second boot securing means 40, 42 could be removed completely, or be comprised of apertures on the vent boot 20 to facilitate manufacturing. A wire housing 47 can also be seen, fastened to the front panel 45 of the vent boot 20 by means of screws, such that it can be removed. The wire housing 47 serves to house wiring for a Printed Circuit Board “PCB” (not shown) and wiring to a male/female connector (not shown) as well as wiring for a heater unit (not shown) installed within the heating vent conduit 10 of the present invention. A worker skilled in the art would be familiar with other types of wiring configurations for a heating vent conduit with a heater unit that could be utilised for other common types of vent boot configurations as presently located in homes or buildings.

[0036] With reference to FIG. 2 and according to one embodiment of the present invention, the heating vent conduit 10 is shown without a housing cover and a heater unit. The inlet boot aperture 21 is shown, allowing air to flow from the inlet boot aperture 21 through to the outlet boot aperture 30. A structural member 50 is also shown which is fastened to the inside of the housing cover (not shown) by means of rivets. The structural member 50 serves the dual purpose of reinforcing the housing cover (not shown) and securing in place a heater unit (not shown). While the housing cover (not shown) is connected to the vent boot 20 by means of rivets; first and second clamps 55, 57 are also shown, which serve to connect to first and second connecting members (not shown) of the housing cover (not shown) to further secure said housing cover to the vent boot 20. A worker skilled in the relevant art would appreciate that said first and second clamps 55, 57 could be removed such that the housing cover would connect to the vent boot solely by means of rivets. With further reference to FIG. 2, a base plate 18 is shown and secures first and second housing securing bracket 25, 27. A worker skilled in
the relevant art would be familiar with means to produce the inlet panel 17 and base plate 18 as a one piece component or as a two piece component.

[0037] With reference to FIGS. 2 and 3, and according to one embodiment of the present invention, the structural member 50 is shown fitted within the housing cover 15. The wire housing 47 is also shown, which directs power wires (not shown) and PCB wires (not shown) through a housing wire aperture 48 and to the male/female connector (not shown). First and second connecting members 52, 54 can also be seen on the housing cover 15, which serve to slide into the first and second clamps 55 and 57 of the front panel 45 of the vent boot 20 which act as a locking mechanism to keep the housing cover 15 secured to the vent boot 20.

[0038] With reference to FIGS. 4a and 4b and according to one embodiment of the present invention, a heater unit 70 is shown. The heater unit 70 is comprised of a heating element 75, secured in three ceramic mounts 80, 82, 84 which are in turn encased in a heater housing 85. The ceramic mounts 80, 82, 84 are fastened to the heater housing 85 by means of clips 90, 92, 94 which clamp around the width of the ceramic mounts 80, 82, 84. The clips 90, 92, 94 are secured to the ceramic mounts 80, 82, 84 by means of screws 86. The ceramic mounts 80, 82, 84 are perforated such that the heating element 75 can snake through the perforations and occupy the area in between the ceramic mounts 80, 82, 84. Air that flows in the resulting space in between the snaking heating element 75 becomes warmer before it exits through the inlet boot aperture (not shown) of the heating vent conduit of the present invention. First and second heating joints 96, 98 are also shown, which serve to connect to first and second coupling members (not shown) to conduct electricity and thus heat the heating element 75 to the desired temperature. Various sealing members 95, 97, 99, 101, 103, 105 protrude from the heater unit 70 in order both prevent the heating unit 70 from moving forward into the housing cover (not shown), and to create air seals such that air is forced to flow through the heating element 75 and cannot otherwise escape. The sealing members 95, 97, 99, 101, 103, 105 are further described below.

[0039] With reference to FIGS. 4c and 4d and according to a variant of the first embodiment of the heater unit, the heater unit 70 is comprised solely of sealing members 97, 99, 103, 105. The removal of sealing members 95, 101 (not shown) allows for wiring to move unobstructedly from the wire housing (not shown), into the area adjacent of the heater unit 70 and through to the other electrical components (not shown). In order to preserve the air seal and for air to continue to move predominantly through the heating element 75, the first side 51 of the structural member 50 is wider than the second side 52 of said structural member 50, such that the first side 51 makes contact directly with the frame of the heater unit 70. Meanwhile, the second side 52 of the structural member 50 remains flush with sealing member 97, as was the case with the first embodiment of the heater unit.

[0040] With specific reference to FIGS. 5, 6a and 6b and according to one embodiment of the present invention, the heater unit 70 is located between the front panel 45 of the vent boot 20 and the structural member 50. As was previously explained, the heater unit 70 is further comprised of first and second structural sealing members 95, 97 as well as a lower structural sealing member 99 in order to create an airtight seal between said heater unit 70 and the structural member 50, and to prevent the heater unit 70 from moving further forward. The heater unit 70 is also comprised of first and second front panel sealing members 101, 103 as well as a lower front panel sealing member 105 which serve to create another airtight seal between said heater unit 70 and the front panel 45 of the vent boot 20. Once properly positioned, the airtight seal created between the structural member 50, the front panel 45, and the heater unit 70, restricts air flowing originating from the inlet aperture 35 of the inlet panel 17, through to the housing cover (not shown), into a boot inlet aperture (not shown), through the vent boot 20, and ultimately through to the boot outlet aperture 30. The heater unit 70 is designed to be removable and interchangeable, such that it can pivot around its base and be removed from the outlet boot aperture 30 of the vent boot 20. This facilitates cleaning of the heater unit 70, as well as allowing for easy repairs or replacing of the heater unit 70 entirely. A worker skilled in the relevant art would appreciate another embodiment of the heater unit, whereby the removal of said heater unit would be facilitated by means of small wheels located on the lower end of the heater unit. The heater unit would be removable by pivoting the heater unit around said wheels and retracting the heater unit, gliding it along the way up the vent boot by means of its wheels.

[0041] With specific reference to FIGS. 6a and 6b, and according to one embodiment of the present invention, the heater unit 70 is shown sealed in between the front panel 45 of the vent boot 20 and the structural member 50 in greater detail. In particular, the first and second structural sealing members 95, 97 are shown secured against the structural member 50, while first and second front panel sealing members 101, 103 are shown secured against the front panel 45 of the vent boot 20.

[0042] With reference to FIGS. 7, 8 and 9, and according to one embodiment of the present invention, the interior of the vent boot 20 is shown. In order for the heater unit 70 to be operational, a source of electricity or power has to be provided to said unit.

[0043] With specific reference to FIGS. 7 and 8, power is led to the vent conduit 10 by means of power wires 110 entering the vent boot 20 via a power supply cover 115. Power wires 110 then are fitted through a first wire aperture 120 of the front panel 45 and into the wire housing 47. From the wire housing 47, the power wires 110 are connected into a male/female connector 125. PCB wires 130 are also shown, which connect from a PCB 135 in through a second wire aperture 140 of the front panel 45. From the second wire aperture 140, the PCB wires 130 go into the wire housing 47, and through to the male/female connector 125. From the male/female connector 125, power wires 110 and PCB wires 130 are connected to first and second coupling members 145, 147, and power wires 110 are specifically connected to thermal protector 150. The current flowing through power wires 110 serve to heat the heating element (not shown) of the heater unit 70. The thermal protector 150 acts as a breaker, cutting the flow of power from the power wires 110 and the PCB wires 130 through the heating element (not shown) when the airflow is insufficient and the heating element (not shown) is overheating. A worker skilled in the relevant art would be familiar with various types of thermal protectors and breakers that could be utilized in order to perform the function as described above.

[0044] With reference to FIG. 9, communication wires 155 are also shown, which are connected to the PCB 135 and into a 3-pole connector 160. From the 3-pole connector 160, the
communication wires 155 are fitted through a third wire aperture 165 (as shown in FIG. 7) and are either connected to a blower to regulate airflow, or to another vent conduit in a daisy chain connection. Ultimately, all vent conduits connected via daisy chain can communicate to the blower to regulate airflow and temperature throughout their respective environments.

[0045] With reference to FIG. 10, the heating vent conduit 10 is shown installed in a room of a house with a commonly found ventilation system with a vent outlet 5. The heating vent conduit 10 is connected to communications wires 155, which follow the ventilation through to a connection panel 170 of a blower 175. As explained above, said communication wires 155 can serve to regulate airflow to the vent conduit 10. The vent conduit 10 is also electrically connected to power wires 110, which are in turn connected to a thermostat 180. A person can configure the thermostat 180 to keep the room at a desired temperature, and the thermostat will regulate the heating vent conduit 10 accordingly. The thermostat 180 is electrically connected to a power source via thermostat wiring 185.

[0046] With reference to FIG. 11, a second embodiment of the heating vent conduit 10 is shown. In this second embodiment, a narrower version of the vent boot 20 is shown. As such, the resulting outlet boot aperture 30 is also narrower but still allows for air to flow through to the heat unit (not shown), and ultimately through the inlet aperture 35 of the housing 15. The narrower vent boot 20 reflects another type and size of vent conduit in the market. A worker skilled in the art would appreciate that different shapes and sizes of vent boots or housings can be utilized without departing from the scope of the present invention.

[0047] With reference to FIGS. 12, 13 and 14, a third embodiment of the heating vent conduit 10 is shown. In this third embodiment, the overall layout of the heating vent conduit 10 has changed. While the outlet boot aperture 30 is in approximately the same spatial vicinity as was the case for the first and second embodiments, the inlet aperture 35 is now below the heating vent conduit 10, such that the airflow travels in an upward direction, from the inlet aperture 35 of the housing 15, through to the heat unit 70 and an inlet boot aperture (not shown), and out of the outlet boot aperture 30 of the vent boot 20. In this embodiment, the housing 15 is much narrower, and is mounted on each side by first and second housing brackets 25, 27. The vent boot 20 and front panel 45 are approximately the same shape as was the case in the first embodiment. Male/female connector 125, PCB 135 and 3-pole connector 160 are all shown in greater detail, and serve the same purposes as was described in the first embodiment.

[0048] With reference to FIGS. 15 and 16, the heater unit 70 according to another embodiment of the heater unit is shown in greater detail. In this third embodiment, the heat unit 70 is wider and thus accommodates four ceramic mounts, 80, 82, 84, (fourth ceramic mount not shown), instead of three ceramic mounts as was the case in the first embodiment. The heating element 75 is also shown, but said heating element 75 is not shown fastened throughout all of the perforations of the ceramic mounts 80, 82, 84 for illustrative purposes. In this third embodiment, ceramic mounts 80, 82, 84 are not fastened into place by clips, as was the case in the first embodiment. In this embodiment, ceramic mounts 80, 82, 84 are locked into place by forcing each extremity of ceramic mounts 80, 82, 84 into a locking aperture 190. Said locking aperture 190 holds the ceramic mounts 80, 82, 84 securely into place without the need of clips and screws, as was the case in the first embodiment. The ceramic mounts 80, 82, 84 simply need to be wedged into the locking aperture 190. The edges of locking aperture 190 tighten around the ceramic mounts 80, 82, 84 such that they are difficult to remove without exerting a significant amount of force. A worker skilled in the relevant art would appreciate that these various types of fastening means for the ceramic mounts are interchangeable between the first, second and third embodiments. The heater unit 70 in this embodiment also comprises of a mesh grill 185 that prevents debris and other larger particles from making contact with the heating element. The thermal protector 150 is also shown in greater detail, which again serves to act as a breaker to cut the flow of power when the airflow is insufficient and the heating element 75 is overheating. In this embodiment, there also exists a fusible link 200, which melts at a certain temperature and serves as an additional breaker should the thermal protector 150 be broken or not functioning properly. A worker skilled in the relevant art would appreciate that many types of fusible links could be utilized here to achieve the desired effect, and that the fusible link 200 or any variations thereof could be added to any of the other embodiments without departing from the scope and spirit of the invention.

[0049] The heating vent conduit as disclosed and described in the present invention allows for independent control of the temperature in a room in order to accommodate an individual's personal temperature preference. It should be noted that all users will be able to adjust the temperature settings according to the thermostat such that the rooms or offices will differ one from the other and accommodate everyone individually. Indeed, in lieu of having the ventilation system provide increased heat to the entire building resulting in the entire home or building having an aggregate uniform temperature (thus unfortunately allowing for discrepancies between room temperatures), the present invention allows for the independent control of heat in a room with a main source of heat at a lower rate. This will reduce overall energy costs, as the ventilation system will have a reduced workload and have the heating vent conduits of the present invention compensate for the reduced workload, while simultaneously maximizing comfort for each occupant.

[0050] The present heating vent conduit can be installed on existing ventilation in the home or office by replacing the existing end boot at the blowing orifice, and has an independent heater that can control temperatures specifically per room as the air flows directly in said room through a thermostat.

[0051] Many modifications of the embodiments described herein as well as other embodiments may be evident to a person skilled in the art having the benefit of the teachings presented in the foregoing description and associated drawings. It is understood that these modifications and additional embodiments are captured within the scope of the contemplated invention which is not to be limited to the specific embodiment disclosed.

We claim:
1. A heating vent conduit, comprising:
   a. a vent boot having an inlet boot aperture and an outlet boot aperture for connecting to a vent outlet;
   b. a base plate;
   c. a housing cover fastened to the vent boot on a first extremity of the housing cover and an inlet panel on a second extremity of the housing cover;
d. an interchangeable, independent heater unit secured on the base plate and located within the housing cover;

e. a thermostat remotely connected to the heating vent conduit to enable control of the heater unit; and

wherein the heating vent conduit is fitted onto an existing ventilation conduit to enable independent control of heat at a vent outlet.

2. The heating vent conduit according to claim 1 further comprising boot securing brackets on the vent boot.

3. The heating vent conduit according to claim 1 further comprising housing securing brackets connected to the base plate.

4. The heating vent conduit according to claim 1 wherein the housing cover further comprises an inlet panel with an inlet aperture.

5. The heating vent conduit according to claim 1 further comprising a structural member fastened to the housing cover.

6. The heating vent conduit according to claim 1 wherein the heater unit comprises at least one heating element, wherein a temperature of the at least one heating element is controlled by the thermostat.

7. The heating vent conduit according to claim 6 wherein the heater unit further comprises at least one perforated ceramic mount to support the at least one heating element.

8. The heating vent conduit according to claim 7 wherein the heater unit further comprises at least two sealing members, wherein the at least two sealing members prevent air from escaping an area defined by the at least one heating element.

9. A heater unit comprising:

a. a heater housing;

b. at least one ceramic mount fastened on the heater housing;

c. at least one heating element secured within the at least one ceramic mount; and

wherein the heater unit is installed in a heating vent conduit.

10. The heater unit according to claim 9 further comprising at least one clip to secure the at least one ceramic mount within the heater housing.

11. The heater unit according to claim 10 further comprising at least one locking aperture to secure the at least one ceramic mount within the heater housing.

12. The heater unit according to claim 11 further comprising at least one sealing member.

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