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(54) **APPARATUS FOR IMPROVED EFFICIENCY OF AN AIR CONVERSION DEVICE**

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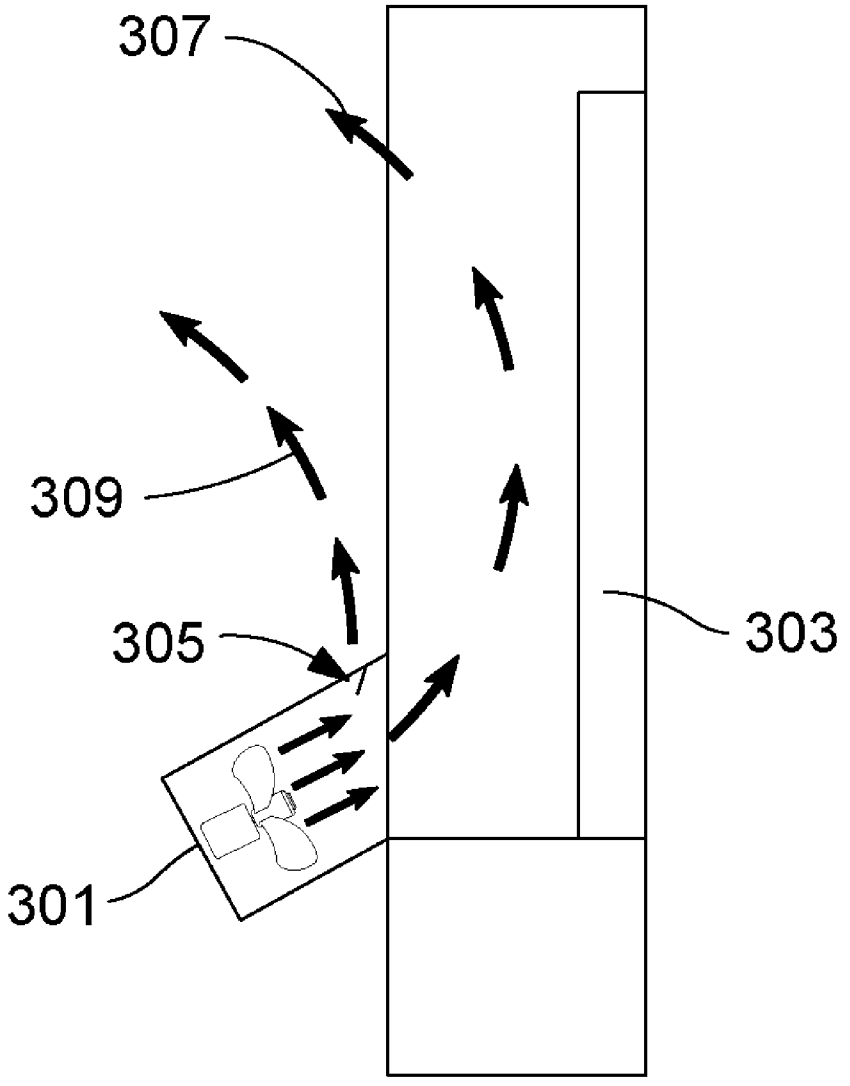
(57) **ABSTRACT**

An apparatus includes a housing including a first side having a first opening and a second side having a second opening. At least one fan creates an airflow through the housing between the first opening and the second opening. A motor activates the at least one fan to create the airflow. A control mechanism controls the motor. A mounting for the housing enables the apparatus to direct the airflow about an air conversion device, thereby increasing an efficiency of the air conversion device.



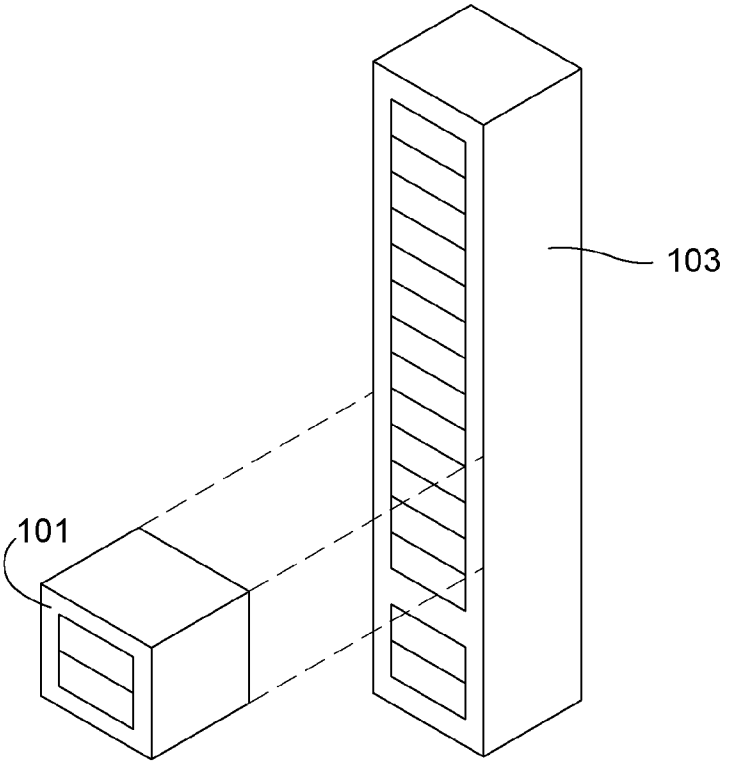


FIG. 1A

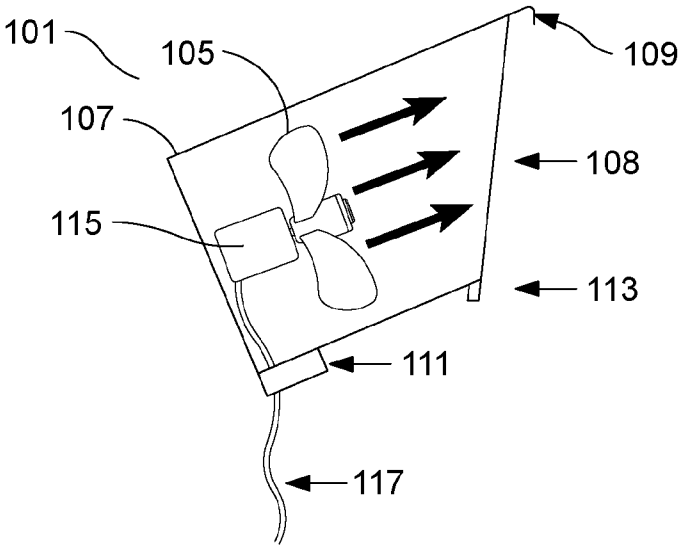


FIG. 1B

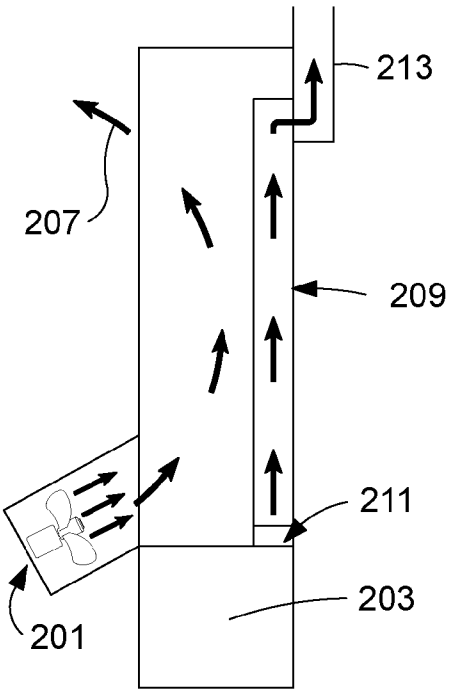


FIG. 2

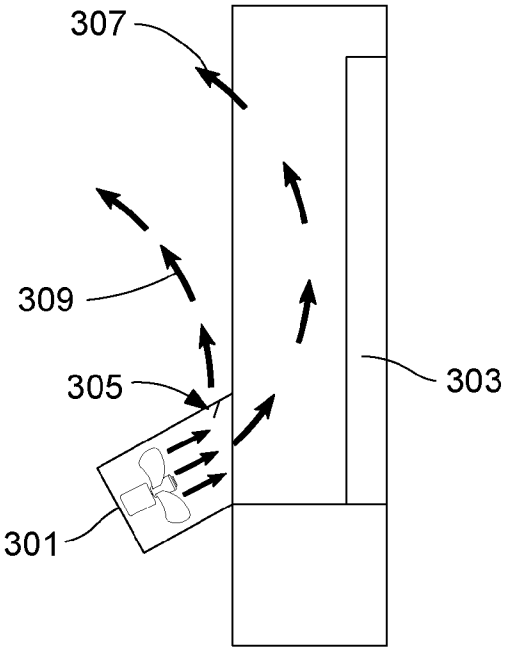


FIG. 3A

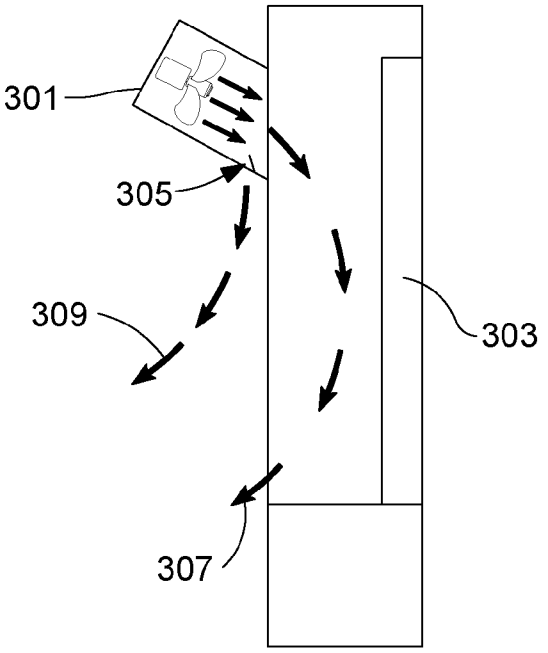


FIG. 3B

APPARATUS FOR IMPROVED EFFICIENCY OF AN AIR CONVERSION DEVICE

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0001] Not applicable.

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER LISTING APPENDIX

[0002] Not applicable.

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FIELD OF THE INVENTION

[0004] The present invention relates generally to air conversion devices. More particularly, the invention relates to a heating recovery apparatus designed to improve the efficiency of a heating source.

BACKGROUND OF THE INVENTION

[0005] Wall mounted gas furnaces are often used to heat rooms or houses. Some such furnaces use natural airflow to circulate the heat from the furnace, which is not sufficient to recover all heat possible. As a result much of the heat from these furnaces is expelled into the environment through a chimney, increasing the user's energy bill and contributing to global worming. It is therefore an objective of the present invention to provide a heat recovery apparatus able to generally prevent heat from being expelled into the environment.

[0006] In view of the foregoing, there is a need for improved techniques for providing a heat recovery apparatus that recovers lost heat from a conventional wall mounted gas furnace or heating unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0008] FIGS. **1**A and **1**B illustrate an exemplary recovery apparatus for recovering lost heat from a heating source, in accordance with an embodiment of the present invention. FIG. **1**A is a front perspective view of the recovery apparatus and the heating source, and FIG. **1**B is a cross sectional side view of the recovery apparatus;

[0009] FIG. **2** is a cross sectional side view on of an exemplary heating system using a heat recovery apparatus illustrating the airflow of the heating system, in accordance with an embodiment of the present invention; and

[0010] FIGS. **3**A and **3**B illustrate the airflow of a heating system using a heat recovery apparatus with an internal wing, in accordance with an embodiment of the present invention. FIG. **3**A is a cross sectional side view of the heating system configured with the heat recovery apparatus creating an upward airflow, and FIG. **3**B is a cross sectional view of the heating system configured with the heat recovery apparatus creating a downward airflow.

[0011] Unless otherwise indicated illustrations in the figures are not necessarily drawn to scale.

SUMMARY OF THE INVENTION

[0012] To achieve the forgoing and other objects and in accordance with the purpose of the invention, an apparatus for improved efficiency of an air conversion device is presented.

[0013] In one embodiment an apparatus includes a housing including a first side having a first opening and a second side having a second opening, means for creating an airflow through the housing between the first opening and the second opening, means for activating the creating means to create the airflow, means for controlling the activating means, and means for enabling the apparatus to direct the airflow about an air conversion device, thereby increasing an efficiency of the air conversion device. Another embodiment further includes means for responding to temperature changes of the air conversion device to control the controlling means. Yet another embodiment further includes means for directing a portion of the airflow along a portion of a front surface external of the air conversion device.

[0014] In another embodiment an apparatus includes a housing including a first side having a first opening and a second side having a second opening. At least one fan creates an airflow through the housing between the first opening and the second opening. A motor activates the at least one fan to create the airflow. A control mechanism controls the motor. A mounting for the housing enables the apparatus to direct the airflow about an air conversion device, thereby increasing an efficiency of the air conversion device. In another embodiment the mounting includes means for joining the second side to a front surface of the air conversion device. In yet another embodiment the apparatus is joined proximate a top portion of the front surface. In still another embodiment a direction of the airflow at the second opening has an obtuse angle with respect to the front surface for enabling a majority of the airflow to pass along a portion of the front surface internal of the air conversion device. In another embodiment the housing is generally rectangular in shape and the second side is angled. In yet another embodiment the direction of the airflow is downward within the air conversion device. In still another embodiment the direction of the airflow is from the first opening to the second opening. Another embodiment further includes a temperature sensor in communication with the control mechanism and disposed proximate the second side for responding to temperature changes of the air conversion device to control the activation. Yet another embodiment further includes means for directing a portion of the airflow along a portion of the front surface external of the air conversion device. In still another embodiment the control mechanism further includes a manual fan control. Another embodiment further includes an additional fan and an additional motor in communication with the control mechanism for increasing a volume of the airflow. In yet another embodiment the air conversion device is a heating system.

[0015] In another embodiment an apparatus includes a housing including a first side having a first opening and an angled second side having a second opening. At least one fan creates a forced airflow between the first opening and the second opening. A motor rotates the at least one fan to create the forced airflow. An attachment mechanism joins the sec-

ond side to a front surface of a heating system thus enabling the apparatus to direct a substantial portion of the forced airflow to pass downward along a portion of the front surface internal of the heating system. A temperature sensor is disposed proximate the second side for responding to temperature changes of the heating system. A control mechanism is responsive to the temperature sensor for controlling the motor, thereby increasing an efficiency of the heating system. Another embodiment further includes means for directing a portion of the forced airflow along a portion of the front surface external of the heating system. In yet another embodiment a direction of the forced airflow is from the first opening to the second opening. In still another embodiment the attachment mechanism includes hooks. In another embodiment the control mechanism further includes a manual fan control.

[0016] Other features, advantages, and objects of the present invention will become more apparent and be more readily understood from the following detailed description, which should be read in conjunction with the accompanying drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] The present invention is best understood by reference to the detailed figures and description set forth herein.

[0018] Embodiments of the invention are discussed below with reference to the Figures. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the invention extends beyond these limited embodiments. For example, it should be appreciated that those skilled in the art will, in light of the teachings of the present invention, recognize a multiplicity of alternate and suitable approaches, depending upon the needs of the particular application, to implement the functionality of any given detail described herein, beyond the particular implementation choices in the following embodiments described and shown. That is, there are numerous modifications and variations of the invention that are too numerous to be listed but that all fit within the scope of the invention. Also, singular words should be read as plural and vice versa and masculine as feminine and vice versa, where appropriate, and alternative embodiments do not necessarily imply that the two are mutually exclusive.

[0019] The present invention will now be described in detail with reference to embodiments thereof as illustrated in the accompanying drawings.

[0020] Detailed descriptions of the preferred embodiments are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

[0021] It is to be understood that any exact measurements/dimensions or particular construction materials indicated herein are solely provided as examples of suitable configurations and are not intended to be limiting in any way. Depending on the needs of the particular application, those skilled in the art will readily recognize, in light of the following teachings, a multiplicity of suitable alternative implementation details.

[0022] Preferred embodiments of the present invention provide an apparatus designed to improve the efficiency of an air conversion device such as, but not limited to, a heating system. The apparatus recovers lost heat from the heating source. Preferred embodiments are used in conjunction with a conventional gas heater or furnace and are easily attached to such a furnace or heater. Preferred embodiments improve the efficiency of existing heating systems and therefore reduce the cost of operating such heating systems. Preferred embodiments are safe, economical and easy to use and economical to manufacture.

[0023] FIGS. **1**A and **1**B illustrate an exemplary recovery apparatus **101** for recovering lost heat from a heating source **103**, in accordance with an embodiment of the present invention. FIG. **1**A is a front perspective view of recovery apparatus **101** and heating source **103**, and FIG. **1**B is a cross sectional side view of recovery apparatus **101**. Referring to FIG. **1**B, in the present embodiment, apparatus **101** comprises a fan **105** in a housing **107** that can be easily attached to an existing heater with mounting hooks **109**. In alternate embodiments the heat recovery apparatus may be attached to the heating source with various different means such as, but not limited to, screws, bolts, welding, etc. In the present embodiment, housing **107** is generally rectangular in shape with an angled side **108** that rests against heating source **103** when installed. However, heat recovery apparatuses in alternate embodiments may be various different shapes such as, but not limited to, spherical shapes, cylindrical shapes, decorative shapes, etc. In the present embodiment, fan **105** creates forced airflow, which improves the efficiency of heating source **103**. In alternate embodiments, the heat recovery apparatus may comprise multiple fans. In the present embodiment, apparatus **101** comprises a fan control mechanism **111** with temperature sensors **113**, which serves to activate fan **105**. Fan **105** is connected to an electric motor **115** that is powered through an ordinary power line **117**. In some embodiments, apparatus **101** may include multiple fans **105** as means for creating the airflow. In alternate embodiments the heat recovery apparatus may be battery powered. In the present embodiment, apparatus **101** is cost efficient, easy to attach to existing wall heating furnaces, and significantly reduces the amount of time and gas used by heating source **103** to achieve and maintain a desired temperature in the space being heated. Heat recovery apparatuses according to the present embodiment have been found to reduce energy bills 3-10 times.

[0024] Referring to FIG. **1**A, in typical use of the present embodiment, heat recovery apparatus **101** is attached to the top or bottom of heating source **103**. In the present embodiment, heating source **103** is a wall mounted gas heater. However, heat recovery apparatuses in alternate embodiments may be implemented to be used with other types of heating sources such as, but not limited to, free standing gas heaters, electric heaters, wood burning furnaces, etc. In the present embodiment, when gas is burning in heating source **103**, temperature sensor **113** of apparatus **101** detects the rise in temperature and prompts control mechanism **111** to turn on fan **105**. Fan **105** creates forced airflow. When a temperature sensor within heating source **103** determines that the desired temperature is achieved within the space being heated, heating source **103** cuts off the gas flow. Temperature sensor **113** detects the lower temperature within heating source **103** and turns off fan **105**. In alternate embodiments, different means may be used to activate the fan in the heat recovery apparatus. For example, without limitation, the fan may be connected to

the temperature sensor within the heating source rather than being connected to a separate temperature sensor.

[0025] FIG. **2** is a cross sectional side view on of an exemplary heating system using a heat recovery apparatus **201** illustrating the airflow of the heating system, in accordance with an embodiment of the present invention. In the present embodiment, heat recovery apparatus **201** is attached to the bottom of a heating source **203** to create an upward airflow **207**. Upward airflow **207** moves past a heating element **209** of heating source **203**. Heating element **209** in the present embodiment is a passage of air heated by a gas burner **211**. However, alternate embodiments of the present invention may be used with heating sources comprising various different types of heating elements such as, but not limited to, electric heating coils, heating elements containing water heated by a gas burner or electricity, wood burning heating elements, etc. In the present embodiment, heated air within heating element **209** moves up through heating element **209** and out a chimney **213** and heat from this heated air radiates out into the space being heated. When upward airflow **207** flows past heating element **209** more of the heat from heating element **209** is carried out into the space than would without heat recovery apparatus **201**. In alternate embodiments, heat recovery apparatuses can create one or multiple airflows, which may be under or over the hood of the heating source. In another alternate embodiment, the fan in the heat recovery apparatus may be reversed to pull air out of the heating source rather than forcing air into the heating source. This outward airflow will pull heat from the heating element out into the space being heated.

[0026] FIGS. **3**A and **3**B illustrate the airflow of a heating system using a heat recovery apparatus **301** with an internal wing **305**, in accordance with an embodiment of the present invention. FIG. **3**A is a cross sectional side view of the heating system configured with heat recovery apparatus **301** creating an upward airflow, and FIG. **3**B is a cross sectional view of the heating system configured with heat recovery apparatus **301** creating a downward airflow. In the present embodiment internal wing **305** creates an internal airflow **307** along with an external airflow **309**. External airflow **309** may serve to pull more of the heat from a heating source **303** into the space being heated. Referring to FIG. **3**A, mounting heat recovery apparatus **301** to the bottom of heating source **303** pointing up creates an upward airflow (i.e., from bottom to top). Referring to FIG. **3**B, mounting heat recovery apparatus **301** to the top of heating source **303** pointing down creates a downward airflow (i.e., from top to bottom). Creating airflow in a downward direction can increase efficiency more than when the airflow is moving in an upward direction. It should be noted that as general rule this covers any external or internal airflow.

[0027] In some alternate embodiments of the present invention, the heat recovery apparatus may not be mounted directly on the heating system, but may be positions near the heating system to induce an airflow though the heating system. In some of these embodiments, the heat recovery apparatus may further include devices such as, but not limited to, vanes, deflector, ducts, etc., to direct the airflow to a desired entry location on the heating system.

[0028] In some other alternate embodiments of the present invention, the heat recovery apparatus may further include an air filter/purifier. These embodiments may help to reduce dust in the air and accumulation of dust in the heating system.

[0029] In yet some other alternate embodiments of the present invention, the heat recovery apparatus may be adapted with a humidifier system. These embodiments may help to provide a more comfortable healthier environment in the space being heated.

[0030] In still some other alternate embodiments of the present invention, the heat recovery apparatus may further include a manual fan control in the control mechanism **111** to override the temperature sensor **113** and prompt control mechanism **111** to turn the fan on or off. Some of these embodiments may further include means for controlling the speed of the fan.

[0031] Having fully described at least one embodiment of the present invention, other equivalent or alternative methods of providing a heating system efficiency increasing apparatus according to the present invention will be apparent to those skilled in the art. The invention has been described above by way of illustration, and the specific embodiments disclosed are not intended to limit the invention to the particular forms disclosed. For example, the particular implementation of the apparatus may vary depending upon the particular type of system on which it is used. The systems described in the foregoing were directed to heating implementations; however, similar techniques are to use efficiency increasing apparatuses on other types of air conversion devices or environmental control systems such as, but not limited to, cooling systems, window mounted air conditioners, air filtration and purification systems, etc. Non-heating implementations of the present invention are contemplated as within the scope of the present invention. The invention is thus to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the following claims.

[0032] Claim elements and steps herein have been numbered and/or lettered solely as an aid in readability and understanding. As such, the numbering and lettering in itself is not intended to and should not be taken to indicate the ordering of elements and/or steps in the claims.

What is claimed is:

1. An apparatus comprising:

a housing comprising a first side having a first opening and a second side having a second opening;

means for creating an airflow through said housing between said first opening and said second opening;

means for activating said creating means to create said airflow;

means for controlling said activating means; and

means for enabling the apparatus to direct said airflow about an air conversion device, thereby increasing an efficiency of the air conversion device.

2. The apparatus as recited in claim **1**, further comprising means for responding to temperature changes of the air conversion device to control said controlling means.

3. The apparatus as recited in claim **1**, further comprising means for directing a portion of said airflow along a portion of a front surface external of the air conversion device.

4. An apparatus comprising:

a housing comprising a first side having a first opening and a second side having a second opening;

at least one fan for creating an airflow through said housing between said first opening and said second opening;

a motor for activating said at least one fan to create said airflow;

a control mechanism for controlling said motor; and

a mounting for said housing for enabling the apparatus to direct said airflow about an air conversion device, thereby increasing an efficiency of the air conversion device.

5. The apparatus as recited in claim **4**, wherein said mounting comprises means for joining said second side to a front surface of the air conversion device.

6. The apparatus as recited in claim **5**, wherein the apparatus is joined proximate a top portion of the front surface.

7. The apparatus as recited in claim **5**, wherein a direction of said airflow at said second opening has an obtuse angle with respect to the front surface for enabling a majority of said airflow to pass along a portion of the front surface internal of the air conversion device.

8. The apparatus as recited in claim **7**, wherein said housing is generally rectangular in shape and said second side is angled.

9. The apparatus as recited in claim **7**, wherein said direction of said airflow is downward within the air conversion device.

10. The apparatus as recited in claim **4**, wherein said direction of said airflow is from said first opening to said second opening.

11. The apparatus as recited in claim **5**, further comprising a temperature sensor in communication with said control mechanism and disposed proximate said second side for responding to temperature changes of the air conversion device to control said activation.

12. The apparatus as recited in claim **5**, further comprising means for directing a portion of said airflow along a portion of the front surface external of the air conversion device.

13. The apparatus as recited in claim **4**, wherein said control mechanism further comprises a manual fan control.

14. The apparatus as recited in claim **4**, further comprising an additional fan and an additional motor in communication with said control mechanism for increasing a volume of said airflow.

15. The apparatus as recited in claim **4**, wherein the air conversion device is a heating system.

16. An apparatus comprising:

a housing comprising a first side having a first opening and an angled second side having a second opening;

at least one fan for creating a forced airflow between said first opening and said second opening;

a motor for rotating said at least one fan to create said forced airflow;

an attachment mechanism for joining said second side to a front surface of a heating system thus enabling the apparatus to direct a substantial portion of said forced airflow to pass downward along a portion of the front surface internal of the heating system;

a temperature sensor disposed proximate said second side for responding to temperature changes of the heating system; and

a control mechanism responsive to said temperature sensor for controlling said motor, thereby increasing an efficiency of the heating system.

17. The apparatus as recited in claim **16**, further comprising means for directing a portion of said forced airflow along a portion of the front surface external of the heating system.

18. The apparatus as recited in claim **16**, wherein a direction of said forced airflow is from said first opening to said second opening.

19. The apparatus as recited in claim **16**, wherein said attachment mechanism comprises hooks.

20. The apparatus as recited in claim **16**, wherein said control mechanism further comprises a manual fan control.

* * * * *