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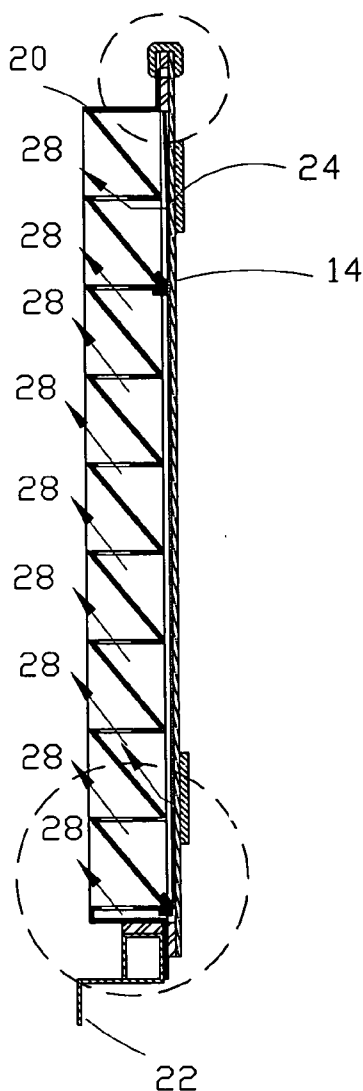
(19) **United States**(12) **Patent Application Publication**  
**Kerr**(10) **Pub. No.: US 2006/0076008 A1**(43) **Pub. Date: Apr. 13, 2006**(54) **SOLAR WINDOW HEATER****Publication Classification**(76) Inventor: **Douglas S. Kerr**, Galveston, IN (US)(51) **Int. Cl.****F24J 2/44** (2006.01)

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**Frank D. Lachenmaier****Suite 200****116 N. Main St.****P.O. Box 1047****Kokomo, IN 46903-1047 (US)**(52) **U.S. Cl. .... 126/638**(57) **ABSTRACT**(21) Appl. No.: **11/243,690**(22) Filed: **Oct. 5, 2005****Related U.S. Application Data**

(60) Provisional application No. 60/618,385, filed on Oct. 13, 2004.

This invention relates generally to solar heaters. More specifically this invention relates to a passive solar heater that can be placed behind a un catching window to add heat to a room through conduction and convection by absorbing solar energy with a black aluminum plate and heating air between the plate and an acrylic plastic glazing sheet and transferring that heated air through a typical aluminum gable ventilator into a room or other closed space.



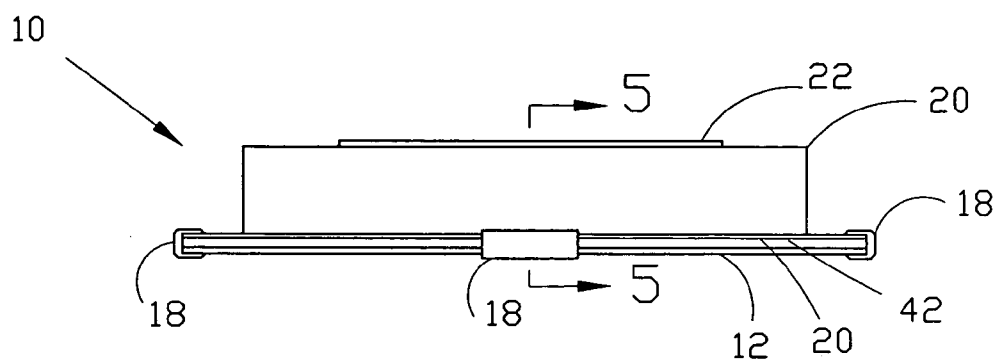


FIG. 1

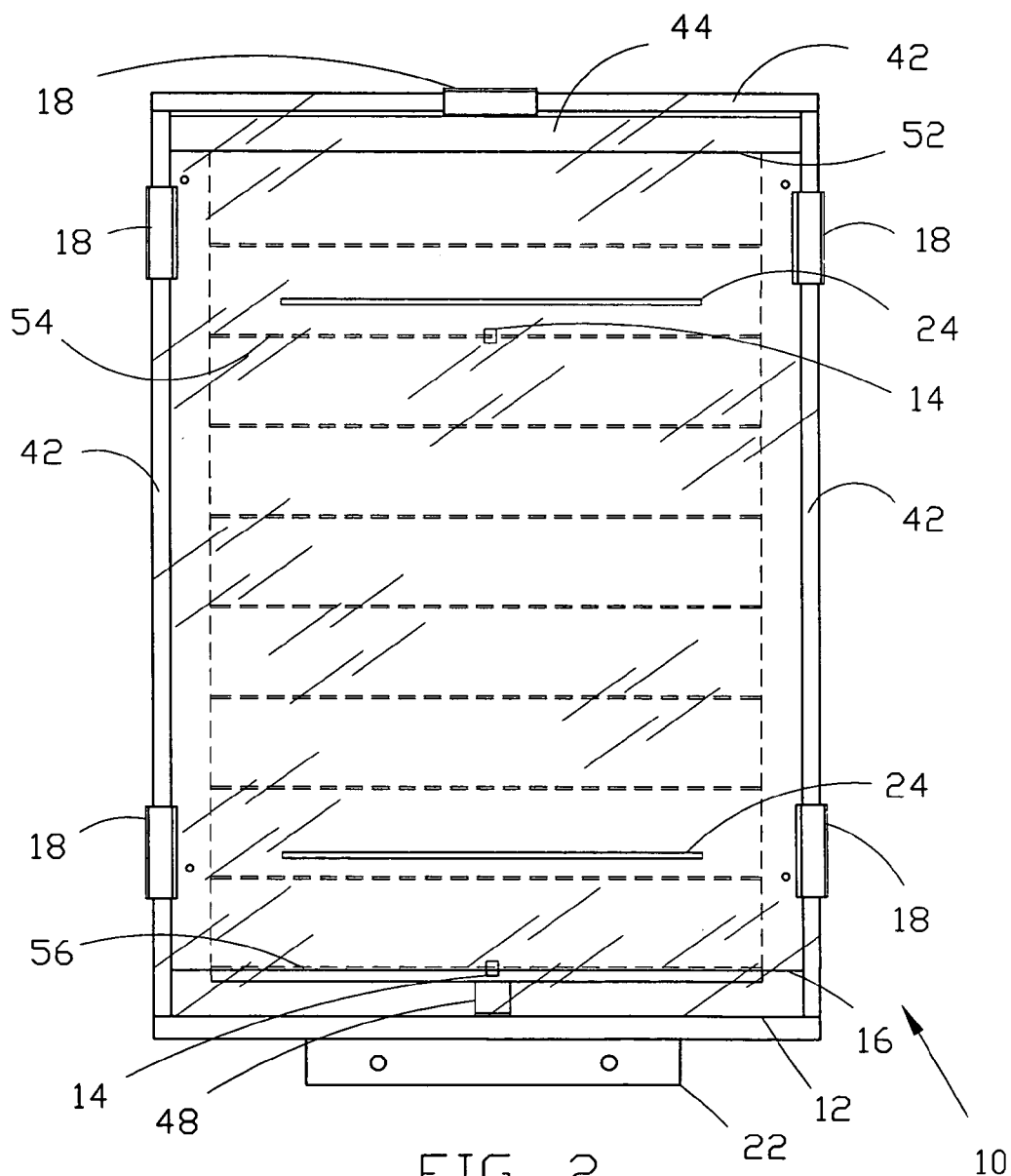


FIG. 2

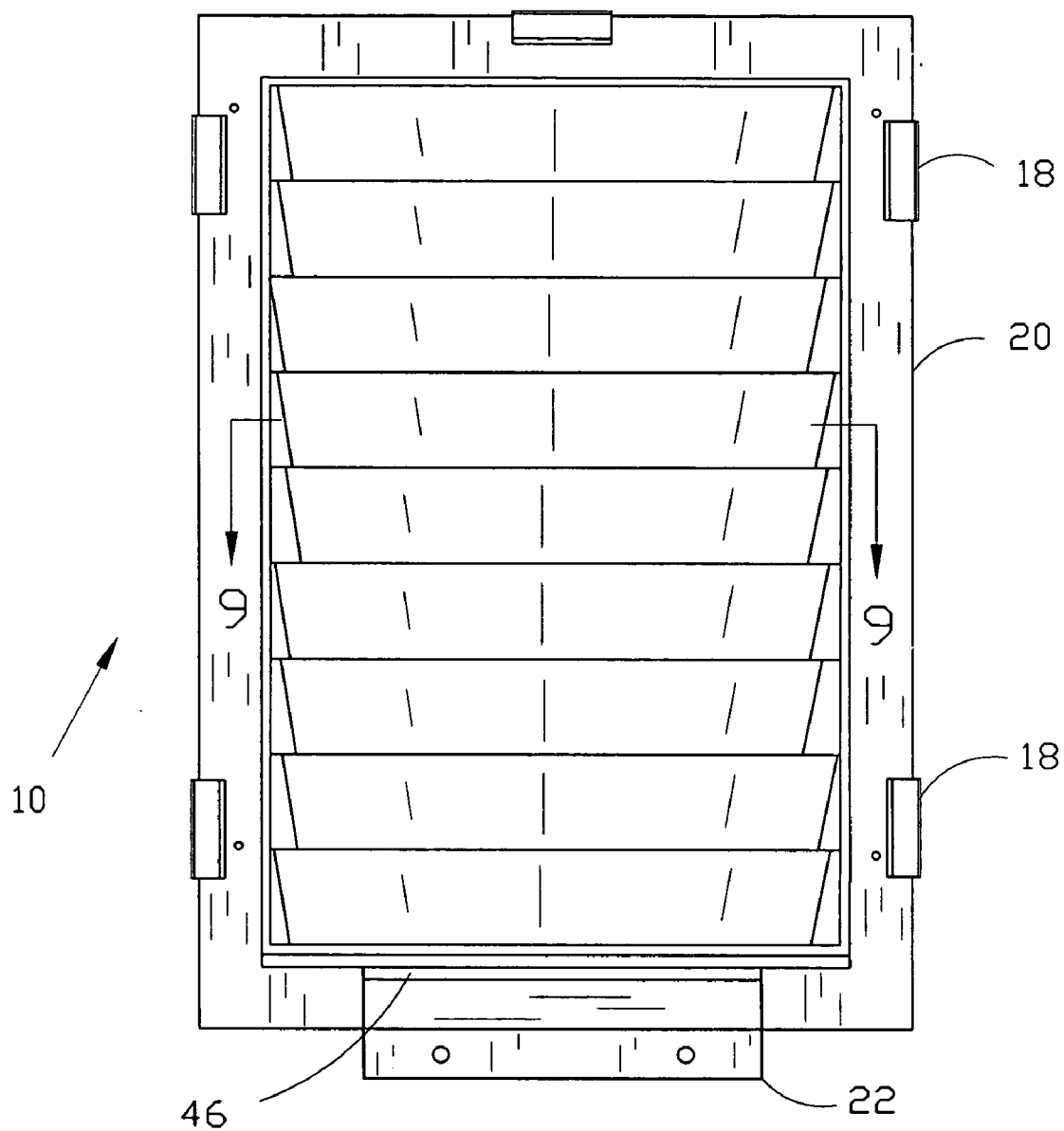


FIG. 3

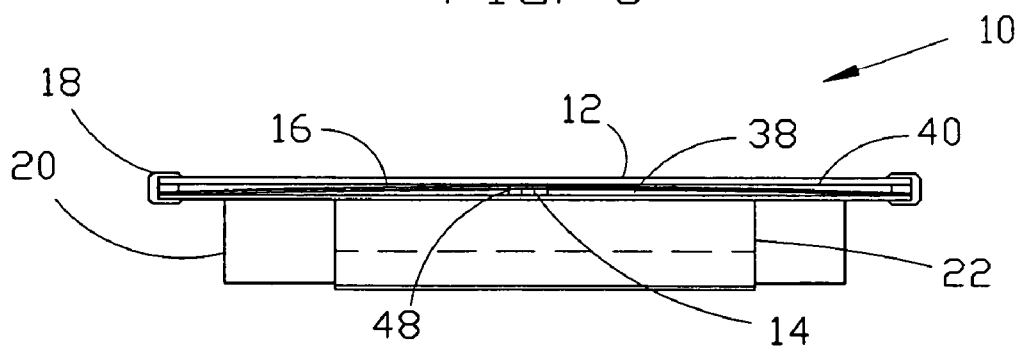


FIG. 4

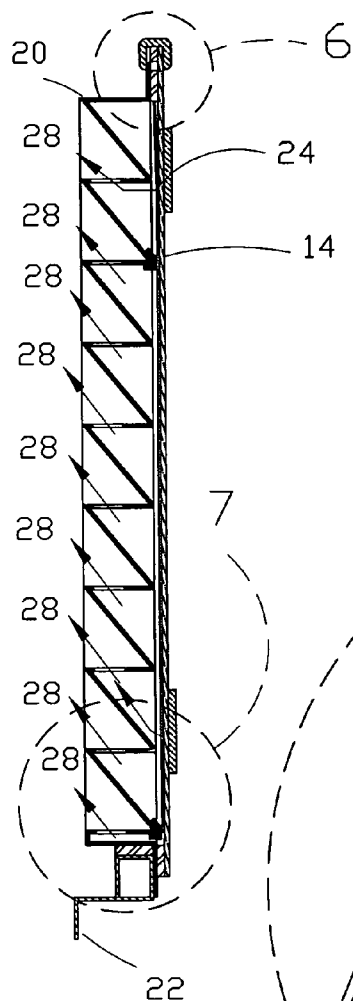


FIG. 5

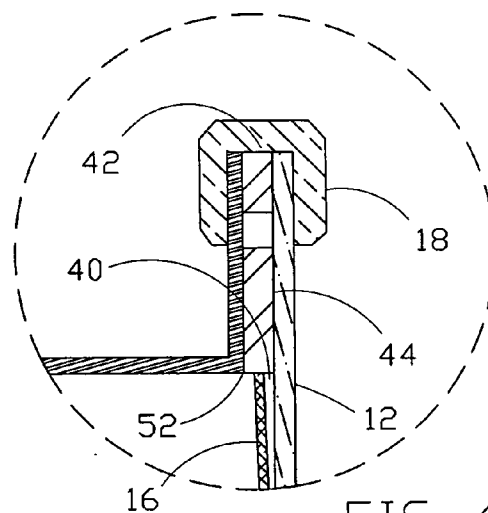


FIG. 6

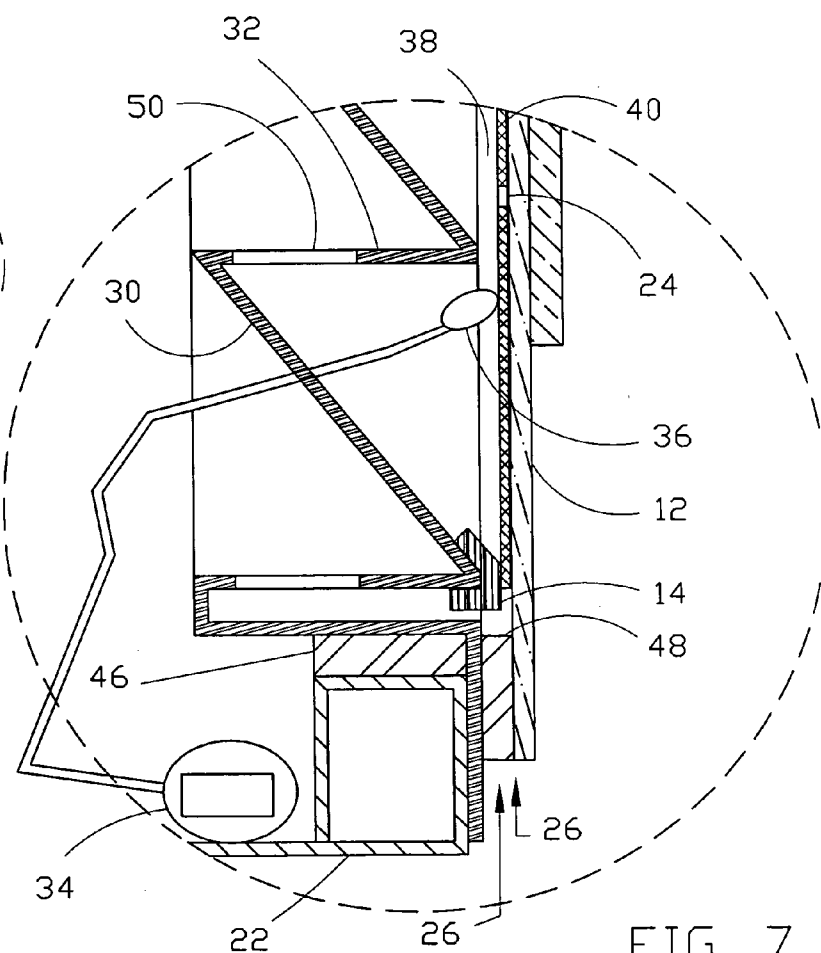


FIG. 7

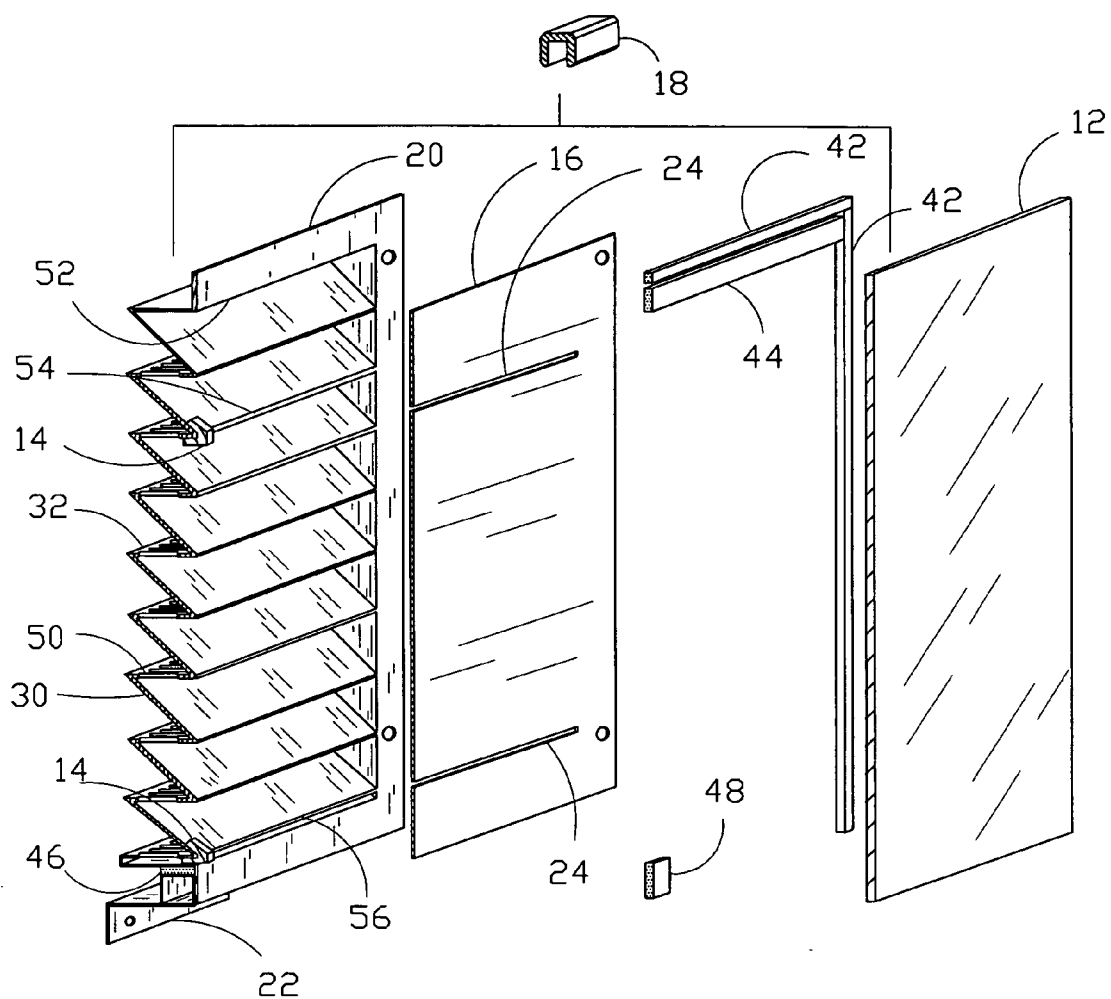


FIG. 8

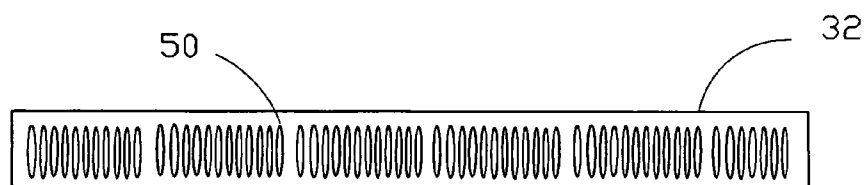


FIG. 9

## SOLAR WINDOW HEATER

### BACKGROUND

#### [0001] 1. Field of Invention

[0002] This invention relates generally to a unique apparatus and method for using solar energy to heat air and passively circulate it into an adjacent room. More specifically, this invention relates to a unique solar air heater which mounts on the inside of a window facing the sun in a home, an office or workshop, a camper or other recreation type vehicle or boat or ice fishing hut. The Solar Window Heater is light weight, easily mounted in a window and requires no external power or wiring as it convects warm air out the top and draws cool air in the bottom.

#### [0003] 2. Prior Art

[0004] U.S. Pat. No. 5,944,011 Breslin and U.S. Pat. No. 4,112,919 Davis both feature solar collectors that are mounted in place of a window and use fans to move the air through the collector and blow it into the room. U.S. Pat. No. 3,925,945 White also shows a system that replaces an existing window with its pivotally mounted frame that allows the window replacement unit to collect heat and disperse it into the room in the winter and to the outside in the summer.

[0005] Two passive room heater systems were 2003/01680056 Fidler and U.S. Pat. No. 3,925,945 MacKenzie. Fidler shows a typical Venetian blind that hangs in front of a window with the tops of the slats painted a dark energy absorbing color and exposed to the sun when increasing the internal temperature of a room is desired. The undersides are painted a reflective white to be tilted up when the room is warm enough. MacKenzie also has solar collectors behind a clear panel that are spaced apart to allow some light to enter the room.

[0006] None of these systems are practically portable and most require some form of power to assist in air movement.

### OBJECTS AND ADVANTAGES

[0007] An object of the Solar Window Heater is to reduce the homeowners cost of heating their home by supplementing their existing source of heat.

[0008] An object of the Solar Window Heater is to provide homeowners with a source of heat that produces no hazardous emissions.

[0009] Another object of the Solar Window Heater is to provide homeowners a passive system with no moving parts and associated noise.

[0010] Another object of the Solar Window Heater is to provide a portable heater that can provide heat in remote locations such as ice fishing huts, campers, tents, hunting blinds with no required fossil fuel or electrical connection.

### SUMMARY

[0011] In accordance with the present invention, a Solar Window Heater is comprised of a transparent glazing sheet that covers an energy absorbing face plate and is attached to an aluminum gable ventilator. It provides both radiant and convection heating when set against a window in a room or other enclosure that faces the sun as it absorbs the radiant

energy from the sun and transfers it to air inside the gable ventilator. The heated air rises and escapes from the tops of the ventilator slots causing cool air to be drawn in at the bottom, circulating room air through the heater. In the northern hemisphere a south facing window provides the most hours of exposure to the sun's rays.

[0012] Further objects and advantages of this invention will be apparent from the following detailed description of a presently preferred embodiment of the Solar Window Heater, which is illustrated in the following drawings.

### DRAWINGS

[0013] In order that the invention may be more fully understood it will now be described by way of example, with reference to the accompanying exemplary drawings in which:

[0014] **FIG. 1** is a top view of Solar Window Heater.

[0015] **FIG. 2** is a front view of Solar Window Heater.

[0016] **FIG. 3** is a rear view of Solar Window Heater.

[0017] **FIG. 4** is a bottom view of Solar Window Heater.

[0018] **FIG. 5** is a side view of a section through Solar Window Heater illustrating the air flow through the solar heater.

[0019] **FIG. 6** is an enlarged partial side view of a section disclosing the glass-setting channel assembly of component parts.

[0020] **FIG. 7** is an enlarged partial side view of a section disclosing a digital thermometer and external temperature sensor.

[0021] **FIG. 8** shows an exploded section view of Solar Window Heater.

[0022] **FIG. 9** shows a partial section view of the vent slot pattern in the horizontal surfaces of aluminum gable ventilator.

### REFERENCE NUMERALS

[0023] The same reference numbers are used to refer to the same or similar parts in the various views.

[0024] **10**—Solar Window Heater

[0025] **12**—glazing sheet

[0026] **14**—spacer

[0027] **16**—energy absorbing back plate

[0028] **18**—rubber glass-setting channel

[0029] **20**—gable ventilator

[0030] **22**—square tubing with flange

[0031] **24**—back plate vent

[0032] **26**—air flow intake

[0033] **28**—air flow vented into room

[0034] **30**—angled faces

[0035] **32**—flat faces

[0036] **34**—digital thermometer

- [0037] 36—external sensor
- [0038] 38—heating chamber under back plate
- [0039] 40—heating chamber over back plate
- [0040] 42— $\frac{3}{8}$ " $\times$  $\frac{3}{16}$ " weather seal
- [0041] 44— $\frac{3}{4}$ " $\times$  $\frac{3}{16}$ " weather seal
- [0042] 46—1" $\times$  $\frac{1}{4}$ " weather seal
- [0043] 48— $\frac{3}{4}$ " $\times$  $\frac{3}{4}$ " $\times$  $\frac{3}{16}$ " weather seal
- [0044] 50—vent openings
- [0045] 52—top inside edge of ventilator box
- [0046] 54—front face of the second louver from the top
- [0047] 56—front face of the first louver up from the bottom

#### DESCRIPTION

[0048] The present invention, in its several embodiments, meets the above mentioned objectives. The preferred embodiment will be illustratively described with aid of the following drawings.

[0049] Turning first to sheet 1, **FIGS. 1 and 2** are a top and front view of Solar Window Heater 10 and sheet 2, **FIGS. 3 and 4** are a rear view and a bottom view respectively. These views show gable ventilator 20 as a louvered rectangular box with perimeter flanges surrounding the opening, with a plurality of angled faces 30 and joining flat faces 32 each with a plurality of vent openings 50. Vent openings 50 and the flat face 32 of the louver are further illustrated in partial enlarged section view in **FIG. 9** on sheet 4. On sheet 3, **FIGS. 5 and 7** show in a section view and an enlarged partial section view respectively, gable ventilator 20 mounted on approximately a 1" square tubing with flange 22 with a approximately 1" wide by  $\frac{1}{4}$ " thick vinyl self stick weather seal 46 between the top of the tubing and the bottom wall of gable ventilator 20. Spacers 14 are adhered to gable ventilator 20 as shown in **FIGS. 5 and 7**, centered on the vertical axis of gable ventilator 20 and adhered to front face of the second louver from the top 54 of gable Ventilator 20 and the front face of first louver up from the bottom 56 of gable ventilator 20. Spacers 14 can be made from hard rubber or high temperature plastics that can withstand extended exposure to temperatures in the range of 140 to 180 degrees Fahrenheit. Gable ventilator 20 forms the room side air distribution system.

[0050] Gable ventilator 20 is rigidly attached to the back side of energy absorbing back plate 16 that acts as the solar collector when placed preferably in a south facing window, not shown. Energy absorbing back plate 16 is a thin, approximately 0.050" thick rectangular plate, preferably blackened aluminum that is as wide as the flanges of gable ventilator 20 and its top edge aligns with the top inside edge of ventilator box 52 of gable ventilator 20. The bottom edge of energy absorbing back plate 16 aligns with the bottom edge of front face of the first louver up from the bottom 56 of gable ventilator 20. This bowing of energy absorbing back plate 16 over spacers 14 allows the inlet of intake air 26 at the bottom of gable ventilator 20 towards the center, beneath energy absorbing back plate 16 into heating chamber under back plate 38 and toward the outside edges over the energy absorbing back plate 16 into heating chamber over back

plate 40. Energy absorbing back plate 16 has two approximately  $\frac{1}{8}$ " high by 9" wide back plate vents 24 in line with the next to the top louver and the next to the bottom louver of gable ventilator 20.

[0051] Approximately  $\frac{3}{8}$ " wide $\times$  $\frac{3}{16}$ " thick vinyl self stick weather seal 42 is placed across the top and down both sides of energy absorbing back plate 16 extending past the bottom of energy absorbing back plate 16 to within approximately  $\frac{1}{2}$ " of the bottom of gable ventilator 20 bottom flange. A approximately  $\frac{3}{4}$ " wide $\times$  $\frac{3}{4}$ " high $\times$  $\frac{3}{16}$ " vinyl self stick weather seal 48 is placed in the center of gable ventilator 20 lower flange, with the bottom edge of  $\frac{3}{4}$ " $\times$  $\frac{3}{4}$ " weather seal 48 approximately  $\frac{1}{2}$ " up from the bottom edge of the lower flange. An approximately  $\frac{3}{4}$ " wide $\times$  $\frac{3}{16}$ " vinyl self stick weather seal 44 is added to run between the  $\frac{3}{8}$ " weather seal 42 side strips with the bottom edge of strip 44 aligned with top inside edge of ventilator box 52 of gable ventilator 20.

[0052] A transparent glazing sheet 12 is then placed over the  $\frac{3}{16}$  thick weather seal strips 42, 44, and 48 forming heating chamber over face plate 40 between energy absorbing back plate 16 and glazing sheet 12. Glazing sheet 12 is made from approximately  $\frac{1}{8}$ " thick transparent material, acrylic plastic is preferred, although a transparent to solar radiation glass could be used as well, if weight is not of concern. This assembly is shown in an exploded section view in **FIG. 8**.

[0053] When the sandwich of the flanges of ventilator 20, spacers 14, energy absorbing back plate 16, weather seal 42, 44 and 48, and glazing sheet 12 is clamped together by a plurality of rubber glass-setting channels 18 as shown in **FIG. 6**, heating chamber under the face plate 38 is formed as energy absorbing back plate 16 is bowed over spacers 14. **FIGS. 2 and 7** show energy absorbing back plate 16 stopping before it reaches the bottom of glazing sheet 12, leaving an opening for an air flow intake 26 into the heating chamber and also two back plate vents 24 that are approximately 9" wide and  $\frac{1}{8}$ " high, cut across energy absorbing back plate 16 close to the top and bottom allowing trapped warmed air between glazing sheet 12 and energy absorbing back plate 16 to escape as air flow vented into room 28.

[0054] **FIG. 5 and 7** shows, in a section view of solar window heater 10, the radiant and convective air flow patterns. **FIG. 7** also shows the external temperature sensor 36 and digital thermometer 34.

[0055] **FIG. 8** is an exploded section view of Solar Window Heater 10 which illustrates the assembly sequence of the component parts.

#### Operation:

[0056] Solar window Heater 10 mounts, preferably, on the inside of a south facing window in a home, an office or workshop, a camper or other recreation type vehicle or boat or ice fishing hut. Solar Window Heater 10 is light weight, easily mounted in a window and requires no external power or wiring as it convects warm air out the top and draws cool air in the bottom. Cool room air is drawn in through the openings at the front bottom of the apparatus, over and under energy absorbing back plate 16 which is exposed to the sun's radiation, warmed and directed up through vertical vent holes 50 shown in **FIGS. 7 and 9** and finally directed into the space where heater is placed through gable ventilator 20.

[0057] Although the preferred embodiment is illustratively described herein it will be recognized by those skilled in this art that substitutions of materials for similar purposes are within the scope of this application and scaling for larger windows is also within its scope.

1. A passive Solar Window Heater that requires no external power source to operate comprising:

- a) a rectangular aluminum gable ventilator with perimeter flanges around suspended walls forming a box with an inside top edge and containing a plurality of louvers within said box, formed from horizontal faces connected to angled faces with front edges in the same plane as said perimeter flanges and with a plurality of vent openings in said horizontal faces mounted on a square aluminum tube with a mounting flange attached;
- b) spacers adhered to second from the top said louver front edge and the bottom said louver front edge on the vertical center line of said ventilator;
- c) a energy absorbing back plate rigidly fastened to said ventilator flanges, being bowed away from said front edges in the center by said spacers creating a heating chamber under said energy absorbing back plate whereby warmed air is allowed to rise up and out of said ventilator and cool room air to be drawn into said chamber towards said centerline, where said energy absorbing back plate is as wide as said ventilator flanges and the top of said energy absorbing back plate is collinear with said inside top edge of rectangular box and the bottom edge of said energy absorbing back plate stops at the bottom of said front edge of bottom louver, and said plate has two approximately 9" long by 1/8" high back plate vents, the first opens into the second from the top louver opening and the second into the second from the bottom louver opening;
- d) self stick weather seal strips adhered across said top of said energy absorbing back plate and down each side to approximately the center of said lower flange, a square

self stick weather seal strip in the center of the top of the bottom flange, and a self stick weather strip running between said vertical self stick weather strips with the bottom edge aligned with said top of said energy absorbing back plate and said inside top edge of said ventilator box;

- e) a clear glazing sheet placed on top of said self stick weather strips where said glazing sheet is the same width as the underlying said energy absorbing back plate and the top of said glazing sheet is collinear with said top of said ventilator top flange, the bottom edge of said glazing sheet is collinear with said bottom edge of said square self stick weather strip, forming a heating chamber over said energy absorbing back plate between the under side of said glazing sheet and the top side of said energy absorbing back plate which grows larger as said back plate bow decreases towards the out side edges of said glazing sheet, whereby the heated air trapped between said energy absorbing back plate and a clear glazing sheet is allowed to rise in said heating chamber and escape into said ventilator through said back plate vents, also drawing cool room air into the bottom of said heating chamber; and
- f) a plurality of rubber glass-setting channels that are used to clip over the sandwich of said ventilator flanges, said energy absorbing back plate, said self stick weather strips and said glazing sheet, holding said glazing sheet securely in place.

2. A passive Solar Window Heater that requires no external power source to operate according to claim 1, wherein said glazing sheet is chosen from a group consisting of clear plastics and glass.

3. A passive Solar Window Heater that requires no external power source to operate according to claim 1, wherein the energy absorbing back plate is made from blackened aluminum.

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