

[54] **PORTABLE ELECTRIC SPACE HEATER**

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[57] **ABSTRACT**

A portable enclosed space heater wherein an inside

wall divides the housing into front and rear compartments. A fluid reservoir and a fluid heater are mounted in the rear compartment of the housing and are connected to each other so that the fluid in the heater may be replenished from the reservoir. A reversible fan and a U-shaped radiator are both horizontally mounted in the front compartment of the housing. The heater is designed to conduct heated fluid to the radiator by thermosiphon action. The fan is mounted above the radiator with its motor disposed in the opening of the radiator so that it may blow heated air that is confined to the front compartment through the radiator and outward through air vents that are formed in the front compartment of the housing. The air vents are located in the front and to walls of the front compartment with the radiator disposed at the upper edge of the front wall vent. A cutoff switch mounted on the housing is actuated by a float and rod arrangement located in the reservoir to deenergize the fan and heater when the fluid in the reservoir falls below a predetermined level.

3 Claims, 4 Drawing Figures

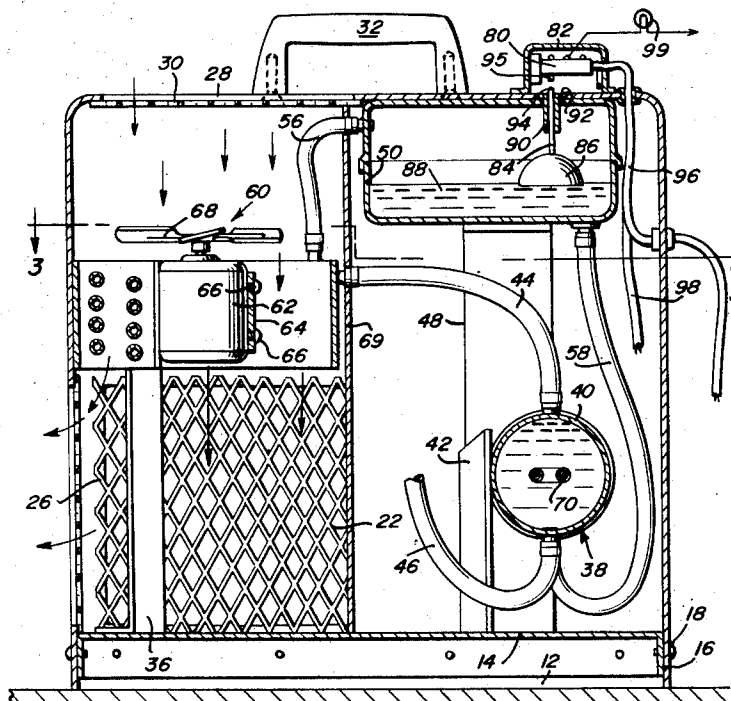


Fig. 1

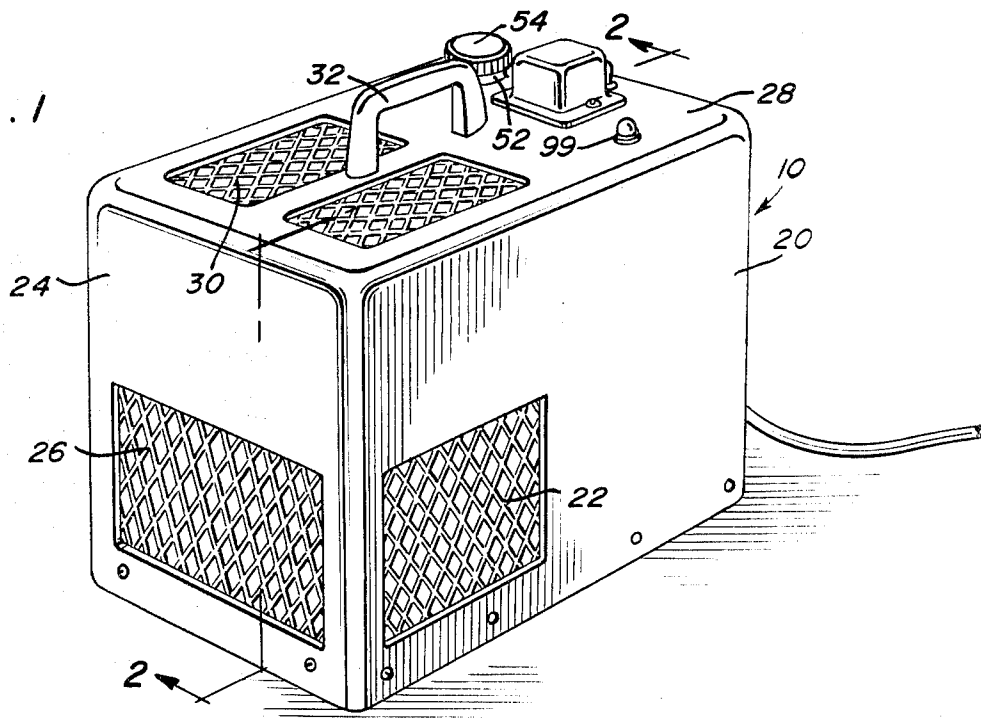
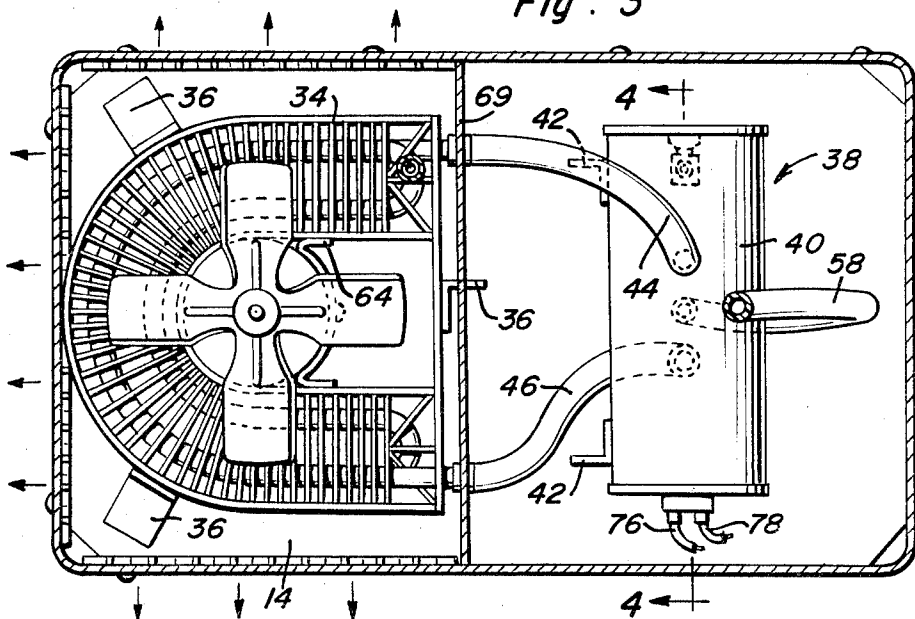


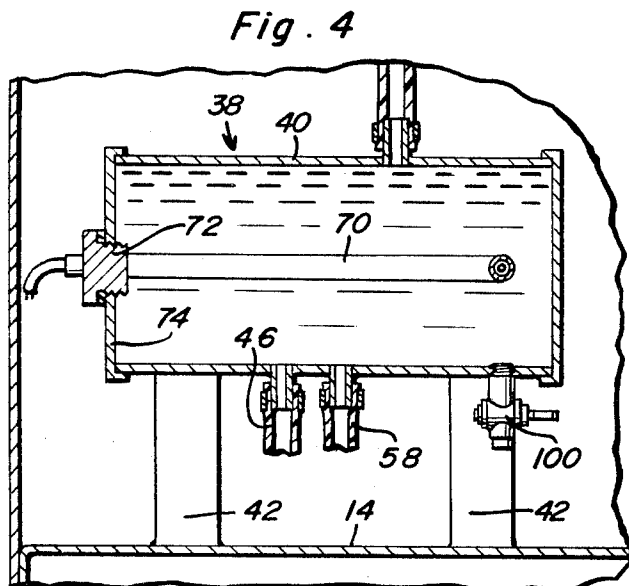
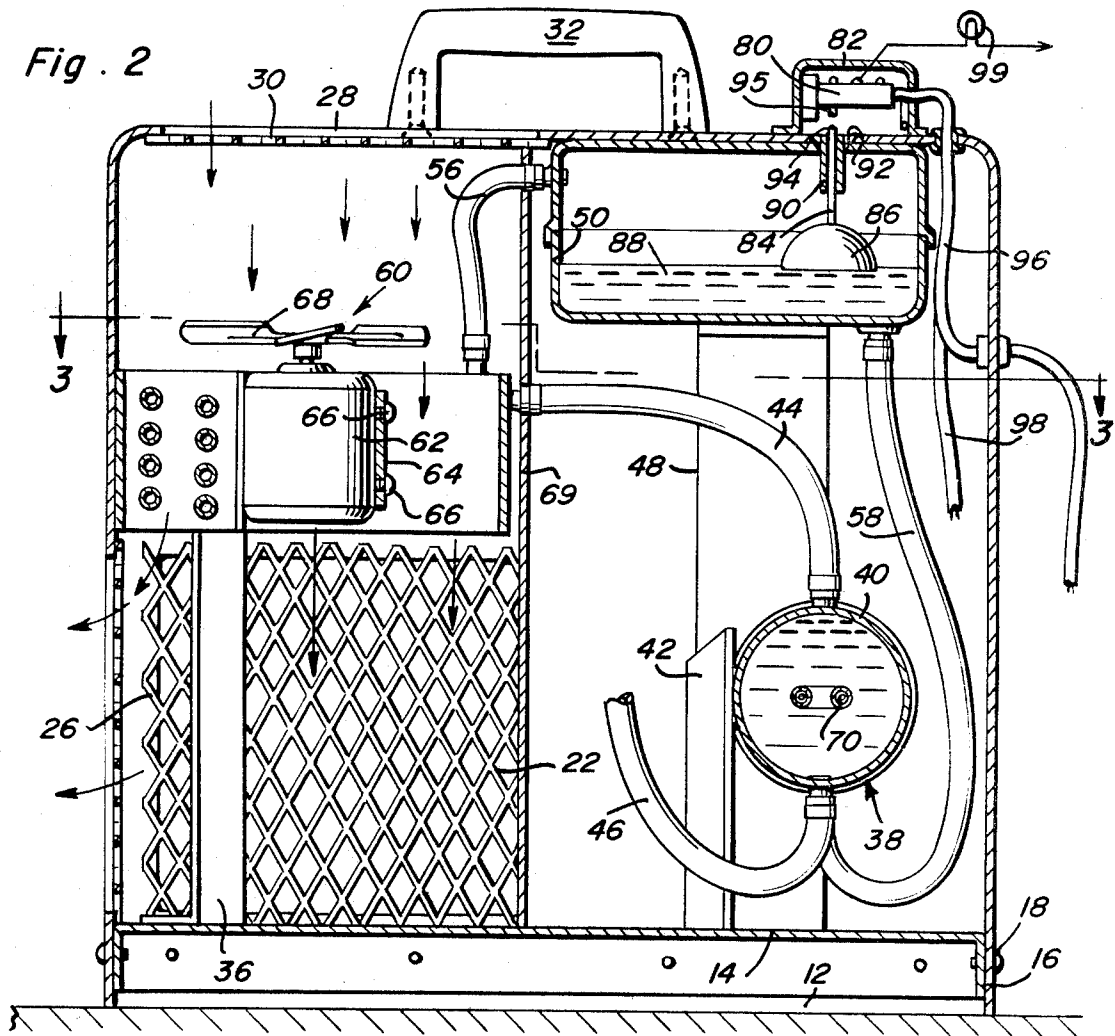
Fig. 3



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PORTABLE ELECTRIC SPACE HEATER

The present invention relates to a portable electric space heater incorporating a hot water radiator.

The present invention is an improvement of my prior U.S. Pat. No. 3,139,516 which discloses a space heater having an electric fan blowing heated air through a radiator. The radiator is supplied with hot water from an electric water heater, thermosiphon action causing conduction of heated water from the electric heater to the radiator. The previously disclosed device has an upstanding hot water radiator fastened to a supporting base. An electric fan is positioned adjacent the radiator and produces a heated airstream as in the case of automobile radiator systems. Although the patented device performs satisfactorily, it would be desirable to make the entire heater more compact.

The improvement of the present invention resides in the utilization of a U-shaped radiator that has a central opening therein for embracing the motor of an electric fan. The motor housing is clamped to the interior bight surface of the radiator thereby reducing the space requirement for the radiator-fan combination.

Further, a large number of louvered ports are formed in the housing of the heater to effect a more widespread distribution of heated air.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a perspective view illustrating the external appearance of the present invention.

FIG. 2 is a vertical sectional view taken along a plane passing through section line 2—2 of FIG. 1.

FIG. 3 is a horizontal sectional view taken along a plane passing through section line 3—3 of FIG. 2.

FIG. 4 is a longitudinal sectional view taken along a plane passing through section line 4—4 of FIG. 3 which illustrates the construction of an electric water heater as used in the invention.

Referring to the figures and more particularly FIG. 1, reference numeral 10 generally indicates the portable space heater. Internally, FIG. 2 shows that the heater has a generally rectangular housing with the lower end 12 thereof opened. A base panel 14 includes a central horizontal portion for supporting the interior components of the heater. The outward ends of the panel 14 are turned vertically downwardly at 16 so that they abut the lower interior surface of the housing. Bolts 18 are employed to fasten the panel 14 to the housing.

As seen in FIG. 1, the housing includes lateral sides 20 having rectangular louvered ports 22 at the lower left hand corners thereof (as viewed in FIG. 1). The housing also includes transverse vertical sides 24, the forward one (shown in FIG. 1) having a large louvered port 26 formed horizontally adjacent the aforementioned louvered ports 22. The top side 28 of the housing includes two rectangular and forwardly spaced louvered ports 30. As illustrated in FIG. 2, with the aid of an electric fan to be discussed hereinafter, air passes between the louvered ports 30 and 22, 26. A carrying handle 32 is secured to the upper side 28 of the housing and facilitates transport of the portable heater from one place to another.

Viewing FIG. 3, a U-shaped or horseshoe shaped radiator 34 is horizontally disposed above the base panel 14. Three angle irons 36 connected at their lower ends to the base panel 14 extend vertically upwardly and provide surfaces for mounting the radiator in a fixed horizontal position.

A cylindrically shaped electric water heater 38 is positioned below and in spaced relation to the radiator 34. A cylindrical body 40 of the heater is vertically supported by two parallel spaced angle irons 42. A hose 44 connects the water heater to the inlet fitting on the radiator. Hose 44 is connected to the upper portion of the cylindrical body 40. A return pipe 46 is connected between the outlet fitting on the radiator and a lower point on the cylindrical body of the water heater.

Viewing FIG. 2, an upstanding support member 48 is suitably attached at its lower end to the base panel while being attached at the upper end thereof to a water reservoir tank 50. A filler tube 52 (FIG. 1) passes through the upper side 28 of the housing to allow the reservoir to be filled. A cap 54 is threadably engaged on the tube and closes the tube during periods when the reservoir is not being filled. A hose 56 is connected between an upper fitting on the radiator and a fitting in an adjacent transverse wall of the reservoir 50. This last mentioned hose serves as an overflow hose. An additional hose 58 is connected between a fitting on the lower portion of water reservoir 50 and an inlet fitting on the lower portion of the water heater body 40. This pipe serves to fill the water heater by gravity flow.

In operation of the device, heated water in heater 38 will be caused to flow through the radiator as a result of thermosiphon action. This action will necessarily occur due to the temperature difference of the water in the water heater and in the radiator. Hose 46 returns radiator water to the heater 38.

Viewing FIGS. 2 and 3, an electric air fan generally indicated as reference numeral 60 is embraced in the central interior opening of the U-shaped radiator 34. The purpose of the air fan 60 is to create an airflow between louvered ports 30 and 22, 26. As will be noted in FIG. 2, the fan includes a motor 62 that is clamped against the interior bight surface of the radiator by an arcuate clamp 64 that has end flanges suitably attached such as by welding or the like to the interior arm surfaces of the radiator. Setscrews 66 are provided to lock the fan housing in position. The motor is positioned vertically within the housing of the heater so that the fan blades 68 are maintained in a horizontal position. During operation of the fan, electrical power can be provided with a polarity causing airflow from the ports 30 to the ports 22, 26. However, with a suitable motor polarity reversal switch (not shown), the fan blades may be caused to rotate in an opposite sense thereby forcing the upward flow of air from ports 22, 26 to ports 30. It has been found that placement of partition 69 as indicated in FIGS. 2 and 3 will improve the air flow.

Referring to FIG. 4, the specific construction of the electric water heater includes an elongated U-shaped heating element 70 that terminates outwardly in a sealing insulative plug 72. The plug is retained in a transverse insulating side 74 that is sealed to the cylindrical body 40 of the heater. As illustrated in FIG. 3, power leads 76 and 78 energize the heater element.

A safety cutoff switch is provided in the form of a float actuated switch 80 is secured to the top side 28 of the housing. A protective cover 82 is removably secured over the switch. The upper side of the reservoir 50 is attached by suitable means such as welding to the underside of the housing top side. Aligned apertures 92 are formed in the reservoir and housing top side to allow insertion of a guide 90 therein. An actuator rod 84 is received in the guide and is adapted for vertical sliding movement therein. The top of the rod (94) is adapted to depress the actuator 95 of switch 80 while the lower rod end terminates downwardly in a float ball 86. The ball floats in water 88 disposed in the reservoir. Normally, the level of fluid in the reservoir is sufficient to raise the float 86 and the interconnected actuator 84 thereby closing switch 80 and providing energization of fan 60 and water heater 38. However, when the level of liquid falls below a certain point, the switch 80 will be released thereby terminating electrical energization. Thus, the float serves as a safety mechanism or cutoff switch for the heater. Wires 96 and 98 are respectively connected to the switch 80 and the electrical components 62, 70. A lamp 99, may be electrically connected to the switch for indicating an empty reservoir condition. Mechanically the lamp 99 can be mounted to the top side 28 (FIG. 1).

When it becomes necessary to drain the water heater, the drain cock 100 (FIG. 4) located on the lower portion of the cylindrical body 40 is opened thereby allowing gravity drainage from the water heater.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A portable enclosed space heater comprising a housing having an inside partition wall dividing the housing into a front compartment and a rear compart-

ment, said front compartment having a plurality of air vents for circulating air into and out of said front compartment including a vertical air vent in the front wall of said front compartment and a horizontal air vent in the top wall of said front compartment, a fluid reservoir and a fluid heater mounted in said rear compartment, said fluid heater being in communication with the reservoir to heat fluid supplied from the reservoir, a generally U-shaped radiator horizontally mounted in said front compartment at the upper edge of said vertical air vent and in vertically spaced relation to said horizontal air vent, the exterior surface of the bight portion of the radiator being disposed adjacent the front wall of the front compartment, said radiator being connected in communicating relation with the heater to form a closed path for heated fluid, said inside wall confining the air heated by said radiator to the front compartment, and a fan disposed above said radiator, said fan including a drive motor disposed in the interior of the bight portion of the radiator and a horizontal blade assembly to force air through the bight portion and leg portions of the radiator.

2. The apparatus of claim 1 wherein said fan is reversible and said front wall vent is positioned at the bottom of said front wall whereby air heated by said radiator may be forced out of the top wall vent when the fan is rotating in one direction and out of the front wall vent when the fan is rotating in the opposite direction.

3. The apparatus of claim 2, together with means connecting said radiator to said reservoir for conducting the overflow of radiator fluid into said reservoir, means for deenergizing said fan and said heater when the fluid in the reservoir falls below a predetermined level, said deenergizing means including a float in said reservoir, a rod connected to said float, and a switch mounted on said housing, one end of said rod passing through aligned apertures in the housing and reservoir to said switch and actuating said switch when the fluid level in the reservoir falls below a predetermined level, and a warning lamp connected to said switch for visually indicating that the fluid level in said reservoir has fallen below a predetermined level.

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