United States Patent [19]

Kofink

[11] **3,822,690**

[45] **July 9, 1974**

[54] **SPACE HEATER PARTICULARLY FOR MOTOR VEHICLES**

[75] Inventor: **Siegfried Kofink,** 7301 a. N., Lenzhalde 8, Germany

[73] Assignee: **J. Eberspacher,** Esslingen, Germany

[22] Filed: **May 13, 1971**

[21] Appl. No.: **142,970**

[52] **U.S. Cl.**..... **126/110 B,** 126/110 E, 126/116 R, 237/32

[51] **Int. Cl.**..... **F24h 3/02**

[58] **Field of Search**..... 126/110 B, 110 R, 116 R, 126/110 E; 237/32

[56] **References Cited**

UNITED STATES PATENTS

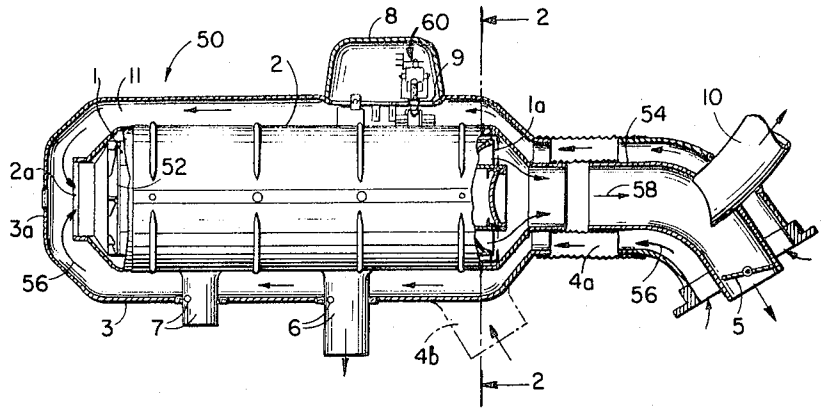
1,448,325	3/1923	Alexander	126/110 E
2,517,446	8/1950	Ryder et al.	126/110 R
2,757,662	8/1956	Baier et al.	126/110 B
2,775,293	12/1956	Raymond et al.	126/110 R
3,543,742	12/1970	Stump	126/110 B

Primary Examiner—Kenneth W. Sprague
Assistant Examiner—James C. Yeung
Attorney, Agent, or Firm—McGlew and Tuttle

[57] **ABSTRACT**

A space heater particularly for motor vehicles comprises an inner tubular enclosure for a heat source, a first jacket defining a first annular space surrounding the tubular enclosure and traversed by heating air, a second jacket surrounding the first jacket and defining a second annular space, the second jacket having an open end and an axially opposite closed end spaced axially from the adjacent end of the first jacket and first annular space, a fresh air inlet communicating with the open end of the second annular space, and a heating air outlet communicating with that end of the first annular space adjacent the open end of the second annular space. The fresh air inlet and the heating air outlet preferably are concentric with each other and are arranged at one and the same end of the space heater or heating device. Fresh air enters through the inlet connection, flows through the second annular space to the closed end of the second jacket, then flows in the counter direction through the first annular space, and is discharged through the outlet connection. The tubular enclosure for a heat source may be a combustion chamber to which combustion air is admitted and exhausted by lateral connections extending across the heating air passage. The heater controls may be mounted in a hood secured adjacent a lateral opening in the second jacket.

1 Claim, 2 Drawing Figures



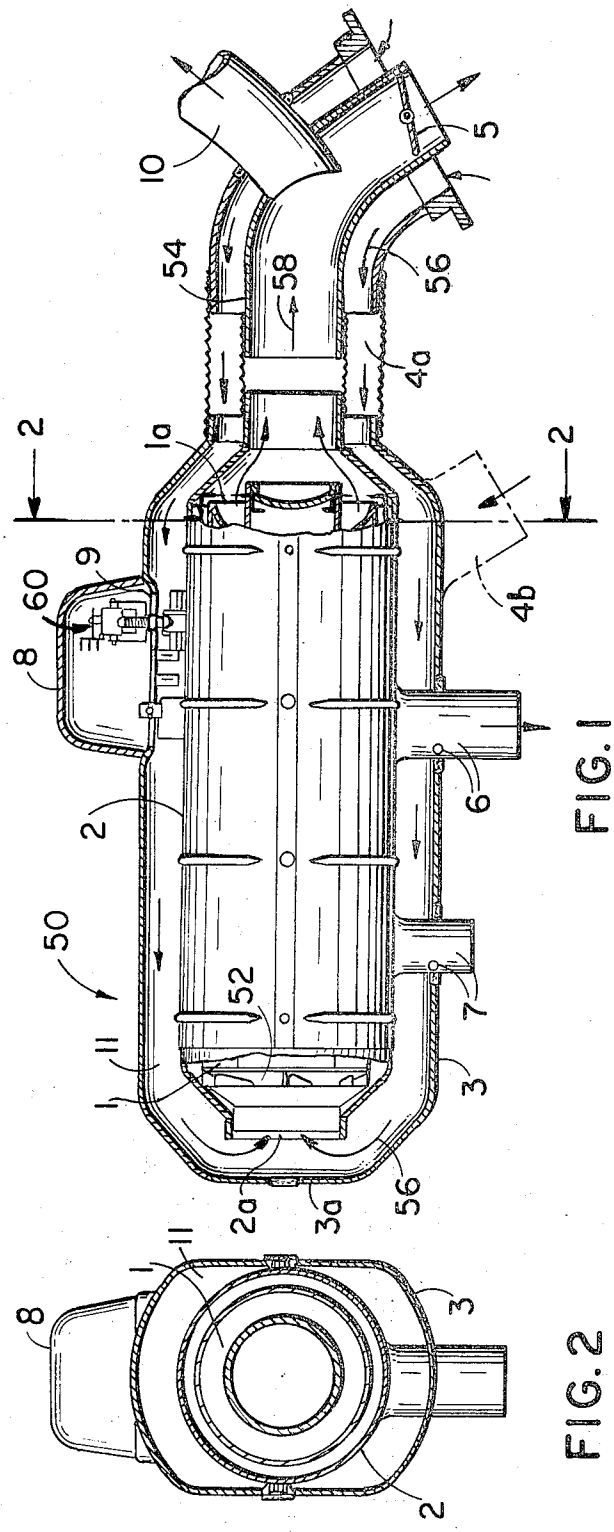


FIG. 1

FIG. 2

INVENTOR
Siegfried Kofink

by
John J. McGlew
ATTORNEY

SPACE HEATER PARTICULARLY FOR MOTOR VEHICLES

SUMMARY OF THE INVENTION

This invention relates in general to the construction of space heaters and in particular to a new and useful heater particularly for motor vehicles which includes an inner tubular enclosure for a source of heat and a jacket defining an annular space surrounding the tubular enclosure and traversed by heating air.

Heaters of the kind described above are known generally but in such heaters the air to be heated, or the medium to be heated, is introduced at the front end of the heating device and then directed over the heat exchange surfaces and discharged into the interior of the vehicle from the axially opposite end of the heater. Such an arrangement has a disadvantage that a high efficiency cannot be reached. Another disadvantage is that the conduits which are connected to the heating devices at the front and back end require a large space for the installation of the heater.

The present invention provides a heater which is easier to install and which includes a simple air conduction system of high efficiency. This is achieved in accordance with the invention by surrounding a first annular space for the heating air with a second annular space for the flow of heating air.

The heating air enters at an open end of the second annular flow space, flows to a closed end thereof, then reverses its direction of flow to flow through the first annular flow space to a heating air outlet. The first annular flow space surrounds the tubular enclosure for the heat source. With such an arrangement, the heating air becomes preheated during its travel along the complete length of the heat source enclosure, in one flow direction, and then is further heated by travel along the complete length of the heat source enclosure in the opposite flow direction. The dimensions of the heater are materially reduced since it is not necessary to supply the heating air at one end and discharge it at the axially opposite end, as in the case of the known arrangements. By forming the housing or jacket with the inner and outer walls, the manufacture of the whole heater construction is made much simpler; and it can be formed of uniform sizes so that they may be easily stocked.

In accordance with a further feature of the invention, the heater would be particularly favorable in installation dimensions if the jacket, surrounding the heating jacket arranged around the heat exchanger, is designed in such a way that an annular cross-section results which, if desired, may be flattened on at least one side. The shell forming the heater may be made of a plastic so that a considerable reduction of weight may be achieved and also excellent heat installation is provided. A heater of higher efficiency and more favorable installation characteristics can be produced by the construction of the invention.

Accordingly, it is an object of the invention to provide an improved space heater construction which includes an inner tubular enclosure for a source of heat, a heat exchanger surrounding the tubular enclosure and defining a first annular space for the flow of heating air, and a casing surrounding the heat exchanger and defining a second annular space for the flow of heating air, communicating with the first annular space

at one end, with the second annular space having an inlet for fresh air at an open end and communicating with the first annular space at a closed end, and with the first annular space having a heating air discharge outlet at the same end of the heater as the fresh air inlet, the air inlet and the air discharge outlet preferably being concentric with each other.

A further object of the invention is to provide a combustion type heater construction for an automobile heater which is simple in design, rugged in construction, and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference should be had to the accompanying drawing and descriptive matter in which there is illustrated a preferred embodiment of the invention.

IN THE DRAWINGS

FIG. 1 is an axial sectional view of a combustion heater constructed in accordance with the invention; and

FIG. 2 is a section taken along the line 2-2 of FIG. 1.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular, the invention embodied therein comprises a space heater for an automobile, generally designated **50**, which includes a horizontally elongated tubular housing **2** having an opening **2***a* at the front end thereof for the inflow of heating air which is directed inwardly by a fan **52** along an annular space **1**. Air for combustion is admitted through inlet fitting **7** and is mixed with a fuel in a furnace in a tubular enclosure within the interior of the tubular housing **2** and surrounded by annular space **1**. The gaseous products of combustion which are formed are directed outwardly through an outlet **6**. The heating air from the annular space **1** is directed through a tubular conduit **54** having a damper control **5** at the discharge end thereof.

In accordance with the invention an outer tubular housing **3** is formed around the inner tubular housing **2** and it includes a closed end **3***a* at the front and it defines an inlet communication with an annular flow passage **4***a* for the inflow of heating air in a direction of the arrows **56** which moves into opening **2***a* at the front end and then moves in an opposite direction along the passage **1** and into a discharge pipe **54** indicated by the arrows **58**.

The outer housing **3** forms with the inner housing **2** the flow passage **11** for the heating air which permits a flow counter to the direction of the combustion gases so that the incoming heating air is preheated. A hood **8** is formed on the outer jacket and it covers an aperture **9** of the outer jacket and provides a space for the electronic controls generally designated **60**.

The admission of the combustion air and the discharge of the combustion gases occurs through connecting pipes **6** and **7** of the outer jacket **3**. The heating air is conducted to the inlet **4***a* which is arranged concentric with the outlet **54** and into the space **11** between the outer jacket **3** and the inner jacket **2**. In this section the heating air is preheated. The heating air

flows through the opening **2***a* and around an annular space **1** over the combustion chamber and exits at the rear end at **1***a*. It is heated to its end temperature at the exit end **1***a* and leaves the heater through the outlet conduit **54.**

At least a partial stream of the heating air can be drawn off through a lateral connecting pipe **10,** for example, for defrosting the windshield. In cases in which it appears desirable, the heating air admission may take place by way of a connecting pipe **4***b* which extends laterally from the one side of the outer housing **3.**

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In an axially elongated heating device for heating the interiors of automotive vehicles, of the type including an elongated tubular combustion chamber, supplied with fuel and independent of the engine, and an elongated jacket defining a cylindrical annular space surrounding the tubular combustion chamber and traversed by heating air to deliver warm air to an outlet means at one end of the annular space, the improvement comprising, in combination; a second jacket surrounding said first-mentioned jacket and defining therewith a second annular space having an open end adjacent said outlet means and an axially opposite closed end spaced axially from the adjacent end of said first-mentioned jacket and communicating with said adjacent end of said first-mentioned annular space; and a fresh air inlet conduit communicating with the open end of said second annular space; said heating air outlet means comprising an outlet conduit extending concentrically through said inlet conduit in radially spaced relation to said inlet conduit; whereby fresh air enters through said fresh air inlet conduit means, flows in a first axial direction through said second annular space to the closed end of said second annular space, then reverses flow direction to flow in the counter axial direction through said first-mentioned annular space, and is discharged through said heating air outlet conduit, so that the admission and discharge of heating air is effected at the same end of said heating device and said fresh air inlet conduit and said heating air outlet conduit extend together from the same axial end of said heating device a bypass duct positioned in said heating air outlet means adjacent the discharge end thereof, and damper means in said heating air outlet means for proportioning the flow between the bypass duct and the heating air outlet means.

* * * * *