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Schlosser

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[45] **May 20, 1975**

[54] **RADIANT SPACE HEATER**

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Related U.S. Application Data

[62] Division of Ser. No. 372,076, June 21, 1973, Pat. No. 3,832,991.

[52] **U.S. Cl.** ..... **126/91 A;** 248/65

[51] **Int. Cl.** **F24c 3/00**

[58] **Field of Search** ..... 431/353; 126/91 A, 91 R; 248/65

[56] **References Cited**

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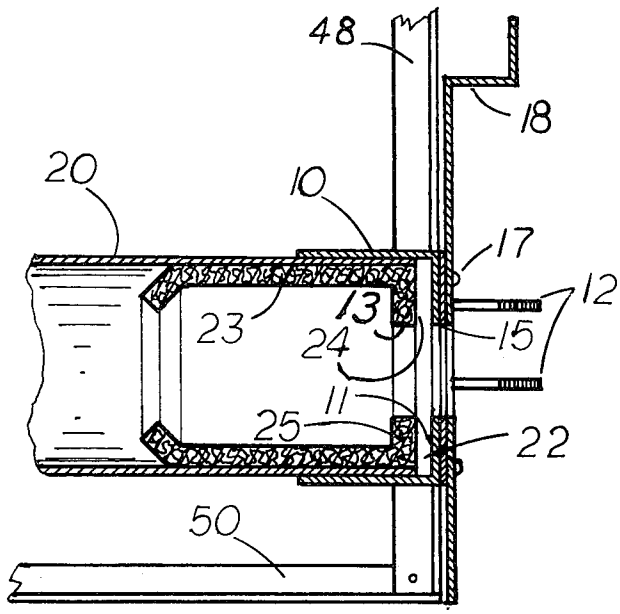
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Primary Examiner—Carroll B. Dority, Jr.

[57] **ABSTRACT**

In a radiant space heater, the end of the combustion tube into which the burner flame is projected is slidably supported in a collar which projects from a base plate having a hole for the flame to pass through, and the tube at that end is lined with heat insulating material which, on lengthwise heat expansion of the tube, seats against the base plate to form a gas tight seal.

5 Claims, 6 Drawing Figures



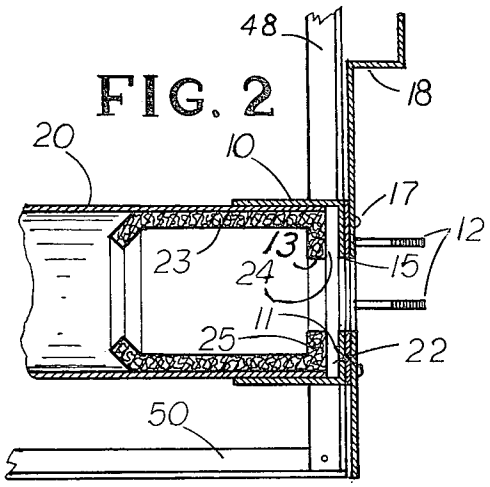


FIG. 2

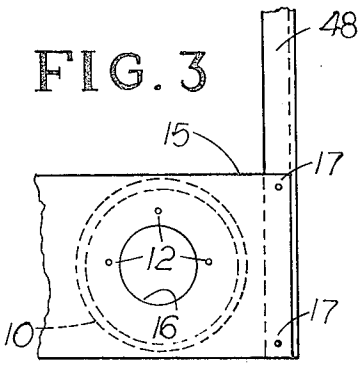
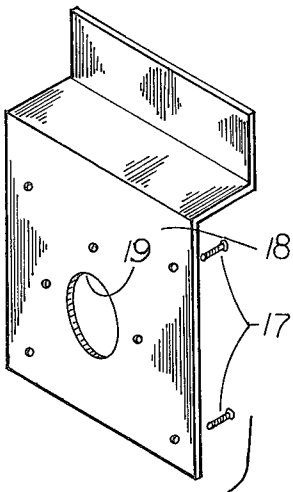
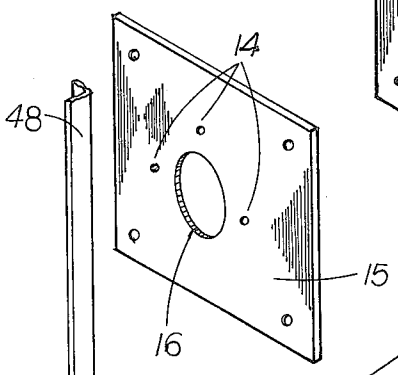


FIG. 3





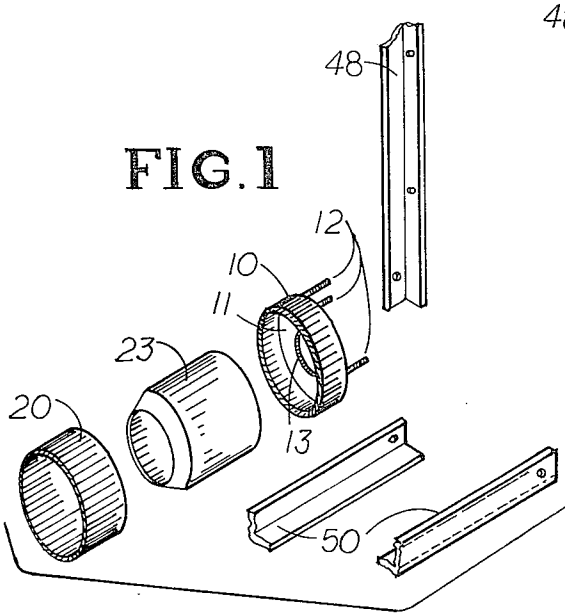
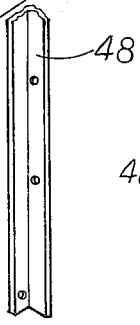
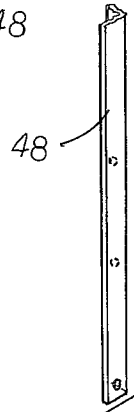


FIG. 1





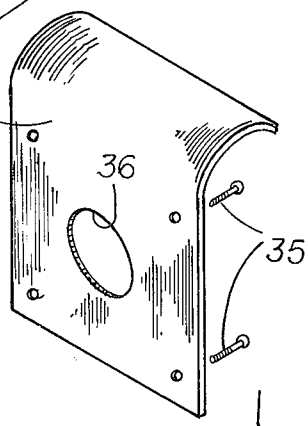


FIG. 4

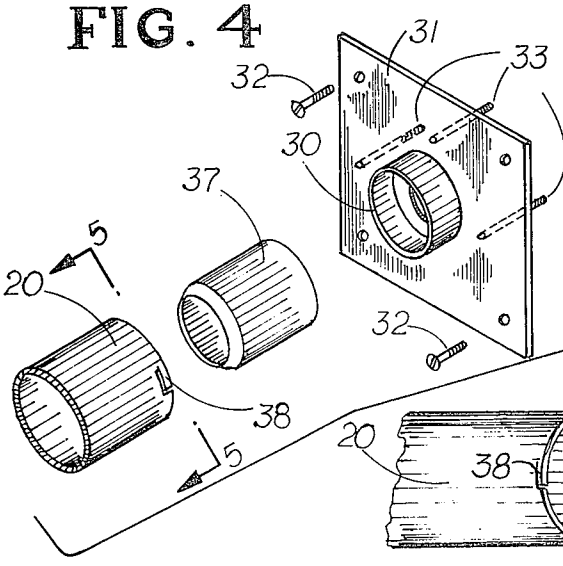


FIG. 5

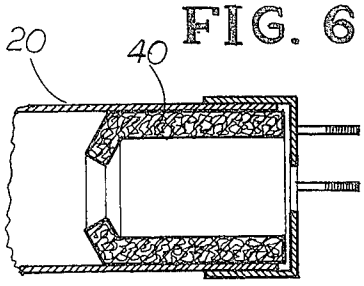


FIG. 6

RADIANT SPACE HEATER

This application is a division of my application Ser. No. 372,076, filed on June 21, 1973 and now U.S. Pat. No. 3,832,991.

This invention relates to space heaters which have an attached fuel burner and which dissipate a major portion of the heat by radiation. The heaters direct the flame and hot combustion gases from the burner into a combustion tube which thereby becomes heated and radiates heat outwardly. Usually, the hot combustion gases pass onwardly through a series of connected tubes to extract more heat.

More particularly the invention is concerned with the combustion tube into which the burner discharges its flame, this being the tube which receives the greatest heat and which is subject to the greatest expansion and contraction endwise. The feature of the present invention is the provision of a heat resistant combustion chamber at the burner end of the tube and which serves the dual function of shielding the tube from the direct blast of the flame and providing a seal against the escape of combustion gases at that end of the tube.

As the combustion tube into which the flame is directed is generally on the order of 3 to 4 feet in length and as the flame heats it from room temperature to a red heat, it will expand three-eights of an inch, more or less. Provision must be made to accomodate the lengthwise expansion (and contraction on cooling) to prevent distortion of and damage to the tube and its supporting structure. Moreover, despite the repeated expansion and contraction of the tube as the flame comes on and off, the burner end of the tube must be sealed against the escape of combustion gases when the flame is on.

The present invention provides a combustion chamber which shields the burner end of the combustion tube against direct contact with the flame and in addition thereto provides a seal to prevent the escape of combustion gases. A representative structure is illustrated in the drawings in which:

FIG. 1 is an exploded view of the parts of the heater structure at the burner end of the combustion tube into which the flame is directed, the burner being omitted,

FIG. 2 is a vertical sectional view through the axis of the assembly when the parts of FIG. 1 are put together,

FIG. 3 is an elevational view of the right hand end of FIG. 2, the heat shield being omitted,

FIG. 4 is a exploded view, similar to FIG. 1, but showing some alternative parts and arrangements,

FIG. 5 is a view of the right hand end of the combustion tube of FIG. 4, and

FIG. 6 show a modified combustion chamber.

The disclosure of my copending application Ser. No. 372,076 now U.S. Pat. No. 3,832,991, is hereby incorporated herein by this reference and its drawings and description should be examined for a fuller understanding of a complete heater which may include the features of this divisional application. It is to be clearly understood, however, that the combustion chamber and its combined shielding and sealing functions is not limited to use in the modular structure of my above mentioned patent. Thus, the assembly of FIG. 2 may be incorporated in any heater structure to which it lends itself, irrespective of how the other combustion tubes are supported or the combustion gases are passed therethrough.

The incorporation of the structure herein disclosed in the complete heater of my above mentioned patent will be evident when it is noted that the frame members **48** and **50** are the same and that the lower combustion tube **20** is the same. The other parts illustrated in the present drawings are the same as or are similar to the corresponding parts disclosed in the above mentioned patent but for clarity of description a progressive identifying numbering will be used herein.

Referring first to FIGS. **1**, **2** and **3**, the tube **20** fits within a larger cylindrical ring or collar **10**. This end of the tube can move back and forth therein when the tube expands and contracts in length during its heating and cooling; the other end of the tube is fixed against such free movement. The collar **10** has a flat base plate **11** welded or integral therewith so that the collar **10** and base **11** are cup shaped. The burner attachment bolts **12** are welded to the base plate **11** and project oppositely from the collar. The plate **11** has a central hole **13** therethrough for the flame to pass through.

The bolts **12** pass through holes **14** in a supporting plate **15** having a central hole **16** therein. This plate **15** is attached as by sheet metal screws **17** to the end vertical bar members **48** of the frame structure. This holds the cup shaped member **10–11** in fixed position; the elements **15**, **10** and **11** thereby constitute a burner supporting module as well as a combustion tube supporting module. The heat shield **18** preferably is provided and it has holes therein for the bolts **17** to pass through and this also supports the shield **18**.

The heat shield **18** has a central hole **19** and also has holes for the bolts **12** to pass through. When a burner is attached to the bolts **12**, the cup shaped member **10–11**, the supporting plate **15** and the heat shield **18** are all clamped together and the central holes **13**, **16** and **19** in them all line up.

When the tube **20** is cool or at room temperature it should be short enough so its end is spaced from the inner face of the base plate **11** as is shown by the space at **22** in FIG. **2**. This space or gap should be just large enough so that when the tube **20** is hot because of the flame being projected into it, the expansion of the tube **20** will just about close this gap. The end of tube **20** should not press forcibly against the base plate **11** as this would press it or the frames out of shape or bend the tube **20** or cause other permanent distortion.

The tube lining or burner shielding gasket **23** is made of a heat resistant substance of conventional construction and material. Its end outside face at **24** should be flush with the end of tube **20** as shown in FIG. **2**. This gasket **23** should forcibly fit within tube **20** so that it moves with the tube end and cannot be dislodged except my manual pressure. When the tube **20** expands the end face **24** should snugly press against the inner face of plate **11** so that the space **22** is closed and a substantially gas tight seal is formed.

The gasket **23** is shown as a lining within the end of tube **20** and it preferably has integral therewith the inwardly flanged or disc portion **25** which is centrally apertured for the combustion flame to pass through. The increased end surface provided by this apertured disk portion **25**, to bear against the plate **11**, serves to establish a better gasket seal when the expansion of the tube brings them into contact after closing the gap **22**. This apertured disc portion **25** can lie slightly or partially beyond the end of tube **20**.

The lining **23** protects the tube against the intense heat of the burner flame and to withstand this it is made of asbestos or asbestos like material. It is sold commer-

cially as a corbel unit and as a pyrolite combustion chamber.

FIGS. **1**, **2** and **3** show the preferred structure in which the collar **10** is made integral with the base **11** by a metal rolling process known in the art. If desired, collar **10** can be a separate cylinder which is attached as by welding to the base plate **11**. Or, if the collar is a separate cylinder as is shown at **30** in FIG. **4** it can be welded to the supporting plate **31** which corresponds to the supporting plate **15**. It is attached to the two vertical frame bars **48** at the same end of the heater by sheet metal screws **32** or bolts and nuts. This supporting plate **31**, like plate **15**, serves to fixedly locate the collar **30** in position at this end of the heater.

The burner attachment bolts **33** (corresponding to bolts **12**) are carried by the supporting plate **31**. The heat shield **34** is fastened to the frame members **48** by screws **35**. This shield **34** has a hole **36** therethrough which is large enough so that the burner to be attached by bolts **33** will be clamped directly against the supporting plate **31**.

The insulating and sealing gasket **37** corresponds to the gasket **23**. To more firmly hold it in place at the end of the tube this tube end is formed with tabs **38** by making a L-shaped cut in the end of the tube. After the gasket **37** has been inserted in the tube **30** each tab **38** is bent inwardly of the tube as is shown in FIG. **5** so that it is imbed in the gasket (the gasket is omitted in FIG. **5**). This engagement of the tab **38** in the gasket **37** serves to more firmly hold the latter in place.

FIG. **5** shows that the gasket **40** can project slightly beyond the end of the combustion tube. This figure also shows that the gasket does not need to have the internal end disk or flange shown at **25** on FIG. **2** and this is especially true if the wall of gasket **40** is relatively thick.

It is to be understood that the details of the several figures are interchangeable. For instance, the tab **38** shown in FIG. **5** may be applied to the end of tube **20** shown in FIG. **1**.

What is claimed is:

1. In a space heater, the combination of a plate having an opening therethrough for the passage of a combustion flame and having a collar surrounding said opening, a combustion tube having an end slidably mounted in and supported by said collar, and heat resistant material lining the interior of said tube at said end and movable with the tube end into a gasket sealing contact with said plate on lengthwise heat expansion of said tube.

2. The space heater according to claim **1** in which said heat resistant material has an internal flange at its outside end to provide an increased end surface area to seat against said plate.

3. The space heater according to claim **1** in which said heat resistant material projects slightly beyond the adjacent end of the combustion tube.

4. The space heater according to claim **1** in which said plate carries bolts projecting oppositely from said collar for the attachment of a burner.

5. The space heater according to claim **1** in which the end of the combustion tube is formed with an inwardly turned tab to better retain the heat resistant material in place.

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