

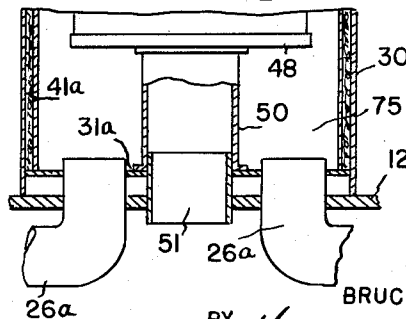
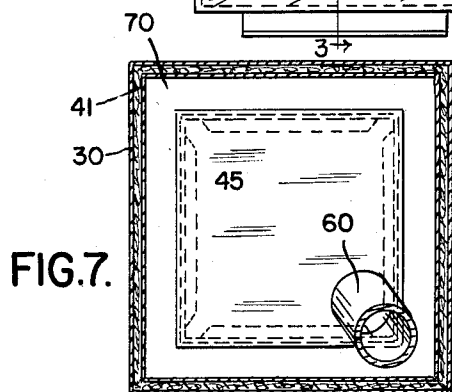
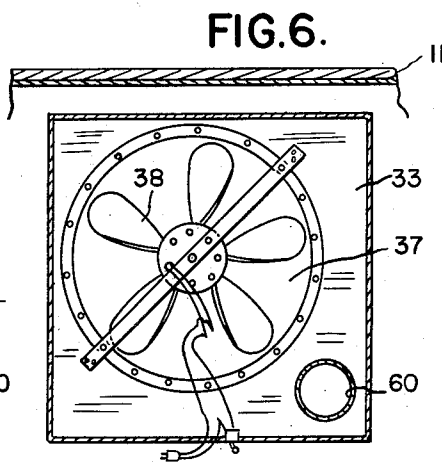
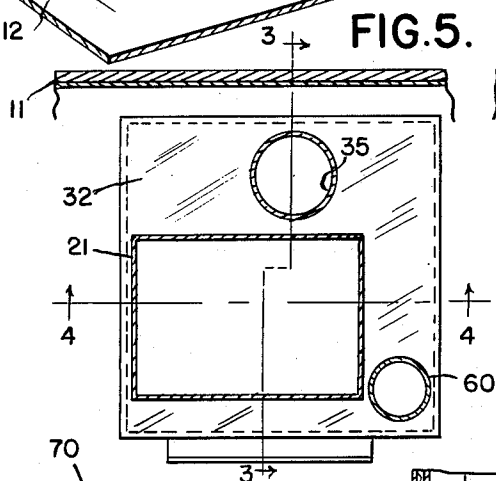
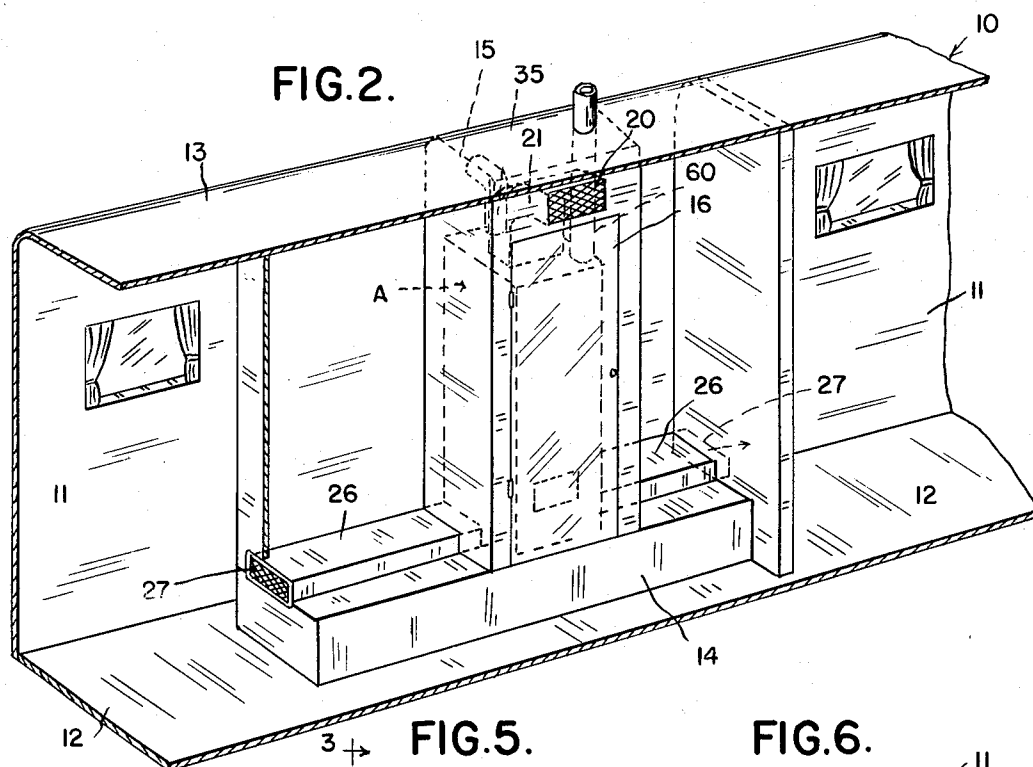
Feb. 14, 1956

B. V. MYERS
SPACE HEATER

2,734,500

Filed July 28, 1951

3 Sheets-Sheet 2



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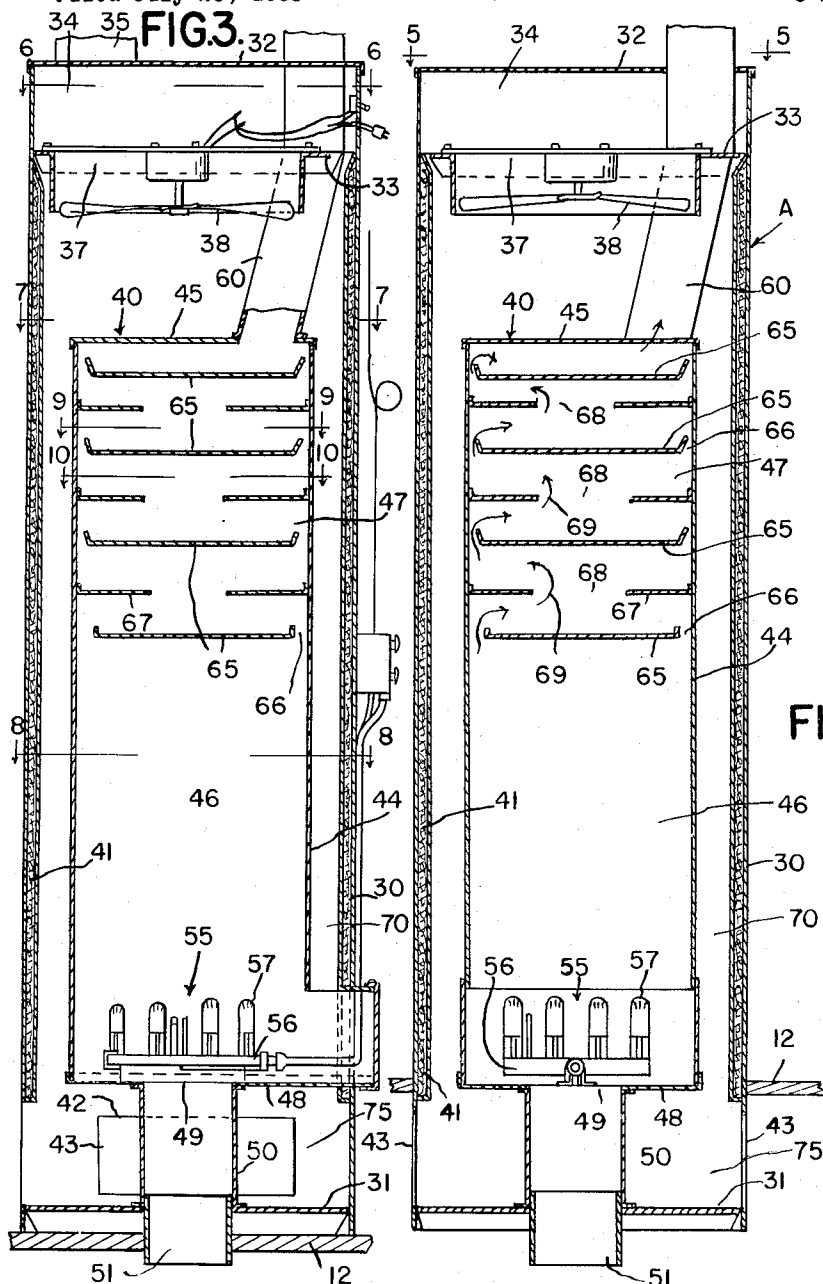


FIG.4.

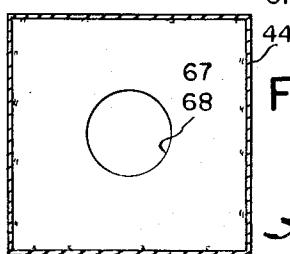
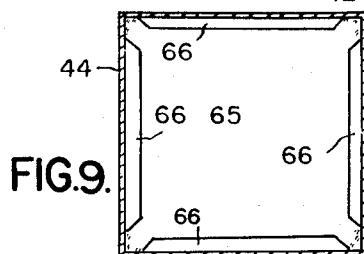


FIG.10.

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SPACE HEATER

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Application July 28, 1951, Serial No. 239,141

7 Claims. (Cl. 126—110)

My invention relates to a space heater of novel construction.

Most space heaters of the type designed for such applications are not constructed as to be enclosed, nor are they of such design as to provide adequate and efficient heating. The present heater is constructed to provide a combustor having a primary and secondary heating areas serving to provide a maximum of efficiency and to facilitate its installation within a closed compartment or closet, and same is further preferably constructed as an upright elongated square tubular structure which is particularly adapted for such installations as noted above.

It is an object of my present invention to overcome the difficulties encountered with the present day heaters now available by providing a space heater of novel construction designed and constructed for installation in house trailers and the like, houses, garages, etc. for creating an improved heating system therefor.

More particularly, it is an object of the present invention to construct a new and improved space heater by providing one which provides a unit structure and superior in efficiency, economy of manufacture, compact and serviceable, and which is capable of being serviced with a minimum of time and expense.

For a more detailed understanding of my invention, references may be had to the accompanying drawings illustrating a preferred embodiment of my invention, in which like characters refer to like parts throughout the several views, and in which

Fig. 1 is a fragmentary sectional perspective view of a house trailer showing my improved space heater installed therein.

Fig. 2 is another fragmentary sectional perspective view of a house trailer showing my improved space heater installed in a closet located more centrally of a house trailer than that illustrated in Fig. 1.

Fig. 3 is a vertical longitudinal sectional view through the space heater and taken substantially on the line 3—3 of plan view Fig. 5.

Fig. 4 is a vertical sectional view through the space heater taken at right angles to Fig. 3 and substantially on the line 4—4 of Fig. 5.

Fig. 5 is a plan view taken as viewed from the line 5—5 of Fig. 4.

Fig. 6 is a transverse horizontal sectional view taken on the line 6—6 of Fig. 3.

Fig. 7 is a transverse horizontal sectional view taken on the line 7—7 of Fig. 3.

Fig. 8 is another transverse horizontal sectional view taken on the line 8—8 of Fig. 3 and showing the burner in plan view.

Fig. 9 is a detail sectional view showing a baffle in plan and is taken on the line 9—9 of Fig. 3.

Fig. 10 is a detail sectional view of the other type baffle in plan and taken on the line 10—10 of Fig. 3, and

Fig. 11 is a detail sectional view of a modified construction in which the outlet ducts are connected with outlet openings in the bottom end wall of the heater casing

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and extended laterally to opposite sides of the heater underneath the floor of the house trailer or building to be heated.

I have chosen to illustrate my present invention in the accompanying drawings in connection with a house trailer, and it will be obvious that my improved space heater may be similarly installed in a small home, garage or other such building. In the drawings, 10 designates a house trailer structure in its entirety, 11 a side wall, 12 the floor, and 13 the roof. Usually the trailer structure is provided with a wheel housing 14 along the vehicle side and located generally, in the case with the larger type house trailers, about midway of the trailer. The trailers are generally provided with built in closets, bureaus, seats and the like, and for purposes of illustrating the preferred manner of installing my space heater, I have shown in Fig. 1 a couple of closets 15 closed by suitable closet doors 16.

My space heater is preferably enclosed in one of these closets. Fig. 1 shows a house trailer structure provided with one or more closets 15 separated by a built-in bureau structure 17, said bureau being located substantially at the middle of the trailer, whereas in Fig. 2 a closet is located at or near the middle of the trailer over the wheel housing. In Fig. 1, the space heater A is housed in one of the end closets away from the middle of the trailer, whereas in Fig. 2, the space heater is housed or enclosed in the closet shown directly above the wheel housing 14 and located substantially at the middle of the trailer length. The heater is of such a height that it can be easily installed on top of the wheel housing if so desired. It will be observed that the space heater is in each instance supported directly on the floor of the trailer, and the upwardly offset roof of the wheel housing is to be considered as a part of the trailer floor, within the scope of the claims. The space heater A is so constructed that the outer casing thereof is never heated to such a temperature as to be a fire hazard, and the unit heater is thus conveniently installed in anyone of the built-in closets of the housing trailer or other type of building in which the heater is to be installed.

The house trailer is provided in both of these installations with an air intake register 20 conveniently located above the closet door, and connected with the heater air intake by a duct 21. The heater A in Fig. 1 is provided with a short hot air outlet duct 22 connected with a hot air register 23 near the trailer floor 12 and an oppositely extending longer hot air duct 24 leading to the opposite end of the trailer body, preferably extending over the wheel housing and terminating in a hot air register 25 at the far end of the trailer and preferably also located near the trailer floor. In Fig. 2, where the heater is installed in a closet located above the wheel housing and substantially at the middle of the trailer, I have provided a pair of oppositely extending hot air ducts 26 terminating in hot air outlet registers 27 located at opposite ends of the trailer. In this installation the hot air outlet ducts are substantially about equal in length thus facilitating substantially uniform distribution of heated air.

The space heater unit A comprises an open end tubular casing 30 closed at the lower end by an end plate 31 and at the top by a cover 32. A top end plate 33 is secured to the casing 30 and is preferably located a little way in from the top (see Figs. 3 and 4) to provide an air chamber 34. The air intake ducts 21 open through the cover 32 into this air chamber and preferably an auxiliary cold air intake 35 also communicates with this air chamber, said intake opening to the outside and preferably provided with a valve or other suitable control, such as a damper type valve 36 so as to regulate the amount of cold fresh air being admitted to the system. The top end plate 33 is provided with an air inlet opening 37 and an

axial flow blower or fan 38 is mounted on this end plate for circulating the air downwardly through the casing 30 over the combustion unit 40. Preferably, the tubular casing 30 is square in cross section as is also the combustion unit 40. An insulated liner 41 of suitable construction is secured to the internal wall surfaces of the casing 30, and this liner preferably extends from the top end plate to a point just above the top edge 42 of the hot air outlet openings 43, said outlet opening connected with the hot air outlet ducts 22, 24 and 26.

The combustion unit 40 comprises a sheet metal casing 44 closed at the upper end by a cover 45 and contains lower and upper end halves respectively designated as the "Primary Heating Zone" 46 and the "Secondary Heating Zone" 47. A bottom cover 48 closes the lower end of casing 44 and is provided with an air inlet opening 49 connected with an air intake pipe section 50 opening through the bottom end plate 31. This pipe 50 is open to the outside air, preferably by an opening 51 in the floor of the trailer with which the pipe is in registry.

A burner 55 is supported on the bottom cover 48 and comprises a looped burner pipe 56 which is preferably substantially square in plan (see Fig. 8) and carries a plurality of upwardly projecting burner tips 57, said looped burner pipe being of such a shape as to locate the burner tips adjacent to or in proximity to the side walls of the casing 44, the air inlet opening 49 lying within the looped burner pipe 56. The air for the burner is thus drawn into the combustor through the inlet 49 and the products of combustion are exhausted through the exhaust stack 60 connected at the top of the combustor and leading through chamber 34 to the atmosphere outside of the trailer.

A plurality of baffles are mounted in the "Secondary Heating Zone" 47 (see Figs. 3, 4, 9 and 10) and comprise horizontally disposed plates secured preferably by welding, at their periphery to the casing 44. Some of these plates, designated by reference character 65 are formed to provide openings 66 at their periphery and the remaining baffles 67 are provided with a center opening 68. The baffles 65 and 67 are alternately installed and provide a tortuous path for the flow of the hot gases through the "Secondary Heating Zone," as indicated by arrows 69 in Fig. 4.

Practically all the heat from the products of combustion are dispersed through the wall 44 to heat the air being circulated about the combustor. It will be observed that this combustor is preferably centrally positioned in the casing 30 and the walls of the combustor are thus substantially uniformly spaced from the casing 30, thereby providing an air passage 70 surrounding the combustor. I thus obtain a uniform circulation of air downwardly through air passage 70 and a quite uniform heating of this air.

The lower end of the combustor, that is, the lower extremity of the "Primary Heating Zone" 46 terminates at a point just above the hot air outlets 43 and thus the heated air first flows into the hot air distributing chamber 75 beneath the combustor and the air for the burner being taken into the combustor through pipe 50 is slightly warmed. The lower end plate 31 is slightly raised or spaced from the vehicle floor 12 to better insulate the warm bottom end plate of the space heater from the floor of the house trailer.

It will be observed that the baffles 65 are secured to the casing 44 only at the corners and baffles 67 are secured thereto preferably about their whole periphery. The two top baffles are spaced closer together than the remaining baffles; in fact, I have determined by experience that the best heat exchange results are obtained by spacing the two top baffles about 1¼ inches and spacing the remaining baffles about 2 inches apart. The top baffle 65 is spaced about 1¾ inches from the top cover, 45, of the combustor. The openings in the baffles are preferably designed of progressively decreasing area in the direction

of the gas flow. I find that quite satisfactory results are obtained by making the openings 68 in the first two baffles 67 about four (4) inches in diameter and the opening 68 in the top baffle 67 and 3½ inches in diameter. Likewise, the openings 66 are arranged progressively less in area in the direction of the hot gas flow, the opening 66 in the first said baffle 65 being about ¾ inch wide, the second one about ½ inch wide, and the two upper baffles having openings about ¼ inch wide. While satisfactory results can obviously be obtained with other specific dimensions, it is found that for the burner output used, these dimensions are most satisfactory. Obviously larger or smaller space heaters can be manufactured, and variations in overall size and capacity will necessitate variations in spacing and dimensions.

The space heater A may if desired be constructed so as to allow for locating the ducts 26 beneath the vehicle floor by lowering the heater with respect to the floor 12 (see Fig. 4). However, the space heater A can also be constructed as shown in Fig. 11 wherein the end plate 31a is provided with one or more air outlet openings and the hot air ducts 26a are extended underneath the floor 12, and the insulated lining 41a is extended the full length of the shell or casing 30, abutting the end plate 31a.

While I have chosen to illustrate but one form of my invention, it will be apparent to those skilled in the art to which it pertains that various modifications and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

I claim:

1. A space heater comprising an elongated upright casing having an air inlet at the top end and one or more air outlets adjacent the bottom end, a heat insulated liner supported about the internal wall surface of said casing and extending to a point adjacent the bottom end and terminating at a point approximately on a level with the top extremity of said air outlets, top and bottom plates carried by said casing, said top plate spaced inwardly from the top end of said casing, a cover for the top end of said casing, said top plate and top cover defining an air chamber, said top and bottom plates each having an opening, an axial flow blower mounted on said top plate moving air from said air chamber downwardly through said casing towards said air outlets, an elongated upright combustion unit, comprising an upper portion of larger cross sectional area, the side walls of which portion are substantially uniformly spaced from the side walls of the casing, and a lower portion of reduced cross-sectional area, said combustion unit being supported by said plates centrally of said casing and provided with an exhaust gas outlet at the top thereof, a burner mounted in said combustion unit and a plurality of baffles mounted in the upper half portion only of said combustion unit to provide a tortuous path for flow of hot gases to disperse said heat to the side walls of said unit and to heat the air flowing downwardly through the casing, said combustion unit lower portion of reduced cross sectional area being disposed in registration with the opening in said bottom plate to provide an air inlet for the burner, the bottom of said combustion unit section portion of larger cross sectional area being disposed approximately on the level with the said horizontal plane extending flush with the top of the air outlets.

2. A space heater comprising an elongated upright casing having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof and comprising an elongated tubular section having an upper portion of larger cross sectional area and a lower extension of reduced cross sectional area supported by said bottom plate in registration with the opening in the bottom plate, the bottom end of said combustion unit section of larger cross sectional area

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being disposed approximately on the level with the top edges of the hot air outlets in said casing, said combustion unit being mounted centrally within said casing and having the side walls of said upper portion of said larger cross sectional area substantially uniformly spaced from the side walls of the casing to provide an air duct enclosing the combustion unit, means circulating air to be heated downwardly through said duct, a burner mounted at the bottom end of said combustion unit upper portion of larger cross sectional area, a plurality of horizontally disposed baffles in the upper half portion only of said combustion unit upper portion of larger cross sectional area, said heated air being introduced into the chamber beneath the combustion unit and surrounding the lower extension and thence passing outwardly through said one or more hot air outlets, and an insulated liner secured to the inner surface of said casing and extending from the top plate to a point substantially adjacent the bottom terminus of the combustion unit upper portion of larger cross sectional area and approximately on a level with the top edges of said hot air outlets.

3. A space heater comprising an elongated upright casing having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof and comprising an elongated tubular section having an upper portion of larger cross sectional area and a lower extension of reduced cross sectional area supported by said bottom plate in registration with the opening in the bottom plate, the bottom end of said combustion unit upper portion of larger cross sectional area being disposed approximately on the level with the top edges of said hot air outlets in said casing, said combustion unit being mounted centrally within said casing and having the side walls of said upper portion of larger cross sectional area substantially uniformly spaced from the side walls of the casing to provide an air duct enclosing the combustion unit, means circulating air to be heated downwardly through said duct, a burner mounted at the bottom end of said combustion unit upper portion of larger cross-sectional area, a plurality of horizontally disposed baffles in the upper half portion only of said combustion unit portion of larger cross-sectional area, said heated air being introduced into the chamber beneath the combustion unit portion of larger cross-sectional area and surrounding the lower extension of reduced cross-sectional area and thence passing outwardly through said one or more hot air outlets, and an insulated liner secured to the inner surface of said casing and extending from the top end plate to a point substantially adjacent the bottom terminus of the combustion unit upper portion of enlarged cross sectional area and approximately on a level with the top edges of said hot air outlets, the air inlet opening in said top plate being offset from the center, an axial flow blower mounted on said top plate, and an exhaust stack connected with the exhaust gas outlet of said combustion unit and extended through the top plate and to a point externally of said casing.

4. A space heater comprising an elongated tubular upright casing substantially square in cross section and having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof mounted in said casing, said combustion unit comprising a substantially square elongated upper tubular section of larger cross-sectional area and having a lower tubular extension of reduced cross sectional area supported by said bottom plate and registering with the opening therein to provide an air inlet for said combustion unit, said combustion unit positioned centrally within said casing, the side walls of said square upper tubular section being positioned in spaced relation with the side walls of the casing to provide an air duct

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enclosing the combustion unit, means circulating air to be heated downwardly through said air duct, a burner mounted at the bottom end of said square unit section, a plurality of horizontally disposed and axially spaced baffles in the upper half portion only of said square unit section, said baffles comprising plates square in plan secured at their periphery to the walls of said unit, alternate baffles having openings respectively located in the center and at the side edges thereof, said baffles having side edge openings secured only at their corners to the side walls of said combustion unit, and an insulated liner secured to the inner surface of said casing.

5. A space heater comprising an elongated tubular upright casing substantially square in cross section and having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof and mounted in said casing and said unit comprising a substantially square elongated upper tubular section of larger cross sectional area and having a lower tubular extension of reduced cross sectional area supported by said bottom plate and registering with the opening therein to provide an air inlet for said combustion unit, the side walls of the combustion unit upper section positioned within said casing in substantially uniform spaced relation with the side walls of the casing to provide an air duct enclosing the combustion unit, means circulating air to be heated downwardly through said air duct, a burner mounted at the bottom end of said square tubular section, a plurality of horizontally disposed and axially spaced baffles in the upper half portion only of said square tubular section, said baffles comprising plates square in plan secured at their periphery to the side walls of said combustion unit, said baffles alternately having openings respectively located in the center and at the side edges thereof, the said baffles having side edge openings secured only at their corners to the side walls of the combustion unit, and an insulated liner secured to the inner surface of said casing, the baffle closest to said burner having the side edge opening as well as the baffle most remote from the burner.

6. A space heater comprising an elongated tubular upright casing substantially square in cross section and having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof and mounted in said casing, said combustion unit comprising a substantially square elongated upper tubular section of larger cross sectional area and having a lower tubular extension of reduced cross sectional area supported by said bottom plate and registering with the opening therein to provide an air inlet for said combustion unit, the side walls of the upper tubular section of said combustion unit positioned within said casing in substantially uniform spaced relation with the side walls of the casing to provide an air duct enclosing the combustion unit, means circulating air to be heated downwardly through said air duct, a burner mounted at the bottom end of said square tubular section, a plurality of horizontally disposed and axially spaced baffles in the upper half portion only of said square tubular section, said baffles comprising plates square in plan secured at their periphery to the side walls of said combustion unit, the baffles alternately having openings respectively located in the center and at the side edges thereof, the said baffles having side edge openings secured only at their corners to the side walls of the combustion unit, and an insulated liner secured to the inner surface of said casing, the baffle closest to said burner having the side edge opening as well as the baffle most remote from the burner, said openings in said baffles being progressively less in area in the direction of the exhaust gas flow upwardly in said combustion unit toward said exhaust gas outlet.

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7. A space heater comprising an elongated tubular upright casing substantially square in cross section and having an air inlet at the top and one or more hot air outlets adjacent the bottom end, top and bottom plates carried by said casing and each having an opening, a combustion unit provided with an exhaust gas outlet at the top thereof and mounted in said casing, said combustion unit comprising a substantially square elongated upper tubular section larger cross-sectional area and having a lower tubular extension of reduced cross sectional area supported by said bottom plate and registering with the opening therein to provide an air inlet for said combustion unit, the side walls of the upper square section of said combustion unit positioned within said casing in substantially uniform spaced relation with the side walls of the casing to provide an air duct enclosing the combustion unit, means circulating air to be heated downwardly through said air duct, a burner mounted at the bottom end of said square tubular section, a plurality of horizontally disposed and axially spaced baffles in the upper half portion only of said square tubular section, said baffles comprising plates square in plan secured at their periphery to the side walls of said combustion unit, the baffles alternately having openings respectively located in the center and at the side edges thereof, said baffles having side edge openings secured only at their corners to the walls of the combustion unit, and an insulated liner secured to the inner surface of said casing, the

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baffle closest to said burner having the side edge opening as well as the baffle most remote from the burner, said openings in said baffles being progressively less in area in the direction of the exhaust gas flow upwardly in said combustion unit toward said exhaust gas outlet, all but the two upper baffles being equally vertically spaced, said two upper baffles being spaced apart a lesser vertical distance from each other, said uppermost baffle vertically spaced from the top end wall of the combustion unit an amount slightly in excess of the space between said two uppermost baffles but less than the spacing of said other baffles.

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