Oct. 2, 1962 R. L. HAMMERSLEY ETAL 3,056,400

AIR INLET AND SMOKE OUTLET BAFFLE STRUCTURE FOR GAS FIRED HEATER

Filed Feb. 8, 1960

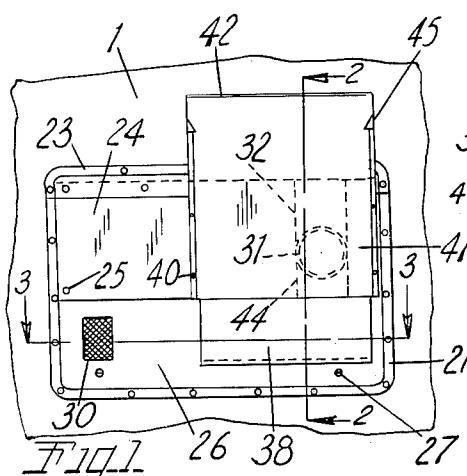


Fig. 1

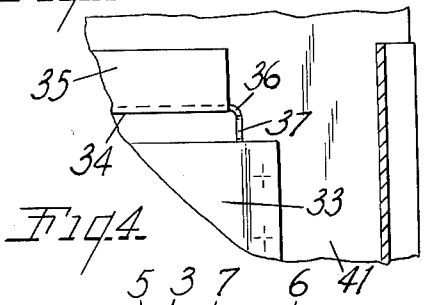


Fig. 4

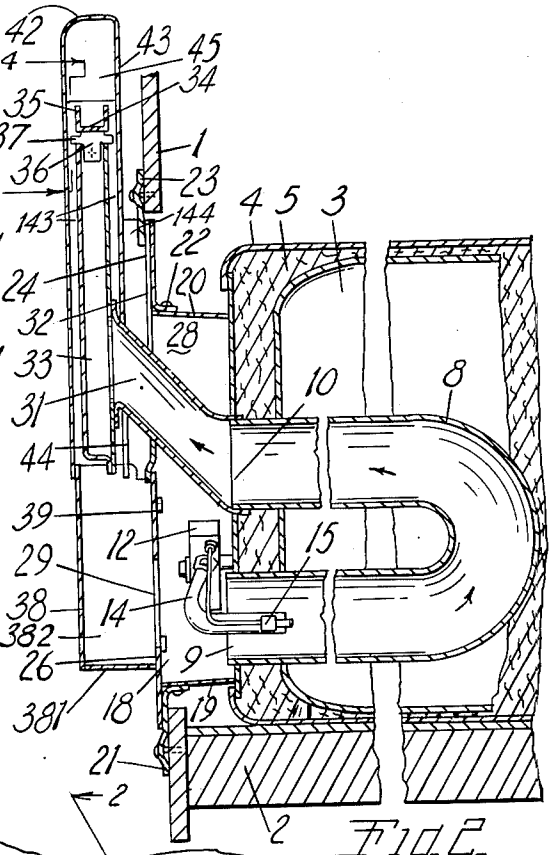


Fig. 2

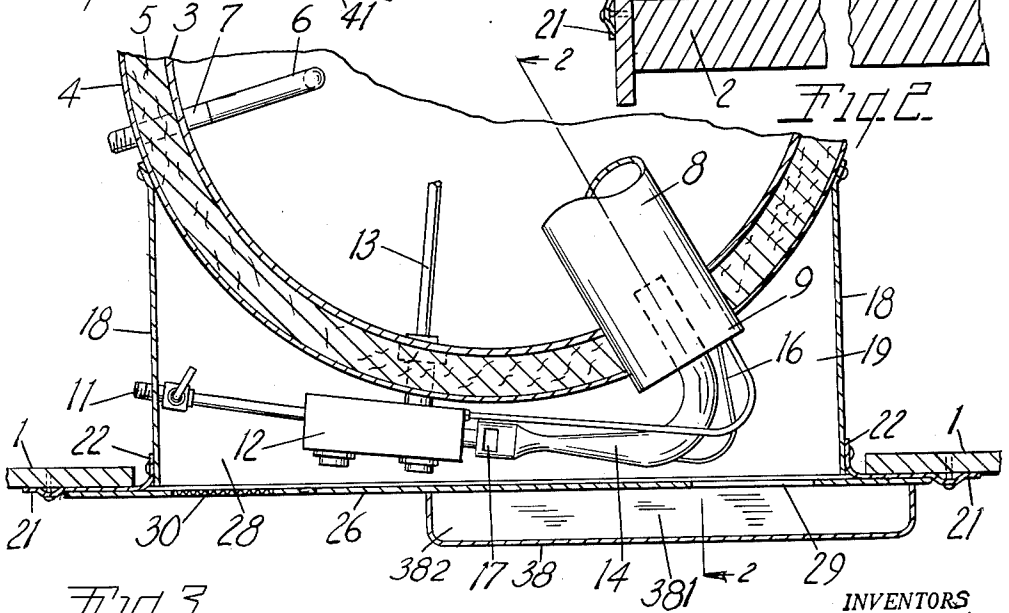


Fig. 3

INVENTORS
Richard L. Hammersley
Donald E. Robinson
BY
ATTORNEY

United States Patent Office 3,056,400 Patented Oct. 2, 1962

3,056,400

AIR INLET AND SMOKE OUTLET BAFFLE STRUCTURE FOR GAS FIRED HEATER

Richard L. Hammersley, Lavonia, and Donald E. Robinson, Northville, Mich., assignors to Handling Equipment Manufacturing Corporation, Wixom, Mich.

Filed Feb. 8, 1960, Ser. No. 7,268
6 Claims. (Cl. 126—307)

This invention relates to improvements in gas fired water heaters for trailers.

The principal objects of this invention are:

First, to provide a gas fired water heater for trailers, mobile homes and similar enclosed places with an exterior air inlet and smoke outlet and baffle structure which will permit the heater to function without disturbance by exterior air currents.

Second, to provide baffle structure for the air inlet and gas outlet of a gas fired water heater which will permit the inlet and outlet to communicate with the exterior of the enclosure in which the heater is positioned.

Third, to provide relatively inexpensive baffle structure for the air inlet and smoke outlet of a gas fired water heater which will substantially equalize the external wind and air pressure conditions at the inlet and outlet under various external wind conditions.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims. The drawings, of which there is one sheet, illustrate a highly practical form of the invention.

FIG. 1 is a fragmentary outside elevational view of the heater installation and the baffle structure therefor.

FIG. 2 is a fragmentary vertical cross sectional view taken along the plane of the line 2—2 in FIGS. 1 and 3.

FIG. 3 is a fragmentary horizontal cross sectional view taken along the plane of the line 3—3 in FIG. 1.

FIG. 4 is a fragmentary enlarged cross sectional view taken along the plane of the line 4—4 in FIG. 2.

The installation of gas fired water heaters in small enclosed spaces such as trailers and mobile homes requires external sources of air combustion and exhaust openings for smoke or the products of combustion which are sealed or isolated from the interior of the trailer or enclosure in order to prevent the gas flame from consuming all of the oxygen in the trailer and to prevent the products of combustion from dangerously contaminating the atmosphere in the trailer. In the drawings portions of a trailer or other enclosure are conventionally illustrated with an outer wall 1 and an inner floor or other support 2. The water heater consists of a generally cylindrical tank 3 positioned on end and enclosed in a jacket 4 desirably provided with insulating material 5. A water inlet is indicated conventionally at 6 and a water outlet at 7 (see FIG. 3). Extending through the side walls of the tank and jacket is a U-shaped heater tube 8 having a lower inlet end 9 and an upper outlet end 10. A gas supply connection is indicated at 11 delivering to an automatic control mechanism enclosed in the case 12. The control mechanism includes a thermostatic sensing element 13 projecting into the water in the tank and a burner tube 14 that extends from the control into the inlet 9.

15 is an igniter which includes a constantly burning pilot light and 16 is a safety thermostatic sensing device to shut off the supply of gas at the control 12 in the event that the pilot light is extinguished. Primary air for mixing with the fuel gas enters the burner tube 14 through the port 17 and secondary combustion air enters through the inlet end 9 around the burner tube. All of the foregoing structures and relationships are more or less common in the gas fired water heater art and so are not described in greater detail.

The baffle structure for regulating the supply of air to the heater and the exhaust of smoke therefrom consists first of side walls 18, bottom wall 19 and top wall 20 secured to and projecting from the side of the case 4 to form a throat surrounding the inlet and outlet ends of the heater tube. An escutcheon plate 21 secured to the outer side of the trailer wall 1 is provided with inturned flanges 22 projecting through an opening in the trailer wall and connected to the throat walls to prevent the leakage of outside air into the trailer. Coacting with the escutcheon plate 21 which is generally U-shaped in character is a top escutcheon strip 23 extending across the top of the wall opening between the sides of the escutcheon 21.

The outer end of the throat is closed by an upper closure plate 24 which slips upwardly under the top escutcheon strip 23 and is secured to the lower escutcheon plate by fastenings 25. Coacting with the upper closure plate 24 is a lower closure plate 26 removably held in place by releasable fastenings 27. The upper and lower closure plates partially close off the outer end of the throat and form an inlet chamber 28 enclosing the control 12 and the inlet end 9 to the heater tube. Together the upper plate 24 and lower plate 26 constitute a panel partially enclosing the inlet chamber. A first air inlet opening 29 is formed in the lower closure plate opposite the inlet end 9 of the heater tube. A second inlet opening having a grill 30 mounted therein is formed in the lower closure plate in laterally spaced relation to the inlet opening 29.

Secured to the outlet end 10 of the heater tube and angling upwardly and outwardly therefrom is a tubular smoke flue 31. The upper closure plate 24 defines a notch 32 which passes the flue when the closure plate is slipped upwardly under the top escutcheon strip 23. The outer end of the flue 31 projects substantially outwardly from the upper closure plate and is secured to and supports a relatively thin and flat box-like smoke box 33 of heat resistant metal. The smoke box 33 is open at the top and closed at the bottom so that the smoke box and flue form a vertically extending stack passage through which the smoke or products of combustion rise by thermal action. The upper open end of the smoke box 33 is covered by a horizontal baffle 34 with upwardly extending front and rear flanges 35. The ends of the baffle 34 are turned downwardly as at 36 and secured within the smoke box to support the baffle in spaced relationship above the upper end of the first stack passage. Laterally extending lugs 37 space the first baffle from the smoke box and also function to space other baffle structure to be described presently from the smoke box.

A first shield 38 of U-shaped horizontal cross section is secured to the outer side of the lower closure plate as by having ears 39 passed through the lower closure plate and bent over behind the plate. The shield 38 is open at the top but closed at the bottom by the wall 381 to form an open topped baffle chamber 382 which embraces or covers the inlet opening 29 in the lower cover plate. Secured to the upper cover plate 24 as by the fasteners 40 (see FIG. 1) is a second or upper shield 41 also of U-shaped horizontal cross section which registers at its lower end with the lower shield 38 and projects thereabove around the smoke box 33. The upper shield 41 constitutes a box-like hood and defines or forms a continuation of the baffle chamber of the lower shield and extends upwardly in surrounding relation to the smoke box 33. The several walls or panels of the shields 38 and 41 collectively constitute baffle walls surrounding the inlet opening 29 and the smoke box 33.

The outer or front wall of the upper shield 41 is ex-

tended upwardly beyond the baffle 34 and curved rearwardly in a cover or hood portion 42 and then downwardly in an inner wall 43 which projects into the upper end of the baffle chamber 382 in spaced relationship between the upper closure plate 24 and the inner side of the smoke box 33. The inner wall 43 of the upper shield is vertically slotted as at 44 to receive and pass over the smoke flue 31. In effect the inner wall 43 of the upper shield forms an air inlet passage 143 surrounding the smoke box 33 and separates the passage from the baffle passage 144 in the upper shield. The cover or hood 42 is spaced above the end walls of the upper shield to provide combined smoke outlet and air inlet openings 45 at each end of the upper shield.

Being positioned on the outside of the trailer wall 1, the shield and baffle structure just described is subject to an almost infinite variation of wind conditions. When the air is calm combustion air for the burner enters mainly through the grill 30 and inlet opening 29 while hot flue gases rising through the stack passage in the smoke box 33 emerge into the surrounding passage formed by the wall 43 to escape through the outlet openings 45. The flow of these hot gases induces a low pressure area at the inlet end 9 of the heat tube which draws the air in through the grille 30 and also draws some air downwardly through the space between the wall 43 and the upper closure plate 24 to protect the outer wall of the trailer from heat.

When a wind current is blowing directly against the side of the trailer and the baffle structure, an area or layer of static pressure is built up around the baffle structure to a depth of 4 or 5 inches. Within this area there is an increased static pressure but no particular air flow due to the wind current. Such air flow as does exist around a trailer wall is downward to escape under the trailer and this flow across the grille 30 actually creates a slight area of relatively low pressure at the opening formed at the grille. The pressure differential between the inlet 9 and outlet 45 due to thermal rise of the products of combustion draws air down between the outer face of the trailer and the inner wall 43 to continue to support combustion of either the pilot flame or the main flame. This downward air flow may create some dilution or contamination of the inlet air with products of combustion from around the outlets 45 but not in enough proportion to defeat satisfactory operation of the heater. When the external wind current varies or fluctuates there is a fluctuation of the static pressure over the face of the trailer and this pressure would tend to build up first around the outlet opening 45 at the upper end of the baffle since the baffle is positioned outwardly from the trailer. However the baffle structure prevents the creation of any substantial pressure differential between the inlet end 9 of the heater tube and the outlet openings 45 so the heater continues to function uniformly.

When the air or wind blows horizontally alongside of the trailer, some venturi or suction action may be created at the grill 30 but an equal and balancing suction action is created by the wind passing through the upper end of the shield 41 and the outlet openings 45 to again balance the externally created pressure at the inlet and outlet ends of the heater tube. Vertical wind currents passing upwardly along the side of the trailer also tend to create a venturi or vacuum action at the inlet opening 30 but an equal and balancing suction action is created around the opening at the upper end of the smoke box so the operation of the gas burner and its pilot light are not seriously affected. The baffle structure thus provides balancing action for equalizing externally created pressures at the inlet and outlet ends of the heater tube under substantially all wind conditions so that the water heater can operate independently and automatically under all wind conditions.

What is claimed as new is:

1. Wind baffle structure in combination with a gas fired heating device having a heater tube with a lower fuel inlet opening and a relatively elevated outlet opening with a hot gas flue projecting upwardly and outwardly from the upper end of the heater tube comprising, a relatively thin and flat upright smoke box communicating with the upper end of the said flue and projecting thereabove, said smoke box being closed at the bottom and sides and having a baffle mounted in spaced relation above the open upper end of the box, a panel positioned in spaced relation to said inlet and embracing said flue to enclose an air inlet chamber, a first laterally facing U-shaped shield positioned in concave facing relation to the panel and open at the top, and an upper shield having laterally turned side walls supporting the upper shield in spaced relationship over said smoke box, the upper end of said upper shield having a top wall defining end openings at the sides of said upper shield, said panel defining laterally spaced openings to said inlet chamber, one of which openings is positioned behind said first shield and the other of said openings being positioned outside of said first shield, the inner wall of said upper shield being spaced outwardly from the plane of said panel and above said first shield to provide parallel air flow passages along the front and back sides of said smoke box opening below the top wall on said upper shield and third air flow passages extending along the inner side of said upper shield.

2. Wind baffle structure in combination with a gas fired heating device having a heater tube with a lower fuel inlet opening and a relatively elevated outlet opening with a hot gas flue projecting outwardly from the upper end of the heater tube comprising, a relatively thin and flat upright smoke box communicating with the upper end of said flue and projecting thereabove, said smoke box being closed at the bottom and sides and having a baffle mounted in spaced relation above the open upper end of the box, a panel positioned in spaced relation to said inlet and embracing said flue to enclose an air inlet chamber, a first laterally facing U-shaped shield positioned in concave facing relation to the panel and open at the top, a bottom wall closing the bottom of said U-shaped shield, and an upper shield having laterally turned side walls supporting the upper shield in spaced relationship over said smoke box, the upper end of said upper shield having a top wall defining end openings at the sides of said upper shield, said panel defining an opening to said inlet chamber positioned behind said first shield, the inner wall of said upper shield being spaced outwardly from the plane of said panel and above said first shield to provide parallel air flow passages along the front and back sides of said smoke box opening below the top wall on said upper shield and third air flow passages extending along the inner side of said upper shield.

3. Wind baffle structure in combination with a gas fired heating device positioned within an enclosure having an upright exterior wall exposed to the weather with a pair of air inlet openings to the device formed through the wall and an exhaust flue from the device projecting upwardly and outwardly through the wall above said inlet openings, said baffle structure comprising a relatively flat box positioned transversely across the outer end of said flue in outwardly spaced relation from said exterior wall and communicating toward the lower part of the box with said flue to form a first stack passage open at the top and closed at the bottom, shield means of laterally facing U-shaped cross section secured to said exterior wall in surrounding relation to said box and spaced outwardly therefrom and closed at the bottom, said shield means embracing one of said inlet openings, and a cover extending as a continuation from the upper edge of the front wall of said U-shaped shield means upwardly over the open top of said shield and said box and downwardly in spaced relation between said exterior wall and the opposed side

of said box to below said exhaust flue and adjacent the lower end of said box, said cover defining openings at its sides over the upper end of said U-shaped shield means.

4. Wind baffle structure in combination with a gas fired heating device positioned within an enclosure having an upright exterior wall exposed to the weather with an air inlet opening to the device formed through the wall and an exhaust flue from the device projecting outwardly through the wall above said inlet opening, said baffle structure comprising a relatively flat box positioned transversely across the outer end of said flue in outwardly spaced relation from said exterior wall and communicating toward the lower part of the box with said flue to form a first stack passage open at the top and closed at the bottom, shield means of laterally facing U-shaped cross section secured to said exterior wall in surrounding relation to said box and closed at the bottom, said shield means embracing said inlet opening, and a cover extending from the upper edge of the front wall of said U-shaped shield means upwardly over the open top of said shield and said box and downwardly in spaced relation between said exterior wall and the opposed side of said box to below said exhaust flue, said cover defining openings at its sides over the upper end of said U-shaped shield means.

5. Wind baffle structure in combination with a gas fired heating device positioned within an enclosure having an upright exterior wall exposed to the weather with an air inlet opening to the device formed through the wall and an exhaust flue from the device projecting outwardly through the wall above said inlet opening, said baffle structure comprising a relatively flat box positioned transversely across the outer end of said flue in outwardly spaced relation from said exterior wall and communicating toward the lower part of the box with said flue to form a first stack passage open at the top and closed at the bottom, shield means of laterally facing U-shaped cross section secured to said exterior wall in surrounding relation to said box and closed at the bottom, said shield means embracing said inlet opening, and a cover extending from the upper edge of the front wall of said U-shaped shield means upwardly over the open top of said shield and said box and downwardly in spaced relation to said exterior wall and to below said exhaust flue, said cover defining openings at its sides over the upper end of said U-shaped shield means.

6. Wind baffle structure in combination with a gas fired heating device positioned within an enclosure having an upright exterior wall exposed to the weather with an air inlet opening to the device formed through the wall and an exhaust flue from the device projecting outwardly through the wall above said inlet opening, said baffle structure comprising a relatively flat box positioned transversely across the outer end of said flue in outwardly spaced relation from said exterior wall and communicating toward the lower part of the box with said flue to form a first stack passage open at the top and closed at the bottom, shield means of laterally facing U-shaped cross section secured to said exterior wall in surrounding relation to said box and spaced outwardly therefrom and closed at the bottom, said shield means embracing said inlet opening, and a cover extending from the upper edge of the front wall of said U-shaped shield means upwardly over the open top of said shield and said box and downwardly between said exterior wall and the opposed side of said box in spaced relation to said box.

References Cited in the file of this patent

UNITED STATES PATENTS

1,939,944	Barthel et al.	Dec. 19, 1933
2,087,983	Martin	July 27, 1937
2,226,816	Hepburn	Dec. 31, 1940
2,647,477	Martin	Aug. 4, 1953
2,678,038	Edwards	May 11, 1954
2,734,501	Fauser	Feb. 14, 1956