United States Patent

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[54] EXHAUST STACK FOR OUTDOOR HEATERS

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 889,475, Dec. 31, 1969, abandoned.

[52] **U.S. Cl.** **98/78**, 98/60

[51] **Int. Cl.** **F23l 17/02**

[58] **Field of Search** 98/58–60, 66–70, 98/78, 79

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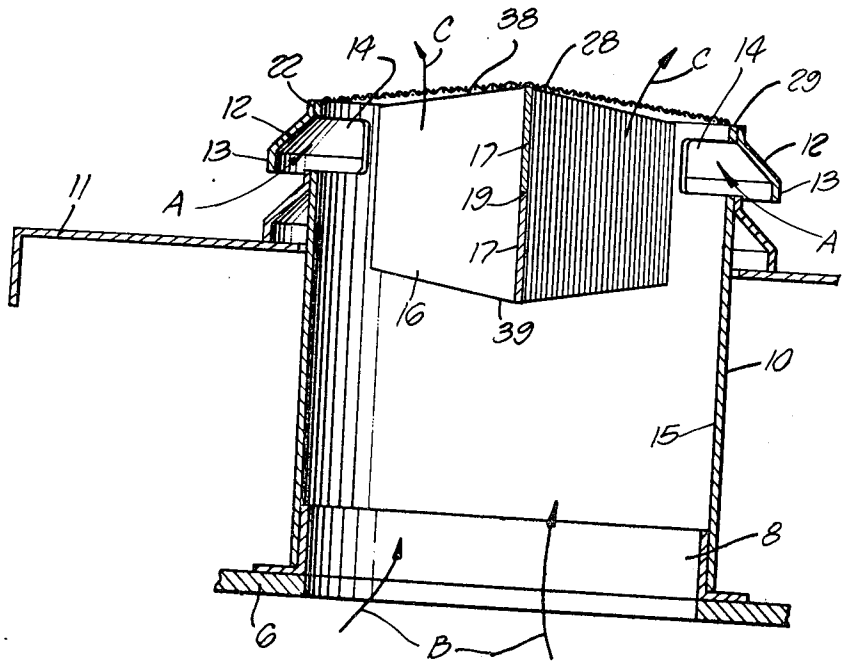
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[57] **ABSTRACT**

Exhaust stack for an outdoor heater including a vent pipe terminating in an upwardly directed open end having annular wind openings in the wall of the vent pipe which are positioned adjacent to its open end. Downwardly directed wind deflectors are positioned outwardly of and extending over the wind openings and spacer elements are positioned within the vent pipe adjacent its open upper end which divide the vent pipe into four substantially pie-shaped quarter sections, the spacer elements extending downwardly in the vent pipe past the wind openings. The upper surfaces of the spacer elements are inclined upwardly toward the center of the vent pipe and a wire mesh screen is positioned in contact with the upper surfaces of the spacer elements to form an upper surface for the vent pipe having a generally conical configuration.

7 Claims, 3 Drawing Figures



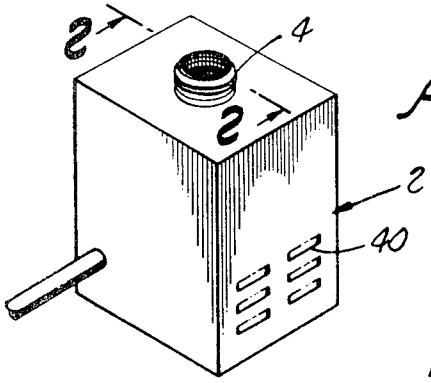


FIG. 1.

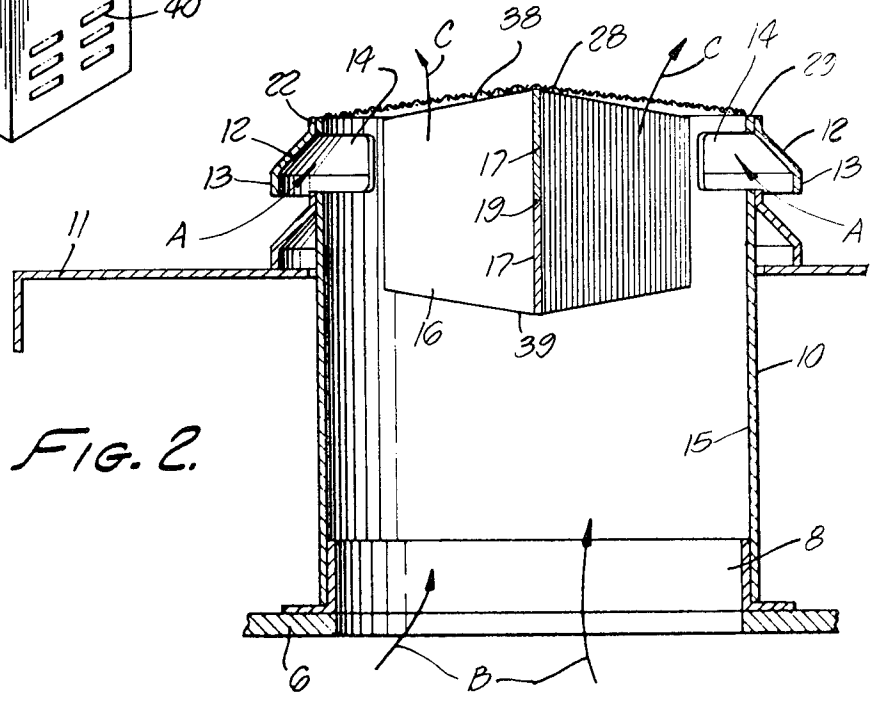


FIG. 2.

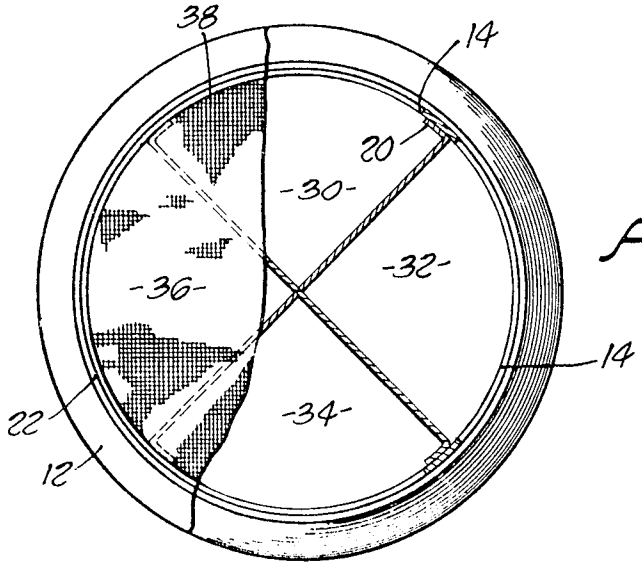


FIG. 3.

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EXHAUST STACK FOR OUTDOOR HEATERS

This application is a continuation-in-part of my prior copending application, Ser. No. 889,475, filed Dec. 31, 1969, which is now abandoned.

The present invention pertains to an exhaust stack configuration for use with an outdoor heater to minimize downdrafts through the exhaust stack of the heater which would have a deleterious effect upon the combustion characteristics of the heater.

Outdoor heaters are widely employed for heating the water contained in swimming pools. In such use, swimming pool water is circulated from the pool to the heater and then back to the pool.

In the use of an outdoor heater, e.g., in heating water for a swimming pool, it is necessary that the heater function satisfactorily under adverse climatic conditions. Typical of such adverse conditions are the effect of wind on the combustion efficiency of the heater. Wind forces may, and frequently do, fluctuate widely in terms of their force and their direction from one moment to another. These wind forces can cause downdrafts in the exhaust stack of an outdoor heater which can impair its combustion efficiency and, in extreme cases, can extinguish combustion altogether.

In providing an exhaust stack for an outdoor heater which functions satisfactorily in minimizing the adverse effect of wind forces, I have also provided an exhaust stack which is reasonably short in height and extends above the heater top only a short distance, such as a few inches. The reasonably short height of my exhaust stack is advantageous in that it improves the overall appearance of the heater and gives it a compact appearance. The use of an exhaust stack which is fairly high and extends upwardly above the heater for a distance of several feet may be unsightly and, therefore, undesirable to a homeowner if the exhaust stack protrudes above the level of the typical backyard fence. Thus, there is a substantial need for an exhaust stack, as provided by the present invention, which functions satisfactorily in minimizing the effect of wind forces upon the combustion efficiency of the heater and which, at the same time, provides an exhaust stack which is relatively short in height.

In illustrating a preferred embodiment of the invention, reference is made to the accompanying drawing in which:

FIG. 1 is a pictorial representation of an outdoor heater employing an exhaust stack of the present invention;

FIG. 2 is a section through the exhaust stack along the line 2—2 of FIG. 1, and

FIG. 3 is a top view of the exhaust stack as shown in FIG. 2 with portions broken away to more clearly illustrate the interior of the stack.

An outdoor swimming pool heater, as generally indicated by reference numeral 2 in FIG. 1, has positioned on its upper surface an exhaust stack generally indicated by reference numeral 4. Air may be introduced into the heater 2 through openings 40 where it and the exhaust products pass upwardly out of the heater through exhaust stack 4. The particular manner in which air is introduced into the heater may, of course, be varied, since the present invention is concerned only with the structure of the exhaust stack and not with the structure of the heater with which it may be used.

Turning to FIG. 2, a heater frame or support 6 may have a stub pipe 8 affixed to its upper surface. A vent pipe 10 surrounds the outer surface of stub pipe 8 and is supported thereby. The vent pipe 10 extends through a hole in the heater body 11 such that only a short length of the vent pipe protrudes above the heater body. The vent pipe 10 has an upwardly directed open end and positioned adjacent the open end are annular wind openings 14. If desired, the vent pipe 10 can have wind openings positioned at several levels along the height of the vent pipe 10 which extends above heater body 11. Wind deflectors 12 are positioned outwardly of and extending over the openings 14. As illustrated in FIG. 2, the wind deflectors 12 form an angle with the exterior surface of the vent pipe 10. Preferably, the angle formed between the wind deflectors 12 and the vent pipe 10 is approximately 45°. I have found that this angle works very well in providing a suitable rate of airflow through the openings 14, which is deflected upwardly with respect to the vent pipe 10 such that the entering air, as indicated by the arrows A, has a tendency to produce an updraft within vent pipe 10.

The wind deflectors 12 preferably have a downwardly directed lip or skirt portion 13. The lip 13 tends to prevent the entry of rainwater through opening 14 where the rainwater may have a tendency to run down the interior surface 15 of vent pipe 10 into the heater 2. The term heater is used herein in a general sense to also include boilers. The distinction between boilers and heaters relates to the pressure of the liquid being heated and the heating efficiencies. In technical terms, an outdoor swimming pool heater is generally a boiler.

Positioned within the vent pipe 10 adjacent its upper end are a plurality of spacer elements 16. As shown in FIG. 2, each of the spacer elements 16 contains a slot 17 which extends approximately halfway through the element and terminates at a surface 19. Each spacer element 16 has upper surfaces 38 which are inclined upwardly toward the axis of the vent pipe 10 and corresponding lower surfaces 39 which are inclined downwardly toward the axis of vent pipe 10. Two spacer elements 16 are joined together to form a unitary structure by engaging the slot 17 of one of the elements with the corresponding slot in the other element. The angles which the upper surfaces 38 make with the axis of vent pipe 10 are the same as the angles made by the lower surfaces 39 with the vent pipe axis. Thus, the spacer elements 16 are completely interchangeable since their lower surfaces 39 can become upper surfaces 38 merely by turning the spacer upside down.

The spacer elements 16 divide the vent pipe into four substantially pie-shaped quarter sections which are indicated by reference numerals 30, 32, 34 and 36. Exhaust gases indicated by the arrows B may pass upwardly through the vent pipe 10 through each of the quarter sections 30, 32, 34 and 36. The wind entering a particular quarter segment through openings 14 will be confined within that quarter segment by the spacer element 16. Thus, if the entering wind has an adverse effect upon the updraft from the stack, the adverse effect will be minimized by confining it to one or more quarter sections. The exhaust gases will still flow in a substantially uniform manner in the quarter sections which are not affected by the entering wind force, with the result that the overall performance of the stack will be relatively smooth.

As shown in FIG. 2, a wire mesh screen 28 engages the upper surfaces 38 of the spacer elements 16 and is connected to the upper edge 29 of vent pipe 10 by any suitable means (not shown). By virtue of the upward inclination of surfaces 38, the overlying screen 28 defines a generally conical surface. The conical configuration of the surface formed by screen 28 prevents debris from collecting on the top of the vent stack which can impede the upward flow of exhaust gases. Also, the screen 28 acts as a safety measure to prevent children from thrusting their hands into the stack where they might be burned.

The wind deflectors 12 have straight cylindrical portions 22. As illustrated in FIG. 2, the cylindrical portions 22 engage the outer surface of vent pipe 10 and may be connected thereto by any suitable means, such as welding, to provide a rigid support for wind deflectors 12.

After mixing of the exhaust gases flowing in the direction of arrows B with the wind or air flowing in the direction of arrows A, the combined gases are ejected from the exhaust stack in the direction indicated by arrows C. Entering wind, as described previously, is deflected upwardly by the wind deflectors 12 such that the overall effect of the wind is to provide an updraft within the exhaust stack. Any adverse effects of the entering wind are confined to one or more of four sections 30, 32, 34 and 36 by the spacer elements 16 which are positioned within the vent pipe 10.

There is no provision in my exhaust stack for preventing the entry of rain or other precipitation through the top of the stack since the top is open and is covered only by wire mesh

screen 28. Water entering the top of vent pipe 10 is permitted to fall freely through the pipe and into the open stack within the heater. The water may fall freely through the heater without impairing its combustion, after which the water may be removed by a drain (not shown), which can be conveniently located near the bottom of the heater. If desired, a rain deflector plate of any conventional design may be mounted above screen 28 if it is desired to use my exhaust stack for a heater whose interior must be shielded from moisture.

As illustrated, the vent pipe 10 is supported by a frame or support 6 within the heater. The manner of supporting vent pipe 10 can, of course, be altered in the use of my exhaust stack. For example, the vent pipe 10 could be shortened and connected directly to the body 11 of the heater. Also, if desired, the openings 14 can be covered by a screen placed within the vent pipe.

I claim:

1. An exhaust stack for an outdoor heater comprising:

a vent pipe terminating in an upwardly directed open end;

annular wind openings in said vent pipe positioned adjacent said open end;

downwardly directed wind deflectors positioned outwardly of and extending over said wind openings;

spacer elements positioned at the upper open end of said vent pipe and dividing said vent pipe into four substantially pie-shaped quarter sections, said spacer elements extending downwardly past said wind openings;

the upper surfaces of said spacer elements being inclined upwardly at an angle toward the center of said vent pipe, and

a wire mesh screen positioned in contact with the upper surfaces of said spacer elements to form an upper surface having a generally conical configuration, whereby wind entering said wind openings is deflected upwardly by said wind deflectors, after which it may contact said spacer elements which tend to combine the effect of the wind to the one or more substantially pie-shaped quarter sections within said vent pipe which communicate respectively with the one or more openings through which the wind enters.

2. The exhaust stack of claim 1 including a slot in each of said spacer elements, the spacer elements being joined together to form a unitary structure by engaging the slot in one of said elements with a corresponding slot in another of said elements.

3. The exhaust stack of claim 2 wherein the bottom surfaces of said spacer elements are inclined downwardly toward the center of said vent pipe at an angle corresponding to the angle of inclination of the upper surfaces of said spacer elements.

4. The exhaust stack of claim 1 wherein said wind deflectors make an angle of about 45° with said vent pipe.

5. The exhaust stack of claim 1 including a rain lip formed on the extremities of said wind deflectors.

6. The exhaust stack of claim 2 wherein the end portions of each of said spacer elements are bent over to form tabs which contact the inner surface of said vent pipe.

7. The exhaust stack of claim 2 wherein said wind openings are spaced at more than one level with respect to the end of said vent pipe, the first level being immediately adjacent and parallel to the end of said vent pipe and other levels being spaced from and parallel to the first level.

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