May 8, 1956 P. R. MILLSAPS ET AL 2,744,503

GAS FIRED TABLE TOP WATER HEATER WITH BUILT-IN DRAFT DIVERTER

Filed Feb. 23, 1952 3 Sheets-Sheet 1

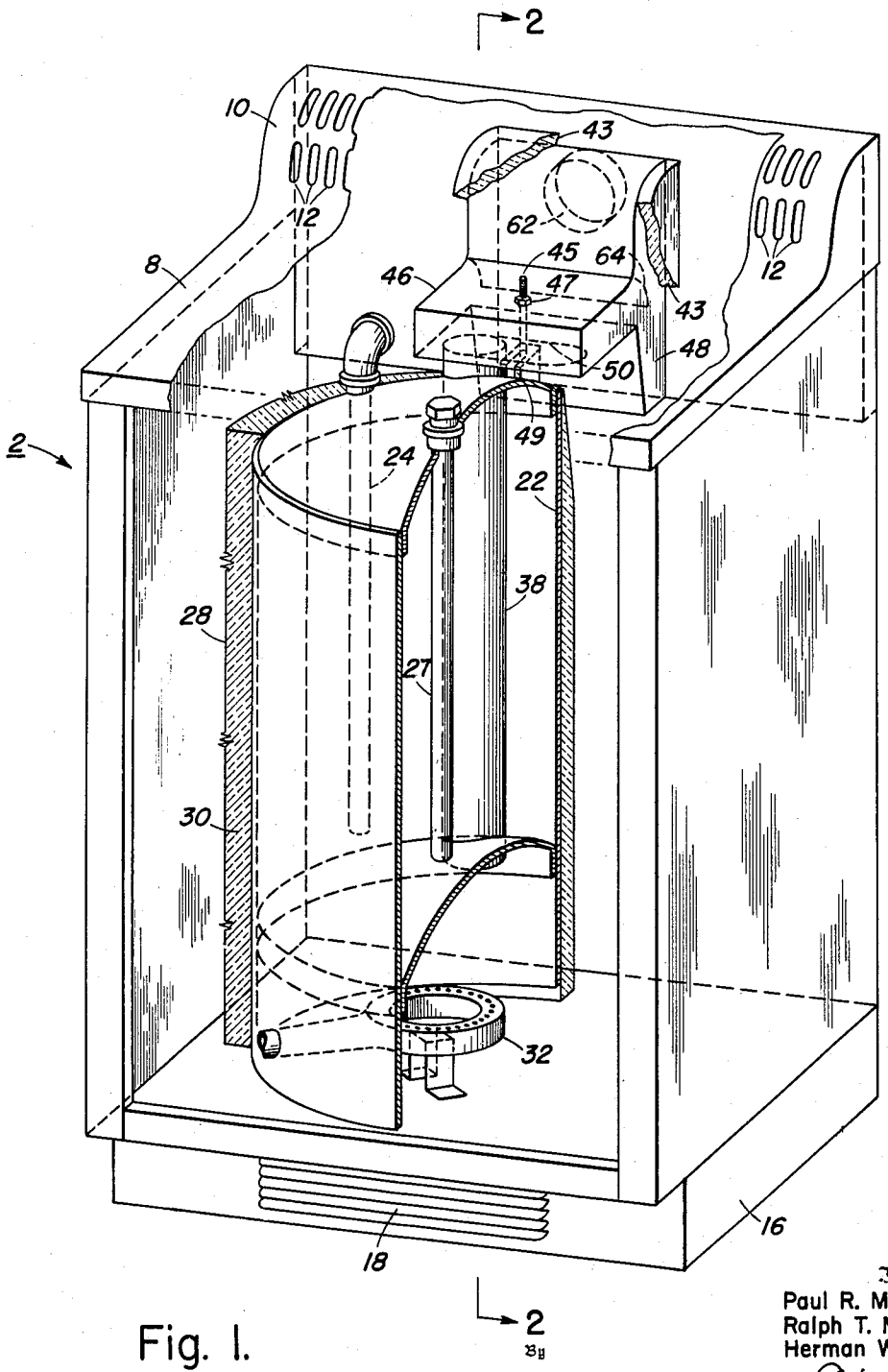


Fig. 1.

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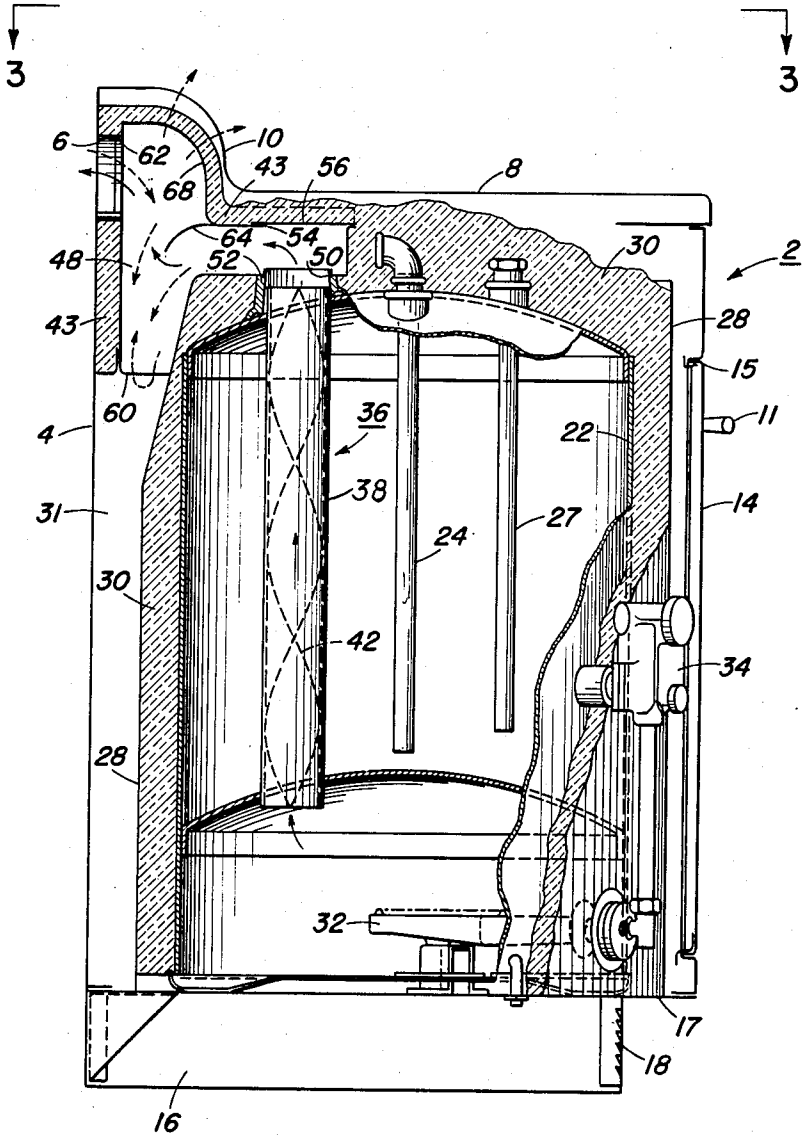


Fig. 2.

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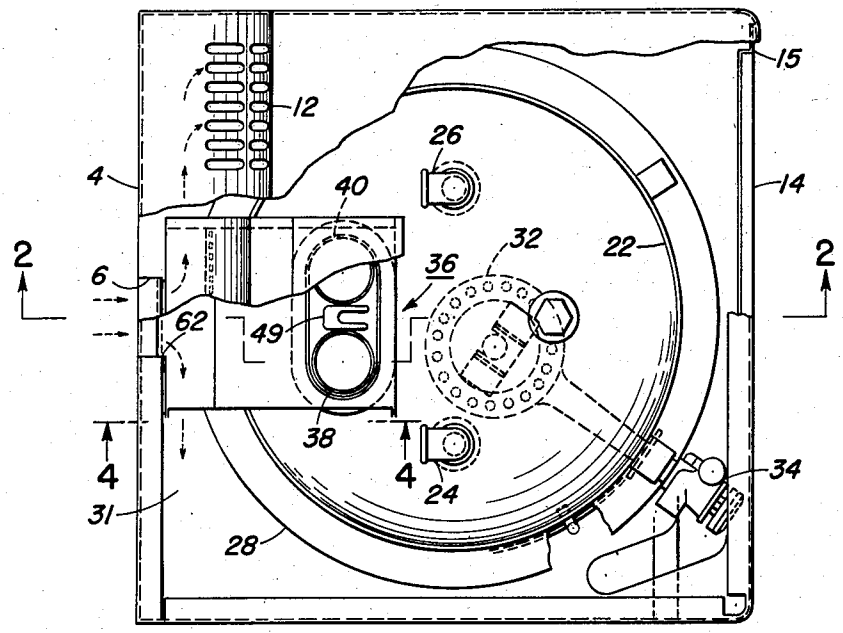
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Fig. 3.



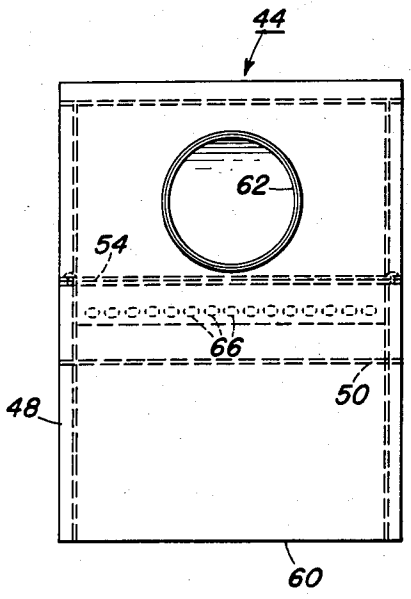


Fig. 5.

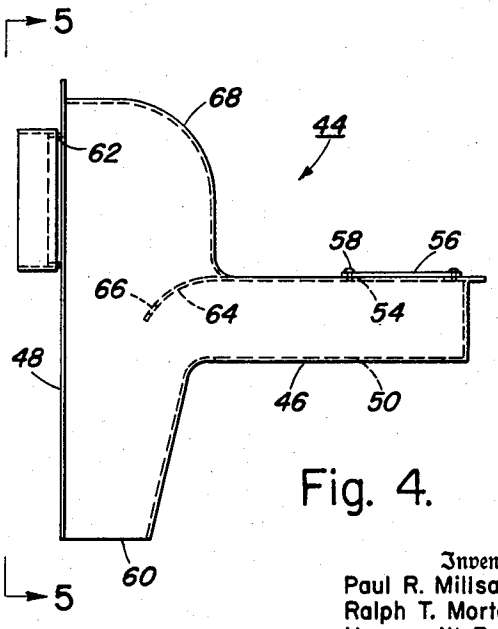


Fig. 4.

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GAS FIRED TABLE TOP WATER HEATER WITH BUILT-IN DRAFT DIVERTER

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Application February 23, 1952, Serial No. 272,972

5 Claims. (Cl. 122—17)

Our invention relates generally to a gas-fired water heater of table top height adapted to be placed in the kitchen of a home and specifically includes such a heater with a draft diverter built into the cabinet thereof permitting flush wall mounting of the unit.

Generally stated, the object of our invention is to improve the design and construction of gas-fired water heaters having draft diverters associated therewith in order to obtain a more compact as well as a more efficiently operating unit.

A more specific object is to provide a gas-fired table top water heater with a draft diverter incorporated within the cabinet thereof allowing the unit to be mounted flush against a wall.

Another object is to provide a gas-fired table top water heater having a vent cavity within the cabinet thereof, which cavity communicates with an outlet opening in the top of said cabinet and is arranged to receive gases passing through a back draft outlet of a draft diverter.

A further object is to provide a gas-fired table top water heater with a draft diverter incorporated within the cabinet thereof in such a manner as to improve the normal operation of said draft diverter.

A still further object is to provide a gas-fired table top water heater with a draft diverter built into the cabinet thereof, which diverter is provided with a clean-out opening to facilitate cleaning the flues of said heater.

Since the American Gas Association requires the use of a draft diverter as well as a flue for carrying the gases from the burner of a hot water heater to a remote point only when the capacity of said heater is above 5000 B. t. u.'s per hour, it is an additional object of our invention to provide such a heater with means to quickly and easily convert it from high output (over 5000 B. t. u.'s per hour) to low output (5000 B. t. u.'s per hour and under) operation.

A still additional object is to provide a draft diverter with a novel baffle arrangement for increasing the operating efficiency of said diverter.

Other and further objects of our invention will become apparent to those skilled in the art as the description proceeds.

With the aforementioned objects in view, our invention comprises an arrangement, construction and combination of the elements of the heater in such a manner as to attain the results desired as hereafter more particularly set forth in the following detailed description of an illustrative embodiment; said embodiment being shown by the accompanying drawings wherein:

Figure 1 is a perspective view, partly in section of apparatus incorporating our invention showing the elements of the heater positioned within the cabinet.

Figure 2 is a view partly in section, generally along line 2—2 of Fig. 1 and Fig. 3, showing the relation of the cabinet, draft diverter and heater tank.

Figure 3 is a top view (from line 3—3 of Fig. 2) with a portion of the top of the heater cabinet broken away also showing the relation of the cabinet, draft diverter and heater tank.

Figure 4 is a side view (from line 4—4 of Fig. 3) of the draft hood or diverter, per se, with the baffle shown in dotted lines.

Figure 5 is an end view (from line 5—5 of Fig. 4) of the draft hood or diverter.

The cabinet and heater unit

Referring to the drawings and more particularly to Figs. 1, 2 and 3 the heater cabinet, generally designated 2, is of table top height and is fabricated from sheet metal having a coat of enamel or the like on the outside thereof in order to present a pleasing appearance. An opening 6, through which a connection may be made to a chimney (not shown), is provided in the upper portion of back 4 of cabinet 2. The top 8 of said cabinet is removably secured to the sides thereof by any suitable means (not shown) and is provided with an upwardly sloping "back splash" 10 having a series of forwardly facing vent openings 12 located at either side of the center thereof. A door 14, pivoted about its lower edge and provided with a handle 11, is positioned in opening 15 in the front of cabinet 2 to provide easy access to the various controls located within said cabinet.

The cabinet 2 is open at the bottom thereof and is mounted upon a base 16, which base is somewhat shorter than said cabinet providing a slight overlap 17 of the front of said cabinet. Louvers 18 arranged in the front of base 16 admit the necessary air to gas burner 32.

Positioned somewhat forwardly within said cabinet is the heater tank 22 having a cold water inlet 24 and a hot water outlet 26. As is common practice in the water heater art the interior of tank 22 is pivoted with a corrosive inhibiting anode 27, preferably of magnesium.

Insulation retainer 28 preferably of sheet metal surrounds tank 22 and retains insulation 30, of any desired insulating material, in position around said tank. Retainer 28 and tank 22 are positioned within cabinet 2 so as to provide a cavity 31 between the rear wall of said cabinet and said retainer for a purpose which will be later explained. Vent openings 12 communicate directly with said cavity 31.

Located directly below tank 22 is the gas burner 32 so arranged that the flame therefrom is directed upwardly against the bottom of said tank. The operation of said burner is controlled by a device designated generally 34, which device includes an on-off switch as well as an adjustable thermostat responsive to the temperature of the water within the tank 22. Since said control device 34 forms no part of the instant invention no further description therefore is deemed necessary.

Offset somewhat from the center of tank 22 and extending longitudinally therethrough is flue 36. Said flue comprises two metallic tubes 38 and 40 which extend through suitable openings in the top and bottom of tank 22 and are welded at opposite ends thereto.

Helical baffles 42 are secured within each of the tubes 38 and 40 in order to delay the passing of the hot flue gases therethrough and accordingly increase the heat transfer efficiency of the heater.

The draft diverter of this invention

The principal purpose of a draft diverter in a heater of any kind is to prevent back drafts, i. e., a flow of gas down the chimney, from adversely affecting the burning of the fuel in said heater by either extinguishing the flame entirely or causing incomplete combustion. Heretofore, in the water heater art, it has been the general practice to locate the draft diverter exteriorly of the heater cabinet in the back or on top thereof, either providing a spe-

cial cover for said diverter or allowing said diverter to remain uncovered.

One of the purposes of our invention is to provide a specific draft diverter which fits neatly within the heater cabinet permitting the back of said cabinet to be mounted flush against a wall without having any unsightly projections emanating from said cabinet and at the same time effecting an increase in the efficiency of said diverter.

Our draft diverter, generally designated **44** (Figs. 4 and 5), is fabricated of sheet metal and is in the general shape of a T having a stem portion **46** and a transverse portion **48**. The back, top and sides of said diverter are provided with a layer of insulation **43** (Fig. 1) of any suitable insulating material.

Opening **50** in the bottom wall of stem portion **46** is arranged to receive the upper portion of adaptor member **52** (Fig. 2) whereby communication is established between flue **36** and the interior of said draft diverter **44**. Directly above opening **50** is a cleanout opening **54**, normally closed by plate member **56** removably secured to the wall of stem portion **46** by screws **58**.

The transverse portion **48** of said draft diverter has an opening **60** in the bottom thereof which communicates directly with cavity **31** and an opening **62** in the top thereof which communicates with opening **6** in cabinet **2**.

Curved baffle **64** depends from the top wall of stem portion **46** downwardly into the interior of transverse portion **48**. A series of holes **66** is provided transversely across said baffle **64** adjacent the edge thereof.

The curved upper portion **68** of said draft diverter generally corresponds to and is fitted within the curved portion of "back splash" **10** while the back of said diverter parallels the back of cabinet **2** whereby said diverter occupies a minimum of space within said cabinet.

Draft diverter **44** is secured to the top of tank **22** through the medium of bolt **45** (Fig. 1) which extends through a hole in plate member **56** and threadedly receives nut **47**. The head of said bolt is slidably received within slotted bracket **49**, which bracket is welded to the top of tank **22** between the two tubes of flue **36**. By tightening down on nut **47** diverter **44** is forced into fluid tight engagement with adapter member **52**.

Operation

In the operation of our device, when the water temperature within tank **22** falls below a predetermined value, control member **34** effects the ignition of burner **32**. The exhaust gases from said burner pass upwardly through tubes **38** and **40** into stem portion **46** of the draft diverter **44**. From there the gases pass into the interior of transverse portion **48** flowing along the concave side of baffle **64**, rise to the top of said transverse portion **48** and pass outwardly through openings **62** and **6**. This flow path is indicated by the unbroken arrows shown in Fig. 2.

In the event of a back draft, air (along with flue gases) passes inwardly through openings **6** and **62**, strikes the convex portion of baffle **64** and flows into vent cavity **31** through opening **60**, while at the same time the flue gases passing upwardly through flue **36** and into stem portion **46** are also directed through opening **60** into said cavity **31**. The gases in cavity **31** then flow upwardly around both sides of draft diverter **44** and out through openings **12** in "back splash" **10**. The flow of gases in the event of a back draft is indicated by the broken arrows shown in Fig. 2.

It has been found that the flow of gases through stem portion **46**, in the event of a back draft, is enhanced by the provision of holes **65** in baffle member **64**. The present theory advanced for this action is that a reduced pressure is created adjacent holes **66** by the flow of gases in through openings **62**, over the convex side of baffle **64** and out opening **60** in the bottom of diverter **44**; i. e., a venturi effect is created by the gases flowing over the convex side of baffle **64**.

Since the back draft outlet **60** is located considerably below vent openings **12** in "back splash" **10** the gas flowing through said back draft outlet must flow upwardly and out of said vent openings **12**. This rising column of gas tends to reduce the pressure adjacent opening **60** thereby increasing the flow through said opening and accordingly the efficiency of operation of said diverter.

Summary

From the foregoing detailed description of our invention it will be evident that we have provided a gas-fired table top water heater with a draft diverter built into the cabinet thereof in such a manner as to enable said heater to be flush wall mounted without having any unsightly pipes or projections protruding from the top or sides thereof; that the draft diverter has been designed and fitted into the heater cabinet so as to occupy a minimum of space therein; and that the draft diverter cooperates with the heater cabinet in such a manner as to increase the operating efficiency of said diverter. It will be further evident that we have provided a draft diverter with a baffle arrangement which, during back draft operation, enhances the flow of flue gases therethrough.

While we have illustrated and described a preferred embodiment of our invention, it is to be understood that such embodiment is illustrative rather than restrictive and that variations and modifications may be made therein without departing from the spirit and scope of the invention. We therefore do not wish to be limited to the precise details set forth but desire to avail ourselves of such changes and alterations as fall within the preview of the following claims.

What we claim is:

1. In a water heater of the type described, a generally rectangular cabinet of substantially table top height having an opening in the upper portion of the rear wall thereof, a "back splash" formed upon the top of said cabinet adjacent the rear thereof providing a chamber therebeneath open to the interior of said cabinet, a plurality of vent openings in said "back splash," a tank positioned forwardly within said cabinet forming a vent cavity between said tank and the rear wall of said cabinet, said vent cavity communicating with said vent openings, a burner for heating the contents of said tank, a flue for conveying the gases of combustion away from said burner, a draft diverter positioned entirely within said cabinet having a portion thereof positioned within the chamber formed by said "back splash" spaced laterally from an end of said chamber and said cabinet, said diverter being provided with an inlet in communication with the flue, a flue gas outlet in communication with the opening in the rear of the cabinet and a back draft outlet in communication with the vent cavity, said back draft outlet being substantially below said vent openings in the back splash whereby, during a back draft, the gases pass laterally and upwardly from the back draft outlet port causing a reduction in pressure at said outlet.

2. In a water heater of the type described, a cabinet with a readily removable top, a tank positioned within said cabinet, a burner positioned below said tank for heating the contents of said tank, a flue leading from a point adjacent said burner to the top of the tank, a draft diverter associated with said flue for preventing a back draft from affecting the operation of the burner, said draft diverter comprising a housing having an inlet communicating with the flue, a cleanout opening in a wall of said housing arranged so that said inlet and flue are accessible therefrom for cleaning purposes, a cover plate removably attached to said wall effectively closing the opening therein, said draft diverter being positioned in said cabinet in such a manner that said clean out opening can be easily reached upon removal of the top of said cabinet.

3. In a water heater of the type described, a generally rectangular cabinet of substantially table top height hav-

ing a front, back, sides and top, the rearward portion of said top having an upward slope forming a "back splash" and providing a chamber therebeneath open to the interior of the cabinet, a plurality of vent openings in said "back splash," an opening in the upper portion of the back of said cabinet, a tank positioned forwardly within said cabinet thereby forming a vent cavity between the rear wall of said cabinet and the tank, said vent cavity communicating with said vent openings, a burner positioned below said tank for heating the contents thereof, a flue leading from a point adjacent said burner to the top of the tank, a draft diverter positioned entirely within said cabinet and in spaced relation with at least one side wall of the cabinet and a corresponding end of the chamber, said draft diverter comprising a housing having a first section positioned generally over said tank in communication with the flue and a second section positioned generally between the back of said cabinet and said tank having a curved upper portion within the chamber formed by the "back splash," said second section being in open communication with said first section and having a first opening in the upper portion thereof communicating with the opening in the back of the cabinet and a second opening in the lower portion thereof communicating with the vent cavity, said second opening being substantially below the vent openings in the "back splash," baffle means in said housing arranged to deflect fluid flowing inwardly through said first opening away from said first section of said draft diverter.

4. In a water heater of the type described, a generally rectangular cabinet of substantially table top height having a front, back, sides and removable top, the rearward portion of said top having an upward slope forming a "back splash" providing a chamber therebeneath open to the interior of the cabinet, a plurality of vent openings in said "back splash," an opening in the upper portion of the back of said cabinet, a tank positioned forwardly within said cabinet thereby forming a vent cavity between the rear wall of said cabinet and the tank, said vent cavity communicating with said vent openings, a burner positioned below said tank for heating the contents thereof, a flue leading from a point adjacent said burner to the top of the tank, a draft diverter positioned

entirely within said cabinet, said draft diverter comprising a housing having a first section positioned generally over said tank, means establishing communication between said first section and said flue, a cleanout opening substantially opposite said means, a cover for said cleanout opening removably secured to said first section, a second section positioned generally between the back of said cabinet and the tank having a curved upper portion within the chamber formed by the "back splash," said second section being in open communication with said first section and having a first opening in the upper portion thereof communicating with the opening in the back of the cabinet and a second opening in the lower portion thereof communicating with the vent cavity, said second opening being substantially below the vent openings in the "back splash," baffle means in said housing arranged to deflect fluid flowing inwardly through said first opening away from said first section of said draft diverter.

5. In a hot water heater of the type described, a cabinet with a readily removable top, a tank positioned within said cabinet, a burner positioned below said tank for heating the contents of said tank, a flue extending generally centrally upward through said tank, a draft diverter connected to the upper end of said flue and operative to convey the gases from the flue through an opening in a side of the cabinet, said diverter including a horizontal duct disposed over and directly communicating with said flue, the upper wall of the duct having a cleanout opening directly over said flue, a cover plate removably attached to said wall effectively closing said opening, said plate and opening being easily accessible upon removal of the top of said cabinet.

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