

March 16, 1943.

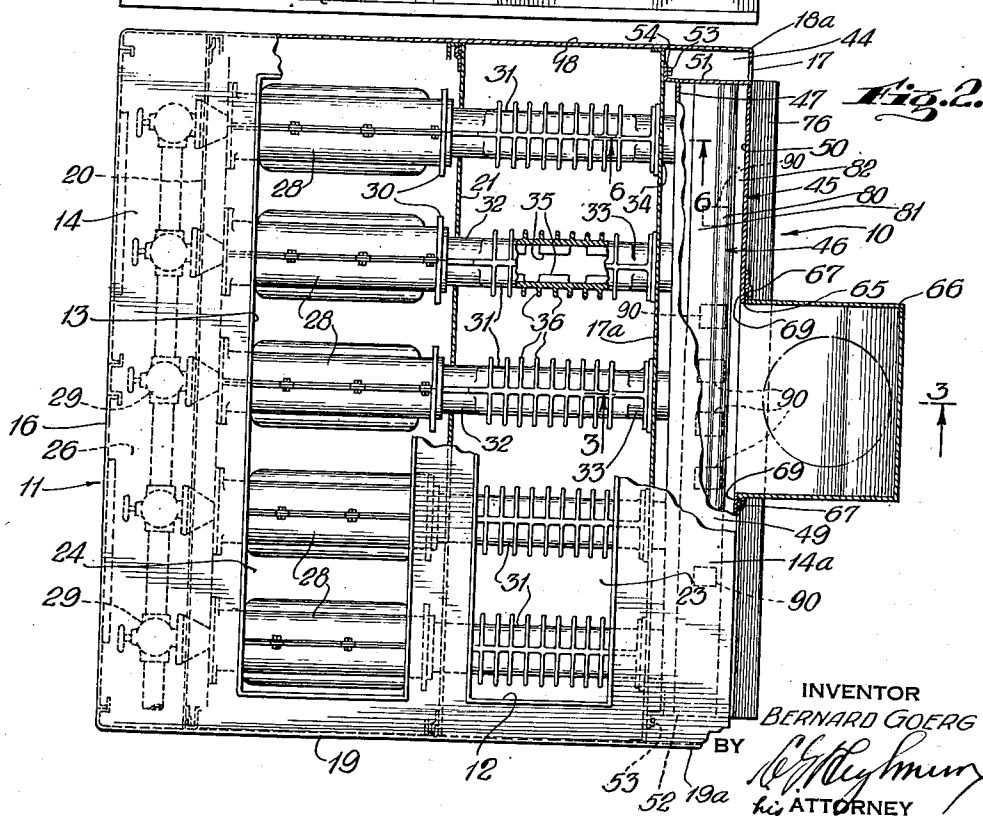
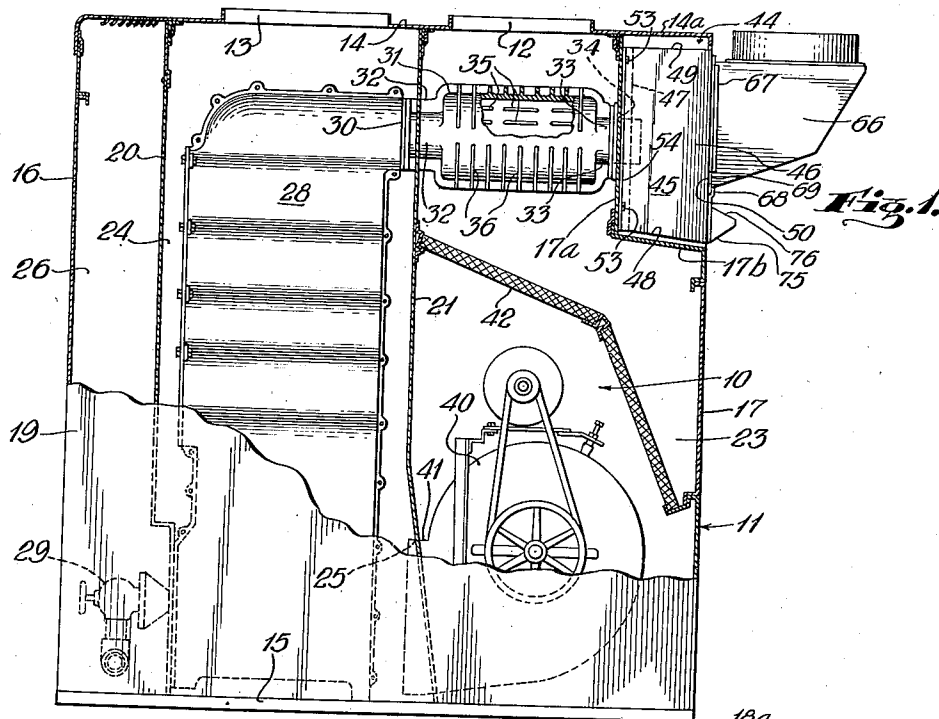
B. GOERG

2,313,933

HEATING APPARATUS

Filed July 26, 1941

2 Sheets-Sheet 1



March 16, 1943.

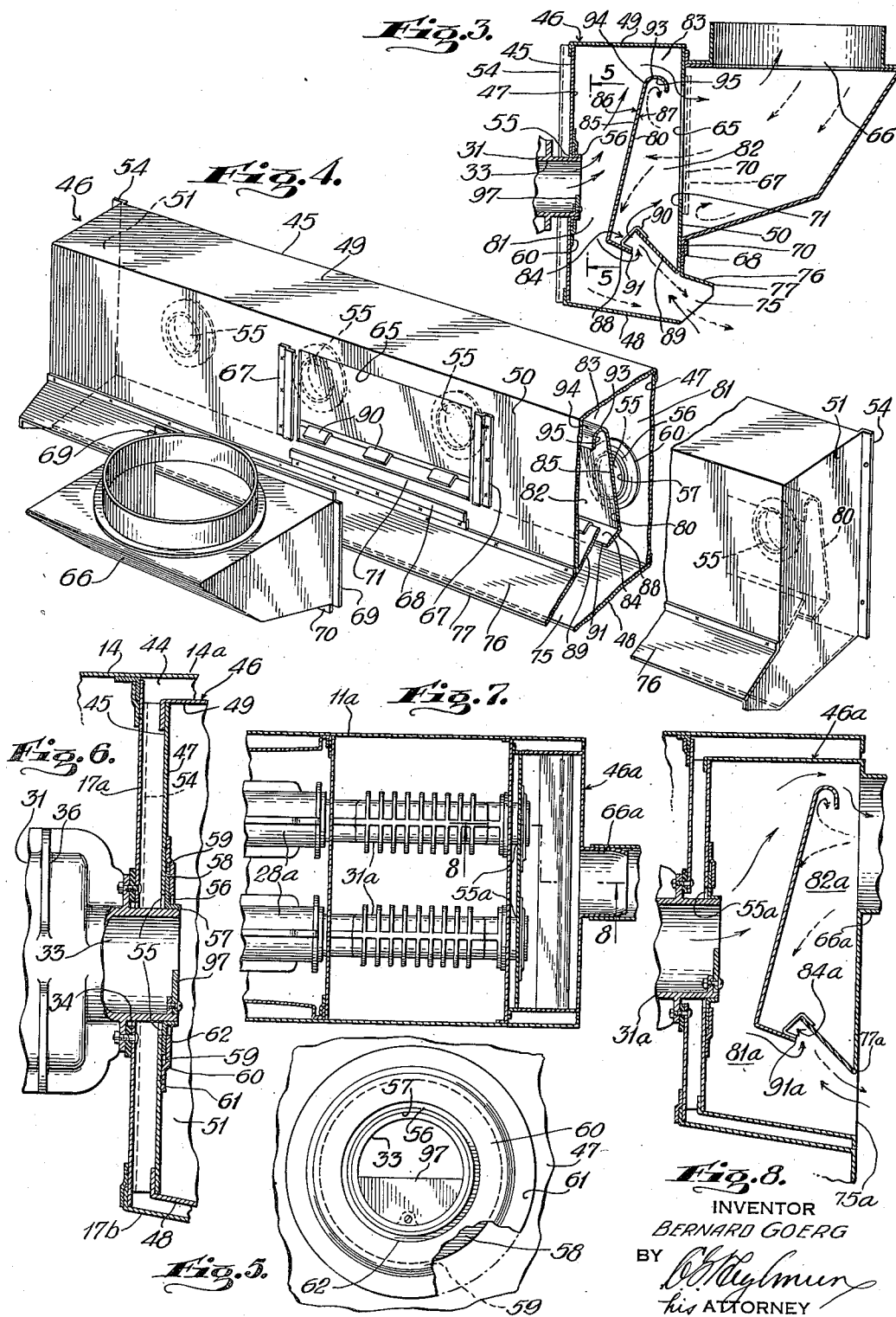
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,313,933

HEATING APPARATUS

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Application July 26, 1941, Serial No. 404,169

12 Claims. (Cl. 126—307)

My invention relates to heating apparatus such, for example, as furnaces, boilers, and the like, and also to that part of the apparatus which functions to connect the flue-gas outlets with the chimney or stack and to prevent abnormal changes in chimney draft from having a harmful effect on combustion conditions.

The invention consists in the novel construction and combination of parts, to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawings, to be taken as a part of this specification, I have fully and clearly illustrated two preferred embodiments of my invention, in which drawings—

Fig. 1 is a vertical side elevational view illustrating one preferred embodiment of my invention, with certain of the parts being broken away and others being shown in section for the purposes of clarity;

Fig. 2 is a plan view of the apparatus shown in Fig. 1, and with certain of the parts being broken away and others being shown in section;

Fig. 3 is an enlarged fragmentary vertical sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an exploded view of the back-draft diverter and its chimney connection, with the parts appearing in perspective and certain of the parts being broken away for the purposes of clarity;

Fig. 5 is a fragmentary vertical elevational view showing the end of one of the flue-gas outlet conduits and its connection with the back-draft diverter, the view being on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged fragmentary vertical sectional view, illustrating more clearly the connection between the flue-gas outlet conduit and the back-draft diverter, the view being taken on the line 6—6 of Fig. 2;

Fig. 7 is a fragmentary plan sectional view showing my invention as embodied in apparatus of smaller capacity than the apparatus of Figs. 1 to 6 incl.; and

Fig. 8 is an enlarged vertical sectional view taken on the line 8—8 of Fig. 7.

Referring now in detail to the construction illustrated and first to the construction shown in Figs. 1 to 6 incl., it will be noted that I have shown my invention as embodied in a warm air furnace 10 fired by gas. The furnace 10 is shown as comprising a furnace casing 11 having an inlet opening 12 for return air from the rooms to be heated, and a supply or outlet opening 13

through which the heated air flows to the rooms.

The openings 12 and 13 are formed in the horizontal casing top wall 14 and are arranged in juxtaposed relation to one another, as shown in Figs. 1 and 2. In addition to the top wall 14, the furnace casing comprises a horizontal bottom wall 15, vertical side walls 16 and 17, vertical end walls 18 and 19, and vertical partition walls 20 and 21.

The partition wall 21 depends from the top wall 14 between the openings 12 and 13, and joins the end walls 18 and 19 along its vertical outer edges and is spaced from the side wall 17 and the partition wall 20 to form therewith parallel incoming and outgoing air passages 23 and 24, respectively. The passage 23 is connected at its upper outer end with the inlet opening 12 and the passage 24 at its upper outer end with the air outlet opening 13. The passages are joined at their lower innermost ends by an opening 25 provided in the lower end of the partition wall 21.

The partition wall 20 is joined along its outer vertical edges to the end walls 18 and 19 and at its upper and lower ends to the top wall 14 and bottom wall 15, respectively. The partition wall 20 is spaced inwardly from the outer side wall 16 to define a vertical space 26 in which the gas supply pipe and control mechanism may be conveniently located.

The furnace 10 also comprises a plurality of separately fired heating units 28 which are identical in construction and which are arranged in uniformly spaced, side-by-side relation across the outgoing passage 24. Each unit 28 is fired by gas and is provided with its individual gas control valve 29. I have not shown the interior of the combustion chamber or the flue passages of any of the units 28, nor have I shown the gas burner positioned within each combustion chamber, as these details may be of conventional construction.

Each heating unit 28 is provided with an outlet 30 for the flue gases generated therein, and each outlet 30 is arranged so as to discharge the flue gases toward the partition 21. A plurality of flue-gas outlet conduits 31, equal in number to the units 28, extend horizontally across the upper end of the passage 23 and are arranged in parallel side-by-side relation, the same as the units 28. Each conduit 31 is provided with an inlet end 32 which extends through an opening in the partition 21 and is joined to an outlet 30 of one of the units 28, and is provided with an outlet end 33 which has a gas tight connection

tion within an opening 34 provided in an inwardly spaced upper part 17a of the side wall 17 (see also Fig. 6).

Flue gases flowing through the conduits 31 heat the latter and consequently, the air returning from the rooms to be heated through the opening 12 contacts and absorbs the heat from the exterior surfaces of the outlet conduits 31. Each conduit 31 may therefore be considered as being an economizer or radiator. In certain types of installations, the conduits or radiators may take the form of straight iron pipes of desired length and diameter. In the construction shown, each radiator is specially constructed so as to provide a relatively high rate of heat transfer from the waste flue gases to the air entering through the opening 12. As shown, each conduit is formed as a one piece casting with internal heat absorbing ribs or fins 35 adapted to contact the flue gases and with external heat radiating and conducting fins 36 adapted to be contacted by the air entering through the opening 12.

In order to provide for the positive flow of air to be heated through the passages 23 and 24 and over the heat-emitting surfaces of the units 28 and the radiators 31, I provide a motor-driven centrifugal fan 40 positioned within the lower part of passage 23 and having its discharge 41 extending through the opening 25. A suitable air filter 42 is arranged across the incoming passage 23 and serves to remove foreign particles from the air flowing therethrough.

The inwardly spaced side wall portion 17a of the furnace casing 11 is joined to the remaining portions of wall 17 by a connecting wall portion 17b. The two wall portions 17a and 17b provide an outwardly opening recess 44 in the furnace casing 11, which extends across the upper edge of the casing 11 and advantageously receives the outer enclosing casing 45 of a back-draft diverter 46. Wall extensions 18a and 19a of end walls 18 and 19, respectively, close the end of the recess 44, and an extension 14a of top wall 14 covers the top of such recess.

Preferably, the walls defining the recess 44 and casing 45 are of such size and shape that the casing 45 fills neatly the recess 44. The casing 45 comprises an inner side wall 47 positioned parallel to and spaced a slight distance from the inwardly set wall portion 17a, a bottom wall 48 arranged parallel and spaced slightly from the connecting wall portion 17b, a top wall 49 arranged beneath and spaced from an extension 14a of the top wall 14, an outer side wall 50 forming an approximate continuation of the outer side wall 17, and end walls 51 and 52 arranged parallel to and spaced inward a slight distance from the end wall extensions 18a and 19a, respectively. The provision of the recess 44 and the relationship between its size and shape with that of the casing 45, provide a furnace casing construction which is decidedly neat and pleasing in appearance and which is, at the same time, highly effective in performing its required function. Even though the inset wall 17a has the effect of narrowing the inlet end of the passage 23, such a construction does not lower the operating efficiency of the furnace, because the incoming air is relatively cool and consequently, is smaller in volume than after it has passed over the radiators 31 and heating units 28.

The diverter walls 47, 48, 49, 51, and 52 are preferably spaced from the walls 17a, 17b, 14a, 75

18a, and 19a, respectively, so as to provide for natural or gravity circulation of air between the furnace casing and the diverter casing. This circulation of air between adjacent walls will result in the evaporation or drying up of any condensation which might possibly have occurred in this space due to a leak of flue gas from the diverter or from the joints between the diverter and conduits 31. The diverter is rigidly supported in this desired spaced relation with respect to the furnace casing walls by bolts 53 passing through outwardly extending flanges 54 and through end portions of the wall 17a. The flanges 54 extend laterally outward from the vertical inner edges of end walls 51 and 52 and they are set inwardly toward the wall 17a and beyond the wall 47 a sufficient distance to provide the required spacing between walls 17a and 47.

The wall 47 is provided with a plurality of flue-gas inlets 55, equal in number to the heating units 28 and to the flue-gas outlet conduits 31, and the inlets 55 are so spaced as to receive, respectively, the outlet ends 33 of the conduits 31. I provide a gas-tight joint between each end 33 and its respective inlet 55 and, at the same time, provide for the tolerances necessary to fit the fixed ends of a plurality of furnace outlet conduits within inlet openings which are preferably formed in the casing wall 47 prior to installation. To this end, each inlet 55 is formed larger in diameter than its respective end 33, and the space therebetween is filled by an adapter or filler plate 56 (see Figs. 5 and 6). Each plate 56 is ring-shaped and is provided with a central opening 57 which is of a diameter to receive tightly the end 33 of its respective conduit 31, and the peripheral portion 58 of each plate 56 slidably fits within an annular recess 59. Each recess 59 is formed by a ring member 60 having an annular outer portion 61 spot-welded to the wall 47 around the opening 55 and having an annular inner portion 62 spaced from the wall 47. The plates 56 are of less diameter than their respective recesses and consequently, each plate may be shifted in a direction normal to the axis of its respective inlet and thereby take care of any misalignment between the conduit ends 33 and their respective inlets 55.

The diverter 46 is provided with an outlet 65 in the outer side wall 50 which is adapted to be connected to the usual chimney, or stack, by an elbow connector 66 secured to the wall 50 about the chimney outlet 65. As can be seen more clearly in Figs. 3 and 4, angle plates 67 and 68 are spot-welded to the wall 50 at the sides and below the outlet 65, respectively. These angle plates provide slots which receive, respectively, flanges 69 and 70 extending laterally from the side and bottom edges of the inlet end of the elbow 66. Thus, the elbow 66 is rigidly held in position on the diverter 46. It is noted that the inlet end of the elbow is higher than the chimney outlet 65 and that a portion 71 of the wall 50 extends above the lower part of the inlet end a substantial distance (see particularly Fig. 3). The portion 71 serves as a baffle for obstructing flow of back draft from the chimney into the outlet 65, as will appear more fully hereinafter.

The wall 50 is provided along the full length of its bottom with an atmospheric outlet 75 which provides open communication between the interior of the casing 45 and the ambient atmosphere of the basement, or wherever the furnace is in-

stalled. Preferably, the outlet 75 is so located that its upper edge is substantially below the lower edge of the flue-gas inlets 55 so as to prevent flue gases from spilling into the basement during normal operating conditions. This is assured in the relatively large capacity furnace of Figs. 1 to 6 incl. by providing a downwardly directed extension or hood 76 over the outlet 75. The outer edge 77 of the hood is the effective upper edge of the outlet 75.

Disposed within the casing 45 and extending from end wall 51 to end wall 52 thereof, is a baffle wall 80 which is arranged in a generally upright position and divides the interior of the casing into an inlet chamber 81 in open communication with the inlets 55 and atmospheric outlet 75 and into an outlet chamber 82 in open communication with the chimney outlet 65. The upper longitudinal edge of the baffle wall 80 is spaced downwardly from the casing top wall 49 to provide an opening 83 connecting the chambers 81 and 82 for the full length of the casing. The baffle wall 80 is arranged with its upper edge above the inlets 55 and its lower edge below said inlets so that flue gases entering through the inlets will be intercepted by said baffle. The baffle wall 80 is provided in its lower part with a slot-like nozzle passage, or opening, 84 which extends for the full length of the casing and is disposed adjacent to and is directed to discharge chimney back draft toward and through the slot-like atmospheric outlet 75.

In the construction shown, the baffle wall 80 is composed of a plate member 85 so arranged that its two opposite surfaces 86 and 87 face the flue-gas inlets 55 and the chimney outlet 65, respectively. The plate 85 is inclined upwardly and away from the flue-gas inlets 55 so as to direct the entering flue gas upwardly and through the opening 83 into the outlet chamber 82 during normal operation; and the plate 85 is also inclined downwardly and away from the chimney outlet 65 so as to direct the flow of back draft from the chimney downward and toward the nozzle passage 84.

The nozzle passage 84 is formed by a plate member 88, and a plate member 89 held in overlapping spaced relation to one another by metal spacing clips 90 which are spot-welded to both plates 88 and 89. The member 88 is shown as being formed as a flange extension of the lower edge of baffle plate 85 and as being inclined in the general direction of the outlet 75 and slightly toward the member 89 so as to direct any back draft against and along the under face of plate member 89. The plate member 89 is shown as being a flange extension of the lower part of plate forming the wall 50 and as extending inwardly and upwardly from the top edge of outlet 75 and as having its inner end portion spaced from and overlying the lower outer edge 91 of the plate member 88 to form the nozzle passage 84.

The upper longitudinal edge of plate member 85 is turned over toward the chimney outlet to provide a curved flange extension 93 of the plate 85 overlying partly the chamber 82. The extension 93 provides a convex upper surface 94 which facilitates the normal flow of flue gas over the top edge of the baffle wall and into the chamber 82 and outlet 65, and also provides a concave under surface 95 which catches any back draft flowing upwardly along the surface 87 and turns such back draft upon itself to form eddy currents and thereby offers an effective obstruction

to the flow of back draft through the opening 83 into the inlet chamber 81.

With a normal chimney condition and normal combustion conditions in the furnace units, the flue gas will be pulled by the chimney suction through the conduits 31, the inlets 55 and into the chamber 81. As the surface 86 is inclined upwardly and away from the inlets 55 and as the flange 93 has a convex upper surface 94, the main portion of the flue gas will be deflected by the baffle 30 to flow through the opening 83 and into the chamber 82 and through the chimney outlet 65 and elbow connection 66 to the chimney. A small amount of the flue gas will be pulled through the opening, or passage, 84 by the chimney draft and also air from the basement will be pulled inward through the outlet 75 and opening 84 into the chamber 82. The full line arrows in Fig. 3 show the direction of flow of flue gas and air under normal operating conditions.

The construction is preferably such that the lower edge 91 of the opening 84 is above the outer edge 77, so that during normal operation, any flue gas that flows downward in the chamber 81 will be pulled into the opening 84 before it can reach the outlet 75 and spill into the basement. The spacing clips 90 are distributed along the slot-like nozzle opening 84 in such a manner as to assure the flow of flue gas in the lower part of chamber 81 into the chamber 82, during normal operation. In Fig. 2, four of the clips 90 are shown as being located opposite the chimney outlet 65 and as being in relatively close spaced relation. The purpose of this is to restrict the flow of flue gas through the opening 84 at this point where the suction is greatest and thereby to provide a greater suction along the outer parts of the opening 84 more remote from the outlet 65. Also, two clips 90 are located at the two outer ends of the opening 84 and each of these clips is opposite the space between the end inlet 55 and the inlet adjacent thereto so that a minimum restriction will be offered to the flow of flue gas from the outer inlets through the opening 84.

The rate of flow of flue gas is determined by the chimney construction, the rate of combustion taking place in the units 28, and the size of choke plates 97 provided in the outlet ends 33 of the flue-gas outlet conduits 31. The manner in which these factors are determined and correlated with respect to one another for any given furnace size and capacity is well known to those skilled in this art and therefore requires no further explanation.

Because of the fact that the atmospheric outlet 75 is in open communication with the inlet chamber 81, I make possible the practical connection of the flue-gas outlets of a plurality of separate heating units into one inlet chamber or manifold. With such a construction, any abnormal change in flue-gas pressure in any heating unit or its outlet will not harmfully affect the combustion conditions in the other heating units. Should the atmospheric outlet 75 be provided in the outlet chamber 82, instead of the chamber 81, and the outlets of the separate heating units still be connected to the single chamber 81, a sudden puff or like disturbance in one heating unit might increase the pressure in the other units and likely put out the flame therein. The danger of such an effect would be greater when only the pilot lights are burning in the heating units. In my improved construction any increased gas pressure caused by a sudden puff or

pressure change in any of the units 28 will be quickly diffused to the atmosphere through the outlet 75 and without any harmful effect on the conditions in any of the other units 28.

In the case of a back draft down the chimney and through the chimney outlet 65, such draft will strike the downwardly inclined face 87 and be directed downward through the nozzle passage 84 and readily escape to the atmosphere through the outlet 75 without harmfully affecting the pressure conditions in the chamber 81 and combustion conditions in the units 28. Because of the location and arrangement of the nozzle passage 84 with respect to the chamber 81 and outlet 75, the outward flowing stream of back-draft gas or air through the nozzle 84 and outlet 75 will entrain and carry with it any flue gases in the lower part of chamber 81. This action will result in maintaining a pressure condition in the chamber 81 which will permit the continued flow of flue gas into the chamber from the units 20 and thus, prevent a back draft from having a harmful effect upon combustion conditions in the furnace. The dotted line arrows in Fig. 3 illustrate the direction of flow of back-draft gases and flue gases during a back-draft condition. The overhanging concave surface 95 creates eddy currents during a back-draft condition and such currents obstruct the flow of back draft upwardly through the opening 83. Therefore, the pressure of the gas in the outlet chamber 82 is relatively high during a back-draft condition, with the result that the velocity of back draft through 84 is high and positive entrainment of the flue gases is effected.

In the construction shown in Figs. 1 to 6 incl. any back draft of chimney gases flowing downward and around the elbow connection 66 will tend to flow to the outside of the curve and will, therefore, strike the baffle wall 71, thus, creating eddy currents in the elbow 66 and a substantial obstruction to the back flow of chimney gases before they can enter the chamber 82.

In Figs. 7 and 8, I have shown my invention as embodied in a furnace of relatively small capacity. However, the general construction, operation, and advantages are the same as in the relatively large capacity furnace of Figs. 1 to 6 incl. In Figs. 7 and 8, only two gas-fired heating units 28a are arranged in the casing 11a, and the diverter 45a is of a length to accommodate only two outlet conduits 31a and flue-gas inlets 55a.

The construction of the back-draft diverter is substantially the same as in the previously described modification, except that there is no hood extension to the atmospheric outlet 75a, and the chimney connector 66a is straight and is not of such a size as to provide a baffle wall such as is indicated at 71 in Fig. 3. The volume of flue gases is smaller in the smaller furnace of Figs. 7 and 8 and hence, the outlet extension 76 is not needed. The edge 77a is beneath the lower edge 91a a sufficient distance so that during normal operation, any flue gas in the lower part of inlet chamber 81a will flow upwardly through nozzle 84a into outlet chamber 82a and will not spill into the basement through outlet 75a. In Fig. 8, like in Fig. 3, the full line arrows indicate the direction of flue gas and air flow during normal operation and the dotted line arrows indicate the direction of back-draft gases and flue gas during a back-draft condition.

What I claim and desire to secure by Letters Patent of the United States is:

1. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one

side thereof and a chimney outlet through the opposite side thereof and having an atmospheric outlet through the lower part thereof; a baffle arranged in a generally upright position within said casing and between said flue-gas inlet and chimney outlet to provide at one side thereof an inlet chamber in open communication with said flue-gas inlet and with said atmospheric outlet, and to provide at the other side thereof an outlet chamber in open communication with said chimney outlet; said baffle being spaced from the lower portion of the casing to provide a discharge opening at the lower part thereof adjacent and communicating with said atmospheric outlet, and said baffle being spaced from the upper portion of the casing to provide an opening at the top of said baffle connecting said inlet and outlet chambers, and the surface of said baffle facing said flue-gas inlet being inclined upward and away from said flue-gas inlet and the surface of said baffle facing said chimney outlet being inclined downward and away from said outlet and toward said discharge opening, so that during normal operation flue gas entering the casing through said inlet is directed upward and through the opening at the top of the baffle and into the outlet chamber, and so that back draft through said chimney outlet will be directed downward and through said discharge opening.

2. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and having an atmospheric outlet through the lower part thereof; a baffle arranged in a generally upright position within said casing and between said flue-gas inlet and chimney outlet to provide at one side thereof an inlet chamber in open communication with said flue-gas inlet and atmospheric outlet, and to provide at the other side thereof an outlet chamber in open communication with said chimney outlet; said baffle being constructed and arranged to provide an opening at its lower portion through which any back draft may be discharged from said outlet chamber to the atmosphere; and said baffle having an upper edge spaced downward from the top of said casing to provide communication between said chambers, and having a surface facing said inlet and inclined upward and away from said inlet to facilitate normal flow of flue gas over said upper edge, and having a surface facing said chimney outlet and inclined downward and away from said outlet to facilitate flow of back draft downward through said discharge opening to the atmosphere; and the upper edge of said baffle being turned over and toward said chimney outlet to provide a flange overhanging said outlet chamber.

3. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and having an atmospheric outlet through the lower part thereof; a baffle arranged within said casing between said flue-gas inlet and chimney outlet to provide at one side thereof an inlet chamber in open communication with said flue-gas inlet and atmospheric outlet, and to provide at the other side thereof an outlet chamber in open communication with said chimney outlet; said baffle including a first plate so arranged that its two opposite sides face said inlet and said chimney outlet, respectively, and said plate being inclined upward and away from said inlet and downward and away from said chimney outlet and having a top edge spaced

downward from the top of said casing to provide communication between said chambers, and said baffle including a second plate extending from the lower part of said first plate toward said atmospheric outlet and a third plate extending inward from said casing at regions adjacent said atmospheric outlet and arranged in overlying spaced relation with respect to the outer portions of said second plate to provide therewith a nozzle so directed as to discharge back draft through said atmospheric outlet.

4. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet; said baffle means being spaced from said casing to provide a first opening connecting said chambers at the upper part thereof and said baffle means having means associated with the lower portion thereof to provide a nozzle opening communicatively connecting said chambers at the lower part thereof and the nozzle opening having its discharge end directed to discharge backdraft toward said atmospheric outlet; and said baffle means including means providing for directing the normal in-flow of flue gases upward and through said first opening and into said outlet chamber, and for obstructing the flow of back draft through said first opening and for directing such back draft downward through said nozzle opening.

5. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet; said baffle means being spaced from said casing to provide a first opening connecting said chambers at the upper part thereof and said baffle means having means associated with the lower portion thereof to provide a nozzle opening connecting said chambers at the lower part thereof and the nozzle opening being directed to discharge toward said atmospheric outlet; and said baffle means including means providing for directing the normal in-flow of flue gases upward and through said first opening and into said outlet chamber, and providing for obstructing the flow of back draft through said first opening and for directing such back draft downward through said nozzle opening; said last-named means including a plate arranged with its two opposite surfaces facing generally said inlet and said chimney outlet, respectively, and said plate being inclined upward and away from said inlet and downward and away from said chimney outlet.

6. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet; said baffle means providing a first opening connecting said chambers at the upper

part thereof, and providing a nozzle opening connecting said chambers at the lower part thereof and the latter opening being directed to discharge toward said atmospheric outlet; and said baffle means including means providing for directing the normal in-flow of flue gases upward and through said first opening and into said outlet chamber, and providing for obstructing the flow of back draft through said first opening and for directing such back draft downward through said nozzle opening; said last-named means including a plate arranged with its two opposite surfaces facing generally said inlet and said chimney outlet, respectively, and said plate being inclined upward and away from said inlet and downward and away from said chimney outlet; and the top edge of said plate defining the bottom of said first opening and being formed as a flange member extending from the main body of said plate partly over said outlet chamber.

7. A back-draft diverter comprising a hollow casing having an inlet for flue gases through one side thereof and a chimney outlet through the opposite side thereof and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet; said baffle means providing a first opening connecting said chambers at the upper part thereof, and providing a nozzle opening connecting said chambers at the lower part thereof and the latter opening being directed to discharge toward said atmospheric outlet; and said baffle means including means providing for directing the normal in-flow of flue gases upward and through said first opening and into said outlet chamber, and providing for obstructing the flow of back draft through said first opening and for directing such back draft downward through said nozzle opening; said last-named means including a plate arranged with its two opposite surfaces facing generally said inlet and said chimney outlet, respectively, and said plate being inclined upward and away from said inlet and downward and away from said chimney outlet, and the top edge of said plate defining the bottom of said first opening and being formed with an upwardly facing convex surface to facilitate the flow of flue gases thereover.

8. A back-draft diverter comprising a hollow casing having a flue-gas inlet through one side thereof, a chimney outlet through the opposite side thereof, and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet and said baffle means being constructed to provide a first opening at the top thereof connecting said chambers and to provide a discharge opening at the bottom thereof and adjacent said atmospheric outlet; and said baffle means including a surface facing said chimney outlet and a flange member projecting from said surface beneath said first connecting opening and in a direction to partially overlie said outlet chamber and thereby offering an obstruction on said surface to the up-flow of back draft through said first connecting opening.

9. A back-draft diverter comprising a hollow casing having a flue-gas inlet through one side thereof, a chimney outlet through the opposite side thereof, and an atmospheric outlet through

the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet and said baffle means constructed to provide a discharge opening at the bottom thereof adjacent said atmospheric outlet and including a plate member arranged with its opposite surfaces facing said inlet and chimney outlet, respectively, and said plate having a top edge spaced downward from the casing top to provide a second opening connecting said chambers and through which flue gases normally flow into said outlet chamber; and a flange member extending along the top of said plate beneath said second opening and partially overlying said outlet chamber to offer an obstruction to the up-flow of back draft along said plate and through said second connecting opening.

10. A back-draft diverter comprising a hollow casing having a flue-gas inlet through one side thereof, a chimney outlet through the opposite side thereof, and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet and said baffle means constructed to provide a discharge opening at the bottom thereof adjacent said atmospheric outlet and including a plate member arranged with its opposite surfaces facing said inlet and chimney outlet, respectively, and said plate having a top edge spaced downward from the casing top to provide a second opening connecting said chambers and through which flue gases normally flow into said outlet chamber; and a flange member extending along the top edge of said plate and projecting from said plate partially over said outlet chamber to offer an obstruction to the up-flow of back draft along said plate and through said second connecting opening and said flange member being formed with a convex upper surface to facilitate the normal flow of flue gases into said outlet chamber.

11. A back-draft diverter comprising a hollow casing having a flue-gas inlet through one side thereof, a chimney outlet through the opposite

side thereof, and an atmospheric outlet through the lower part thereof; baffle means dividing the interior of said casing into an inlet chamber in open communication with said inlet and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet and said baffle means constructed to provide a discharge opening at the bottom thereof adjacent said atmospheric outlet and including a plate member arranged with its opposite surfaces facing said inlet and chimney outlet, respectively, and said plate having a top edge spaced downward from the casing top to provide a second opening connecting said chambers and through which flue gases normally flow into said outlet chamber; and said top edge of said plate being formed with a turned over flange partially overlying said outlet chamber and providing a convex upper surface to facilitate the normal flow of flue gases thereover and a concave under surface to obstruct up-flow of back draft.

12. A back-draft diverter comprising a casing including top, bottom, side, and end walls; said casing having a plurality of flue-gas inlets through one side wall thereof, a chimney outlet in the opposite side wall thereof, and having a slot-like atmospheric outlet in the lower part of said casing and extending for substantially the length of the casing; a baffle wall extending between the end walls for substantially the length of said casing and dividing the interior into an inlet chamber in open communication with said inlets and said atmospheric outlet and into an outlet chamber in open communication with said chimney outlet, and said baffle wall being constructed to provide a first opening extending for the length of said casing and connecting said chambers across the casing top and through which flue gas normally flows into said outlet chamber; means forming a slot-like nozzle passage located at the lower portion of said baffle and extending for substantially the length of said casing, the discharge end of said nozzle passage being directed toward said atmospheric outlet; and said baffle wall including means facilitating normal flow of flue gas through said connecting opening and into said outlet chamber and for obstructing the flow of back draft through said opening.

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