

Feb. 5, 1946.

W. A. GRISWOLD

2,394,441

HEATING STOVE

Original Filed May 30, 1942

3 Sheets-Sheet 1

FIG. 1

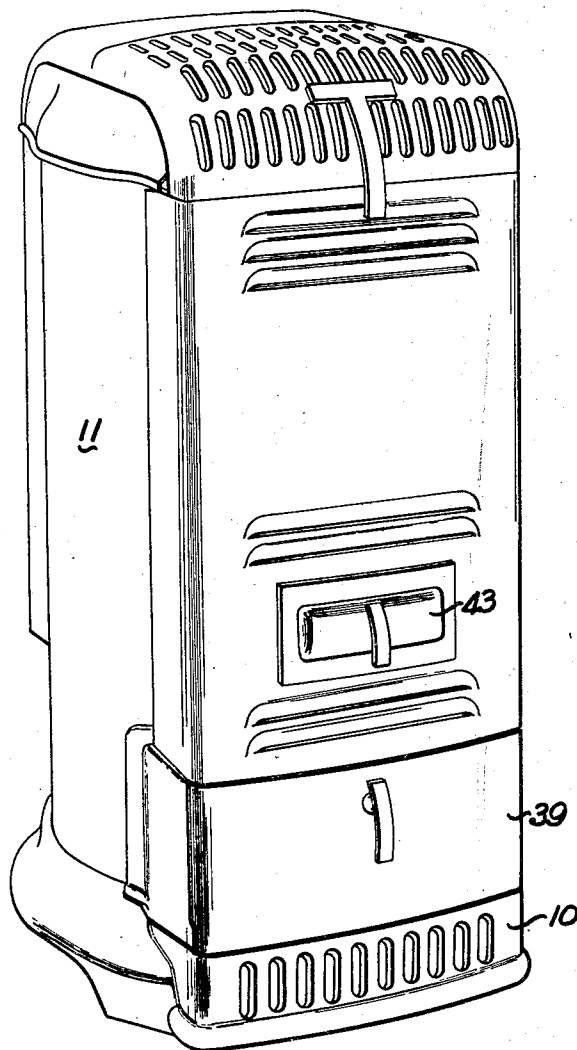
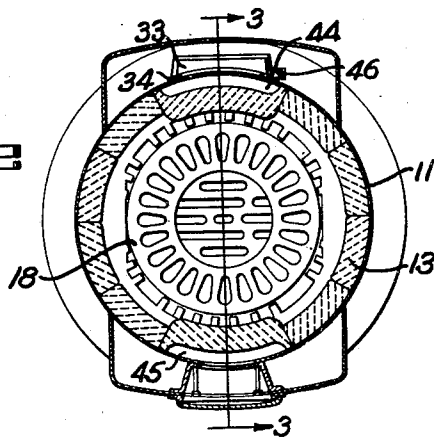


FIG. 2



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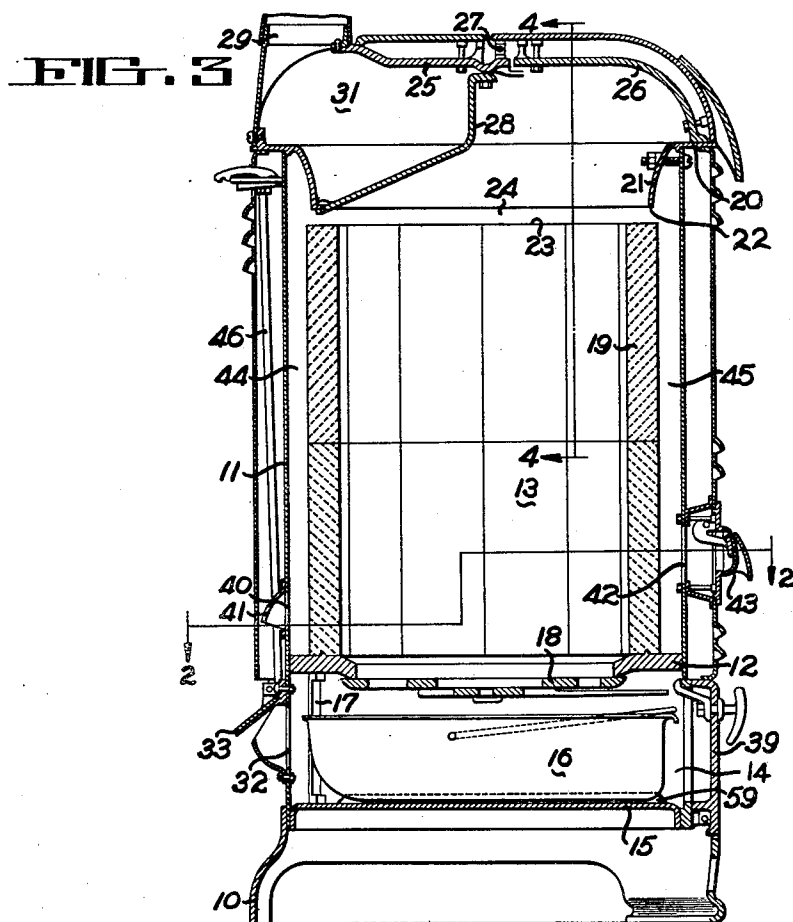
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3 Sheets-Sheet 3

FIG. 4

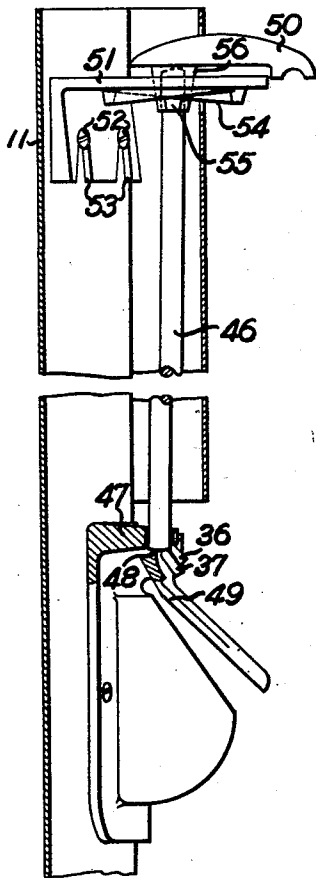
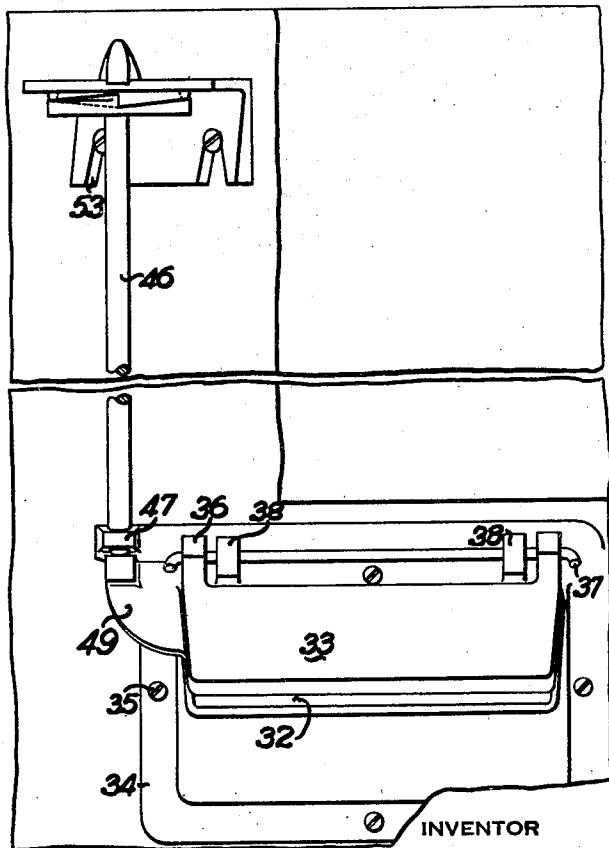


FIG. 5



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2,394,441

HEATING STOVE

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Original application May 30, 1942, Serial No. 445,169. Divided and this application May 24, 1943, Serial No. 488,205

1 Claim. (Cl. 126-67)

This invention relates to heating appliances and particularly heating stoves adapted to be used within a room of a dwelling or other area to be heated.

An object of the invention is to provide an automatic draft control that utilizes the normal expansion of the walls of the combustion chamber for regulating the quantity of air supplied to the fuel in the combustion chamber.

Another object of the invention is to provide a heating appliance that will heat both through radiation and recirculation of air.

Another object of the invention is to provide an automatic control for the air supplied beneath the fuel bed in a heating appliance that automatically reduces the quantity of air supplied to the fuel bed in response to an increase in temperature of the combustion chamber.

Another object of the invention is to provide an automatic control over the quantity of air supplied to the fuel bed of a heating appliance wherein a portion of the control mechanism is maintained at a lower temperature than another portion thereof, and the temperature differential of the portions of the mechanism is utilized to actuate an air supply control member.

Another object of the invention is to provide an automatic draft control for the fuel bed of a heating appliance in accordance with the foregoing object wherein a part of the control mechanism consists of the wall of the combustion chamber of the heating appliance.

Another object of the invention is to provide a heating appliance wherein a primary source of air is supplied beneath the fuel bed, and a secondary source of air is preheated and applied above the fuel bed to complete combustion of the products of combustion of the fuel, wherein the primary source of air is under automatic control to regulate the draft through the fuel bed.

Another object of the invention is to provide a heating appliance wherein a primary air supply is provided beneath the fuel bed of the heating appliance for producing a draft therethrough, and a second air supply is directed within the combustion chamber of the heating appliance but is prevented from engaging the fuel bed until the secondary air reaches a point above the fuel bed for completing combustion of the products of combustion from the fuel bed.

Another object of the invention is to provide a heating appliance wherein the combustion chamber is partially enclosed so that a portion of the chamber can heat an area by radiation

while the enclosed portion will heat an area by circulation of air within the area.

It is still another object of the invention to provide a heating appliance in accordance with the foregoing objects wherein a draft control member for the fuel bed is disposed within one of the air circulating portions of the heating appliance so that the draft control member will be maintained at a lower temperature than the combustion chamber of the heating appliance, whereby the temperature differential between the draft control member and the combustion chamber is utilized as the actuating power for controlling operation of an air supply member that supplies air to the fuel bed of the heating appliance.

Further objects and advantages will become apparent from the drawings and the following description.

This application is a division of my application No. 445,169, filed May 30, 1942, and now abandoned.

In the drawings:

Figure 1 is a perspective elevational view of a heating appliance constructed and arranged in accordance with the teachings of this invention.

Figure 2 is a transverse cross-sectional view of the heating appliance taken along line 2-2 of Figure 3.

Figure 3 is a vertical cross-sectional view of the heating appliance taken along line 3-3 of Figure 2.

Figure 4 is an elevational view of the draft control apparatus of this invention.

Figure 5 is a side elevational view, partially in cross-section of the draft control apparatus.

The heating appliance or stove of this invention is adapted to be used within a room of a dwelling or other area to be heated for increasing the temperature of the air within the room by radiation and recirculation of the air.

When the heating appliance or stove is loaded with fuel the intensity of the fire gradually increases as long as the draft through the fuel bed remains the same. The usual heating stove requires considerable personal attention to prevent the same from overheating, the drafts for the fuel bed requiring constant manipulation to regulate the same and establish a proper air supply to the fuel within the combustion chamber.

There is no assurance that after the drafts have been set that the fuel bed will burn at an even rate because the intensity of the draft may change due to changing wind conditions outside the area being heated which effects the flue draft

for the heating appliance. Therefore, even though the drafts have been set some time after the fuel bed has started to burn vigorously there is no assurance that the air supply will not change to the fuel bed due to a different draft condition.

The combination chamber of the stove or heating appliance varies considerably in temperature ranging anywhere from substantially room temperature with a low fire to red heat when the fire is burning vigorously. As a result the wall from which the combustion chamber is constructed expands and contracts in direct proportion to the temperature variation of the wall. This invention utilizes the normal contraction and expansion of the wall of the combustion chamber as a part of an actuating system to automatically control the draft to the fuel bed of a heating appliance in response to the temperature of the wall of the combustion chamber, so that as the temperature of the chamber rises the draft to the fuel bed will be automatically reduced. The draft control of this invention can be manually set and the quantity of air supplied to the fuel bed will be automatically regulated to prevent overheating of the stove, as well as prevent underheating due to lack of air supply to the fuel bed.

In particular, the invention relates to a heating appliance or stove of the type having the combustion chamber in the form of a magazine that is adapted to be filled with fuel about once a day. After the fuel bed has started burning the draft beneath the fuel bed can be manually set and thereafter the automatic draft control will increase or decrease the quantity of air supplied to the fuel bed to maintain a substantially even combustion of the fuel bed in response to the temperature of the combustion chamber.

The heating appliance disclosed herein consists of a base 10 that supports a circular sheet metal wall 11 forming the wall of the combustion chamber for the heating appliance. A wall 12 divides the cylindrical chamber formed by the wall 11 into a combustion chamber 13 and an ash chamber 14. A bottom wall 15 is provided within the cylindrical wall 11 upon which an ash pan 16 is supported. The wall 12 is suitably supported upon the wall 15 by means of the bars 17. A grate 18 is provided adjacent the wall 12 for supporting the fuel within the combustion chamber 13.

The combustion chamber 13 is lined with a fire brick wall 19 that is supported upon the horizontal wall 12 and forms the magazine to receive the fuel. The cylindrical wall 11 supports a ring 20 upon the upper edge thereof, the ring 20 having an inverted cone shaped flange 21 extending downwardly therefrom. The lower edge 22 of the flange 21 is spaced from the upper edge 23 of the fire brick wall 19 to provide an air space 24 through which air can be supplied over the top of the combustion chamber 13 in a manner to be hereinafter described.

A top closure wall 25 is provided for the heating appliance to which an access door 26 is hinged by means of the hinge member 27. The combustion chamber 13 can be loaded through the door 26 to fill the magazine with fuel.

A baffle plate is secured to the closure wall 25 and has the sides thereof open to permit discharge of flue gases through the flue 29. The baffle plate 28 is of sufficient width to prevent a direct flow of the flue gases to the flue 29, the gases being directed around the edges of the baffle 28 to cause the same to enter the chamber 31

provided between the baffle 28 and the flue 29.

The primary source of air for the fuel within the combustion chamber 13 is admitted to the ash compartment 14 through the draft opening 32 that is closed by means of a draft door 33. The draft door assembly consists of a frame 34 that is secured to the wall of the ash compartment 14 by means of the bolts 35 and has the air supply opening 32 therein. The draft door 33 is provided with a pair of lugs 36 through which a hinge wire 37 extends, the hinge wire also extending through the lugs 38 carried upon the frame 34. The ash compartment 14 is provided with a suitable access door 39 in the front wall thereof. A secondary air supply is provided within the combustion chamber 13 that is admitted to the combustion chamber through an air supply opening 40 provided in the rear wall of the combustion chamber. A baffle plate 41 is secured adjacent the air opening 40 to direct air into the combustion chamber as it flows upwardly along the side of the wall 11.

A second source of secondary air is supplied through an opening 42 provided in the front wall of the combustion chamber 13. This opening is regulated by means of a draft door 43 that is manually operated for controlling the quantity of secondary air supplied therethrough. The air supplied through the openings 40 and 42 does not enter directly into the combustion chamber 13 but enters passages 44 and 45 disposed adjacent the openings 40 and 42 respectively. These passages 44 and 45 are provided in the fire brick wall 19 by recessing a portion of the fire brick wall so that there is a space between the wall and the wall 11 of the combustion chamber, as shown in Figure 2. This secondary air passes upwardly along the fire brick wall 19 until it reaches the space 24 provided between the fire brick wall 19 and the baffle 21 at which point the air passes over the edge of the fire brick wall 19 and contacts the products of combustion discharging from the fuel bed within the combustion chamber 13. The air is preheated in its passage along the wall 19 so that the contact of a fresh supply of air with the products of combustion at the top of the wall 19 consumes any unburnt combustible gases before they pass through the chamber 31 and the flue 29.

A draft control member is provided for regulating the degree of opening of the draft door 33 and thereby controlling the quantity of primary air that is supplied through the grate 18 to the bottom of the fuel bed within the combustion chamber 13. This draft control member consists of a rod 46 having one end thereof slidably guided within a lug 47 extending from the draft door frame 34. The lower end of the rod 46 engages a knife edge 48 provided on an arm 49 extending from the draft door 33. A control handle 50 is provided for the rod 46 and is supported upon a bracket 51 by means of a boss 55. The bracket 51 is secured to the wall 11 by means of the bolts or screws 52 that extend through slots 53 provided within the bracket 51 so that the bracket can be adjusted vertically upon the wall 11. The lower face of the bracket 51 is provided with a cam surface 54 that is engaged by a bar 55 carried by the boss 56 on the handle 50. The upper end of the rod 46 extends within a recess provided within the boss 56 for guiding the upper end of the rod 46 and supporting the same with respect to the handle 50.

When the handle 50 is rotated upon the boss

56 the bar 55 will ride vertically upon the cam surface 54 thus moving the rod 46 vertically so that the lower end thereof, that is in engagement with the knife edge 48, will cause the draft door 33 to be pivoted upon the hinge wire 37 and move with respect to the frame 34 and thus regulate the degree of opening of the air supply opening 32. Thus the degree of opening of the draft door 33 can be manually set to regulate the supply of primary air beneath the grate 18 and the fuel in the combustion chamber 13.

As the temperature of the wall 11 increases it will expand vertically as much as $\frac{1}{8}$ of an inch to $\frac{3}{8}$ of an inch so that the actual dimension between the bracket 51 and the knife edge 48 increases when the temperature of the wall 11 increases. Since the rod 46 is spaced a substantial distance from the wall 11 of the combustion chamber, the rod 46 will be at a lower temperature than the wall 11 and thus will not expand to the same extent. In fact the temperature differential between the wall 11 and the rod 46 is quite high because the rod 46 is subjected to the air circulating within the room. In view of the fact that the rod 46 does not expand to the same extent as the wall 11 of the combustion chamber the effective length of the rod actually becomes less so that the door 33 can swing downwardly to maintain the knife edge 48 against the bottom end of the rod 46. It will thus be seen that the temperature differential between the rod 46 and the wall 11 of the combustion chamber provides the power for actuating the door 33 to decrease the size of the air supply opening 32 when the temperature of the combustion chamber increases. The reverse situation exists when the wall 11 of the combustion chamber cools down. That is the contraction of the wall 11 decreases the actual dimension between the bracket 51 and the knife edge 48 so that the bottom end of the rod 46 is forced downwardly against the knife edge 48 to move the door 33 upwardly and thus increase the air inlet passage through the opening 32. The draft control mechanism thus provides an automatic control for regulating the supply of air beneath the fire bed in the combustion chamber 13 in direct response to the temperature of the combustion chamber. Regardless of the temperature of the combustion chamber at the time the draft control is manually set by the handle 50, the control will function in a manner heretofore described. In fact if the handle 50 is set to regulate the draft within a range of temperature lower than the temperature of the combustion chamber as reflected by the wall 11 at the time the draft control is set, the draft door 33 will close to reduce the quantity of air supplied beneath the fuel bed until the temperature of the wall 11 has reduced sufficiently to supply a proper quantity of heat to the room in accordance with the setting of the draft control.

The primary air supplied beneath the fuel bed and the combustion chamber 13 is thus under automatic control. The secondary air supplied through the space 24 is always delivered in at least a minimum amount as controlled by the supply opening 40. This opening is always completely open. The draft door 43 regulates the quantity of secondary air supplied above the fuel bed in amounts in addition to the minimum quantity supplied by the draft opening 40. The draft door 43 is set manually to adjust the quantity of secondary air supplied therethrough. This opening is varied in accordance with the quantity of unconsumed products of combustion that reach the chamber 31 and flue 29. If the unconsumed products of combustion are quite large the draft door 43 will be opened to increase the supply of secondary air. This condition exists particularly after the combustion chamber 13 is charged with a fresh supply of fuel. After the gases evolved by the fuel upon initiation of combustion have reduced the draft door 43 can be closed to reduce the quantity of secondary air supplied above the combustion chamber 13.

While the form of the invention disclosed herein is a preferred form yet it is to be understood that the features of the invention are adaptable to structural modification and that all such modified structures as fall within the scope of the appended claim are intended to be included herein.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

In a stove, a vertical closed wall forming a combustion chamber, a base supporting and conforming to the contour of said wall at the back and sides but projecting exteriorly of said wall at the front, a top having a contour conforming to said wall at the sides but projecting exteriorly of said wall at the front and back, a second wall fitting between and conforming to the projecting portions of said base and top at the front and contacting said chamber at the sides to form a flue from base to top, there being openings in said secondary wall at said base and top whereby ambient air may circulate through said flue and be heated by said closed wall, and a third wall fitting the projecting portion of said top at the rear and having its sides engaging said closed wall and extending downwardly to a point adjacent the base to form a second flue open at the bottom, there being an opening in said third wall adjacent said top whereby ambient air may circulate through and be heated by the chamber wall, there being an air inlet in said chamber wall adjacent the base of said second flue, means for varying the effective size of said inlet, and control means for said varying means extending upwardly through said second flue.

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