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DRAFT TUBE FOR STOVES AND FURNACES

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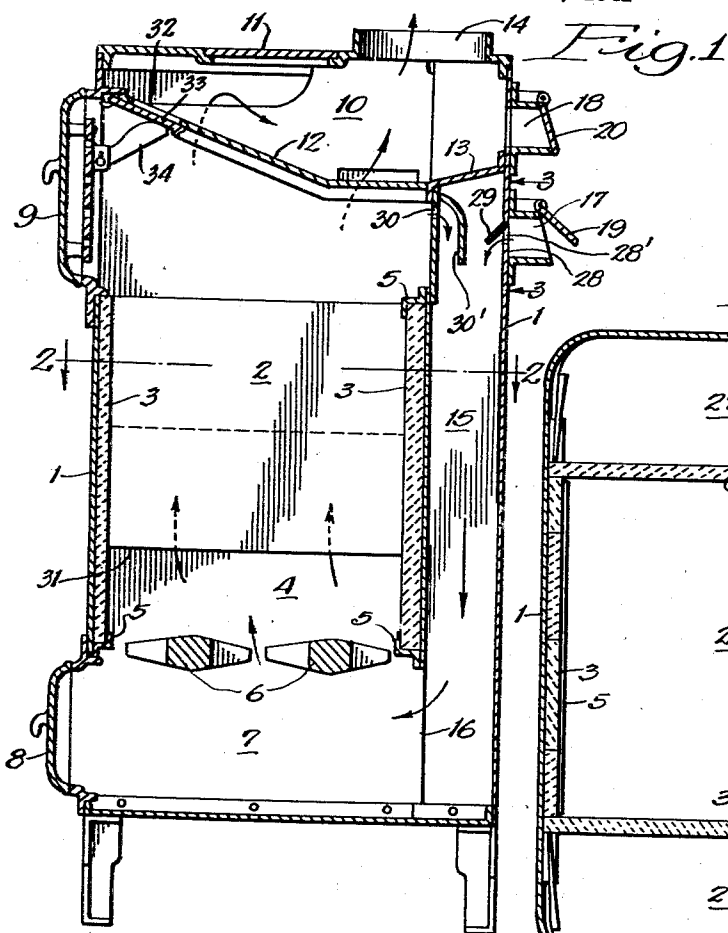


Fig. 2

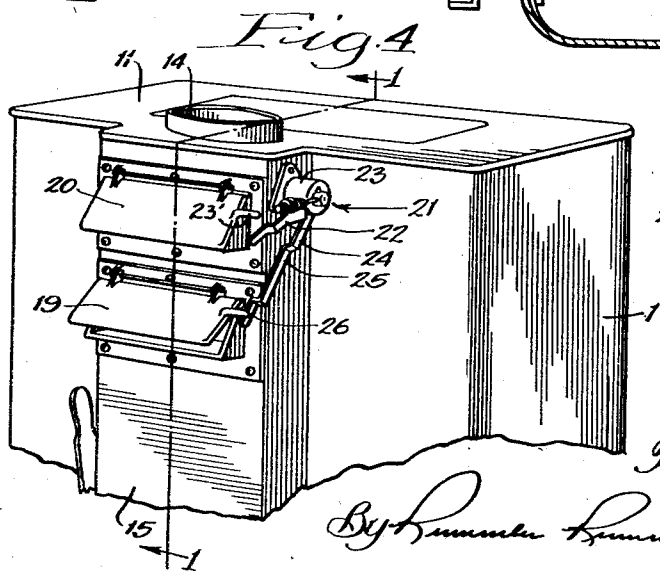
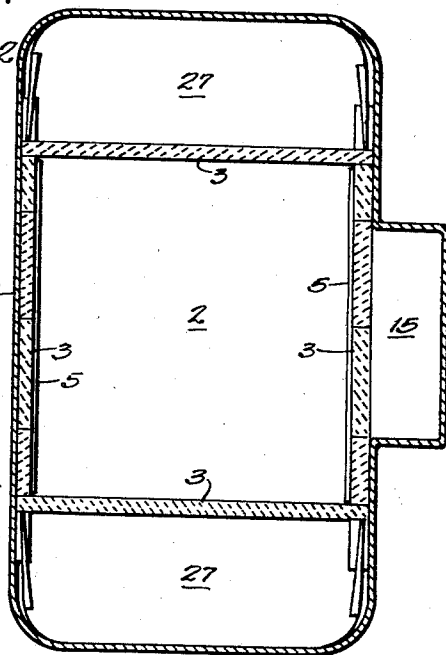
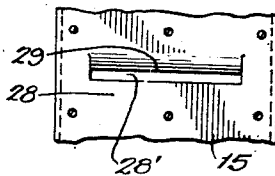


Fig. 3



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DRAFT TUBE FOR STOVES AND FURNACES

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Application February 5, 1941, Serial No. 377,511

5 Claims. (Cl. 126-77)

This invention relates to improvements in stoves, furnaces and the like, and more particularly to an improved arrangement for supplying and controlling the draft therefor.

The main objects of this invention are to provide an improved draft control arrangement for stoves and furnaces; to provide such a draft means whereby the cold air taken into the stove from the atmosphere will be preheated before coming into contact with the fuel bed; to provide a device of this character which will act as an insulation medium to keep the wall of the stove, or like device, to which it is attached reasonably cool; to provide a device of this character which is arranged to provide a down draft for stoves and furnaces, and which is provided with an improved arrangement for controlling the amount of air entering the combustion space; and to provide a device of this character having an improved arrangement to limit the amount of air in accordance with a predetermined maximum combustion rate.

An illustrative embodiment is shown in the accompanying drawing in which:

Figure 1 is a vertical cross section, taken on the line 1-1 of Fig. 4, of a complete stove embodying my invention.

Fig. 2 is a cross sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a face view of the air inlet opening for the primary draft damper, parts being shown broken away.

Fig. 4 is a perspective view of the rear upper portion of a stove embodying the invention.

Referring to the drawing, the stove shown, and in which my invention is embodied for illustrative purposes, is fully disclosed and claimed in my copending application, filed June 19, 1941, Serial No. 398,785, for Internal constructions for stoves and furnaces. This stove is provided with a shell 1 of sheet metal, preformed to the desired size and shape and which completely encloses the internal parts of the stove. The internal parts of the stove comprise a sealed magazine 2, the lower part of which is lined with fire brick 3 to define a fire pot 4, the fire brick 3 lining being held in position by suitable brackets 5.

The stove is also provided with grates 6; an ash pit 7; ash pit door 8; a feed door 9; an upper chamber 10 defined by the side walls of the shell 1, the top covering of the stove proper 11, partition plates 12 and 13; and a stack opening 14.

The draft supply tube 15, to which this invention is particularly directed, is preferably constructed of sheet metal and may be preformed as

part of the shell 1, but it may also be formed separately and apart from the shell 1 and attached thereto by any suitable means. The tube 15 is preferably located on the rear wall of the stove in the manner shown in the drawing, but the tube 15 may, however, be formed in either of the side walls of the shell 1 or formed separately apart from said shell and secured to either of the side walls and still be as effective as the arrangement illustrated herein.

This draft tube 15 is provided with an outlet opening 16 at its lower end, below the grate line, where it communicates with the ash pit 7, while the upper end terminates in and forms a part of the separate upper chamber 10 from which the stack connection 14 leads. The draft tube is also provided with a partition plate 13 for separating the air intake inlets 17 and 18 which are located near the top of the stove, in the upper end of the tube 15, and are controlled by a primary draft damper 19 and a check damper 20, respectively.

The primary draft door 19 and check damper door 20 are controlled by a unitary thermostatic control device 21 such as illustrated in Fig. 4 of the drawing and which is mounted on the side wall of the draft tube 15 substantially at the level of the check inlet 18. This regulator device 21 is fully described and claimed in the copending application of Howard C. Edwards, now Patent No. 2,302,197, November 17, 1942, for Thermostatic combustion control for stoves and furnaces.

The control device shown is provided with an arm 22 which is integrally secured to the free end of a bimetallic coil, not shown, housed within the casing 23. This coil is subject to expansion and contraction under the influence of the heat of the gases passing through the chamber 10 and in the arrangement shown is so constructed and arranged that increase in heat will cause the coil to contract, and decrease in heat will cause the coil to expand. Upon contraction of the coil the arm 22 will move upwardly and the upper edge of the free end of that arm will abut against the projecting lug 23' on the check damper door 20, and gradually open the door allowing cool air from outside of the stove to enter the upper chamber 10 and break the draft effect of the chimney, or flue—not shown—connected at the outlet 14.

As the stove cools the bimetallic element of the coil expands causing the arm 22 to move downwardly until it abuts against the upper end of lever 24. This lever 24 is pivoted intermediate its ends, on the side wall of tube 15 by any

suitable means, such as by bolt 25. Upon continued expansion of the coil and pressure of the arm 22 on the upper end of lever 24, the lower end of the lever 24 will swing upwardly until it abuts against the lug 26 on the primary draft door 19 to open said door. This allows air from the outside of the stove to enter the draft tube 15, whereupon it is drawn downwardly to the ash pit 7 and thence upwardly through the grates 6 to the fuel bed.

As combustion takes place on the grate, the products of combustion will pass off into the side passageways or radiators 27, see Fig. 2, and thence upwardly into the upper chamber 10 from which they pass through the stack opening 14 into the chimney, not shown.

In order to prevent the fire in the stove from burning at greater than a predetermined rate, I have restricted the primary draft opening 17 by providing a baffle plate 28 which has an elongated opening 28' of a predetermined size. The upper margin of the opening 28' is bent inwardly to provide a downwardly extending means 29 for directing the air coming through the primary draft opening, downwardly into the tube 15. This arrangement provides a reduction of any pressure in the upper end of the tube 15, as a result of which any gas which may accumulate in the upper portion of the magazine 2 is drawn off or siphoned into the tube 15 through a series of small apertures 30 formed in the inner wall of the tube 15 adjacent the partition 13, which act as safety vents, and is directed downwardly in the tube 15 by a second baffle 30' which extends downwardly inside the said tube.

A primary function of the tube 15 is to pre-heat the incoming cool air for combustion, thereby increasing combustion efficiency. This pre-heating occurs as the cool air travels down the length of the tube during which it picks up some of the heat generated in the fire pot and passing through the fire brick lining and admixes with the magazine gas siphoned through the ports 30. Hence, the incoming air will be warmed before it reaches the grates and prevent unnecessary cooling of the burning fuel bed. This also keeps the rear walls of the stove relatively cool and thereby prevents heat from the back of the stove being transferred to room walls, which heat might be harmful if the stove were backed up close to a room wall, as is customary in most homes. The tube 15 will thus function as an insulator as well as a draft tube and air preheater.

As the magazine of the stove is completely closed on top and has no direct connection with the stack, while the feed door is closed, and because of the draft effect of the stack through the radiators 27, the gases driven off from the heated fuel in the magazine 2 are drawn downwardly from above and within the fuel bed, along the inner wall surfaces of the fire brick and through the hot coke on the grate, and thence through the side slots 31 where they mix with the air coming from the ash pit chamber to convert the gases into a flame. The side slots 31 are not illustrated in detail herein, but are fully described and claimed in my copending application, Serial No. 398,785, filed June 19, 1941, for Internal construction for stoves and furnaces. Since there is but slight fuel bed resistance, an extremely low draft of only about .05 inch is all that is necessary in normal operation. This results in a slow, lazy flame travel through the radiators 27, allowing maximum time for the trans-

fer of heat to the room, and thereby giving lower than average stack temperatures.

In order to provide for the passage of gas, in the upper portion of the magazine, into the stack when the feed door 9 is opened, I have provided an auxiliary or safety by-pass opening 32 having a pivoted closure plate 33 which is controlled by the opening and closing of the feed door 9 on the inner side of which a loosely-anchored, upwardly and inwardly extending camming arm 34 is attached. It will be apparent that when the feed door 9 is opened, the plate 33 will swing downwardly automatically by gravity, thereby uncovering the opening 24 and allowing any gases accumulating in the upper portion of the magazine 2 to flow upwardly into the upper chamber 10 and thence out the stack opening 14. When the feed door 9 is closed, it closes the by-pass opening 24 automatically.

This by-pass construction is fully shown and claimed in my copending application, Serial No. 377,825, filed February 7, 1941, for Safety by-pass for stoves and furnaces.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A stove of the character described comprising an elongated shell having a refractory lined combustion chamber therein, a partition in the upper end of the shell forming an upper compartment for receiving products of combustion thereinto and discharging same therefrom through a suitable opening in the shell, a lower fuel magazine compartment within the shell, a grate disposed within the lower compartment adjacent the bottom thereof, and an ash pit chamber below said grate, a draft tube defining a portion of one wall of said shell, said draft tube extending substantially throughout the length of the said wall of the shell which it defines and forming a closed passage way throughout a major portion of its length, a closure for said draft tube adjacent its upper end in substantially the same plane as the said partition whereby the upper end of the draft tube completes the enclosure for and is part of the said upper compartment, the said tube being open at its lower end and completing the enclosure for and in effect being part of the said ash pit chamber, means adjacent the upper end of said draft tube and below the said closure for admitting volatile gases from the lower compartment thereinto, and means substantially directly opposite said last named means for admitting outside air into the said tube whereby a co-mingling of the volatile gases and incoming outside air is effected and the same conducted downwardly in the said tube to its open end and discharged directly beneath the said grate.

2. A stove of the character described comprising an elongated substantially rectangularly shaped shell having front, side and rear walls and closed top and bottom and a refractory lined combustion chamber therein, a partition in the upper end of the shell forming an upper compartment for receiving products of combustion thereinto and discharging same therefrom through a suitable opening in the top of the shell, a lower fuel magazine compartment within the shell, a grate disposed within the lower

compartment adjacent the bottom thereof, and an ash pit chamber below said grate, a draft tube defining a portion of the rear wall of said shell, said draft tube extending substantially throughout the length of the said rear wall of the shell which it defines and forming a closed passage way throughout a major portion of its length, a closure for said draft tube adjacent its upper end in substantially the same plane as the said partition whereby the upper end of the draft tube completes the enclosure for and is part of the said upper compartment, and the said tube being open at its lower end and completing the enclosure for and in effect being part of the said ash pit chamber, means adjacent the upper end of said draft tube and below the said closure for admitting volatile gases from the lower compartment thereinto, and means substantially directly opposite said last named means for admitting outside air into the said tube whereby a co-mingling of the volatile gases and incoming outside air is effected and the same conducted downwardly in the said tube to its open end and discharged directly beneath the said grate.

3. A stove as defined in and by claim 1 wherein the said means adjacent the upper end of the draft tube and below the closure is an opening, a baffle plate in the draft tube and extending in spaced relation with and over said opening so as to deflect and direct the said volatile gases downwardly in the tube.

4. A stove as defined in and by claim 2 wherein the said means adjacent the upper end of the

draft tube and below said closure is an opening, a baffle plate in the draft tube and extending in spaced relation with and over said opening so as to deflect and direct the said volatile gases downwardly in the tube.

5. A stove of the character described comprising an elongated shell having a combustion chamber therein, a partition in the upper end of the shell dividing the same into an upper compartment into which products of combustion are received and from which said products of combustion are discharged through a suitable opening in the shell and a lower fuel magazine compartment, a grate disposed within said lower compartment adjacent the bottom thereof, and an ash pit chamber below said grate, a draft tube defining a portion of one wall of said shell and forming a closed passageway throughout a major portion of its length, and the said tube being open at its lower end and in communication with the said ash pit chamber, means adjacent the upper end of said draft tube for admitting volatile gases from the fuel compartment thereinto, a baffle plate in the draft tube and extending in spaced relation with and over said means so as to deflect and direct the said volatile gases downwardly into the tube, and means for admitting outside air into the said tube whereby a co-mingling of the said volatile gases and incoming outside air is effected and the same conducted downwardly in the said tube to its open end and discharged directly beneath the said grate.

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