Dec. 26, 1944. H. R. BLUMSTENGEL 2,365,675

HEATING STOVE

Filed Dec. 23, 1940 3 Sheets-Sheet 1

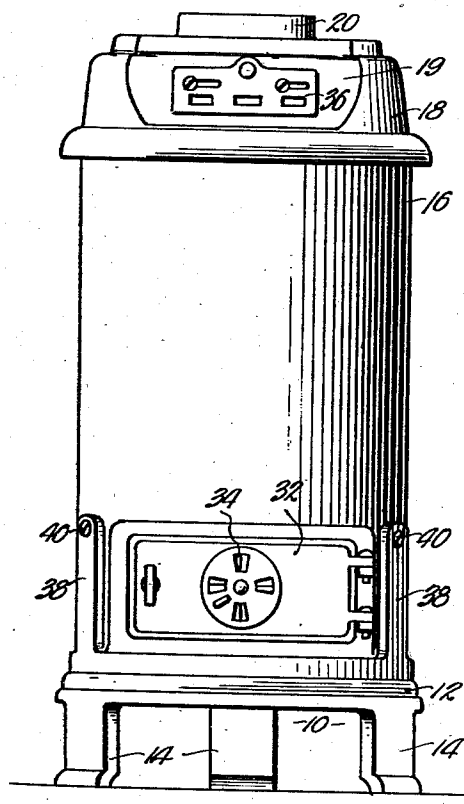


Fig. 1.

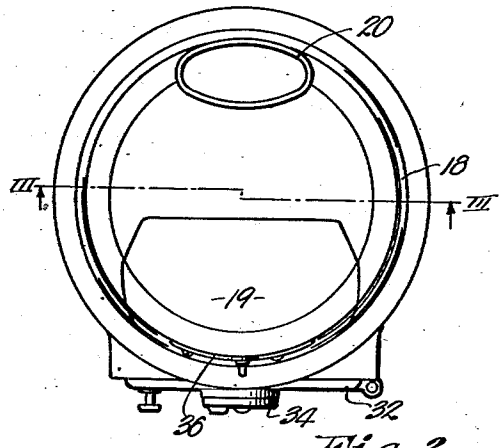


Fig. 2.

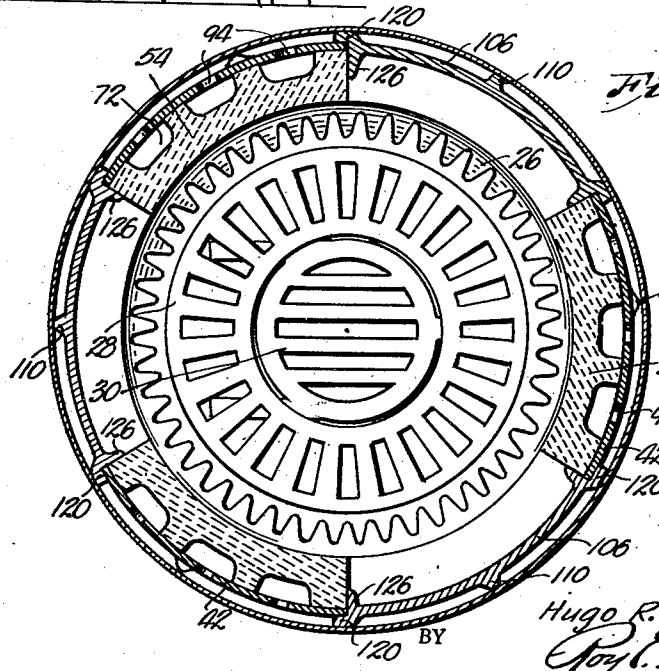


Fig. 4.

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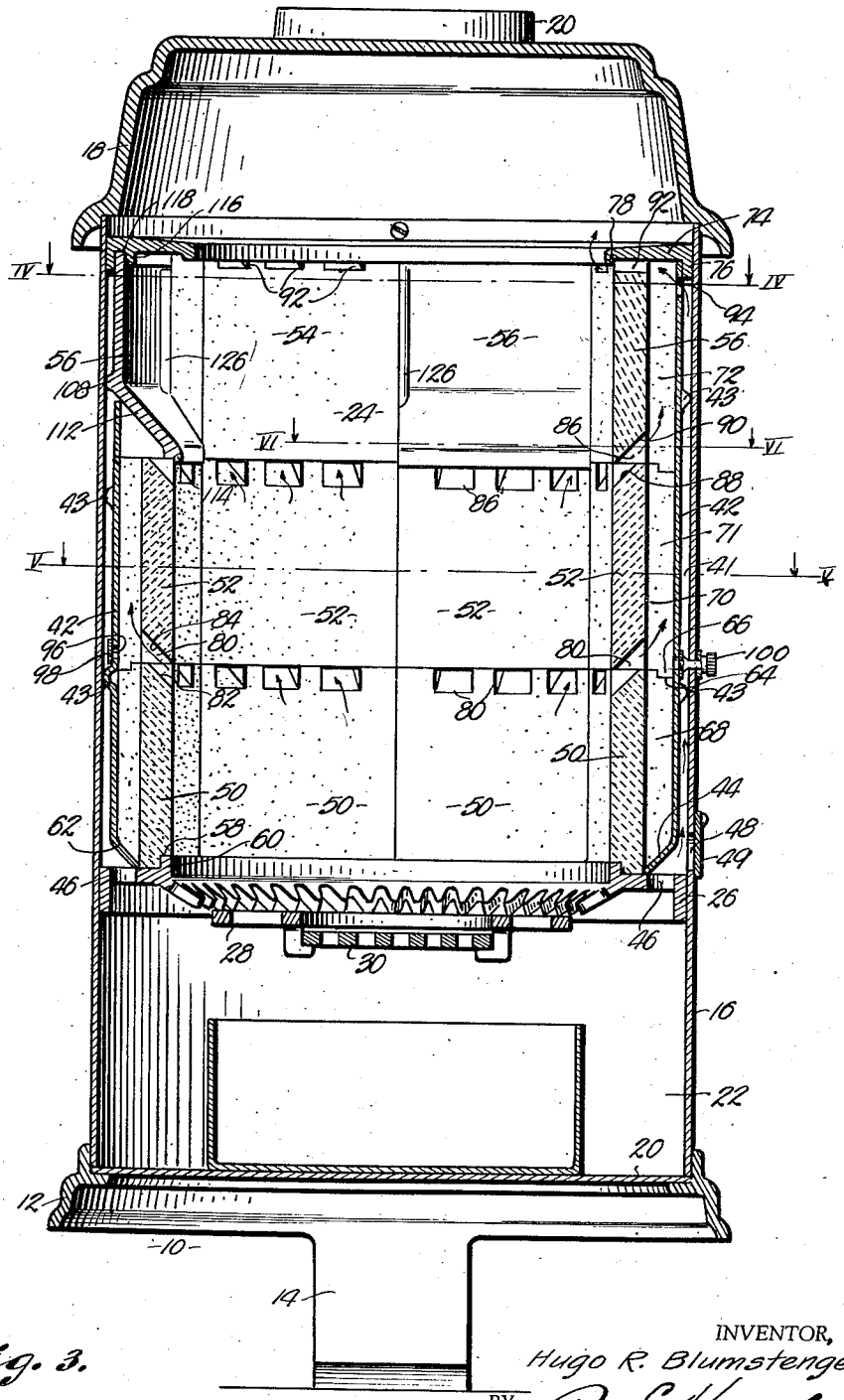


Fig. 3.

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Fig. 5.

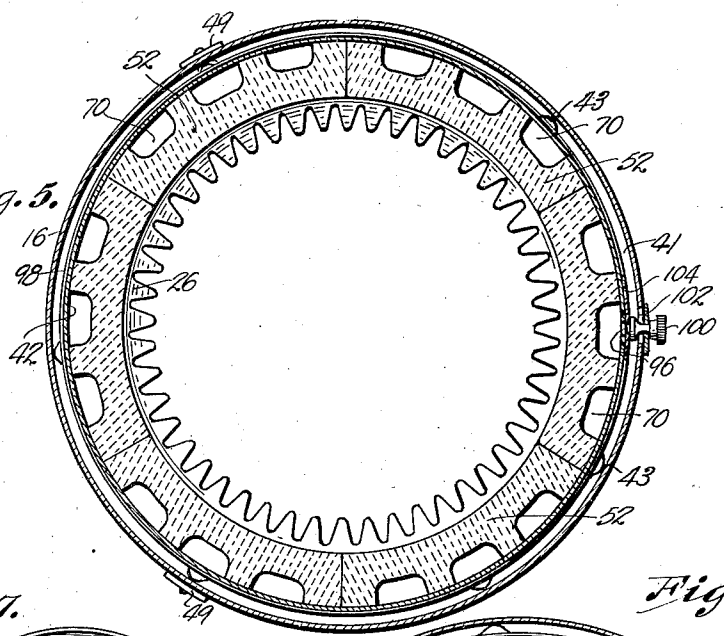


Fig. 7.

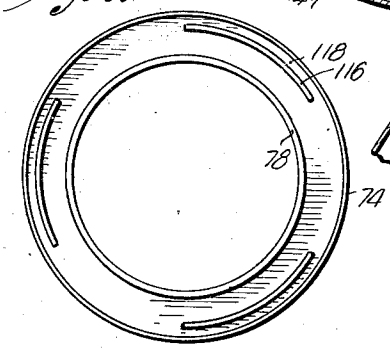
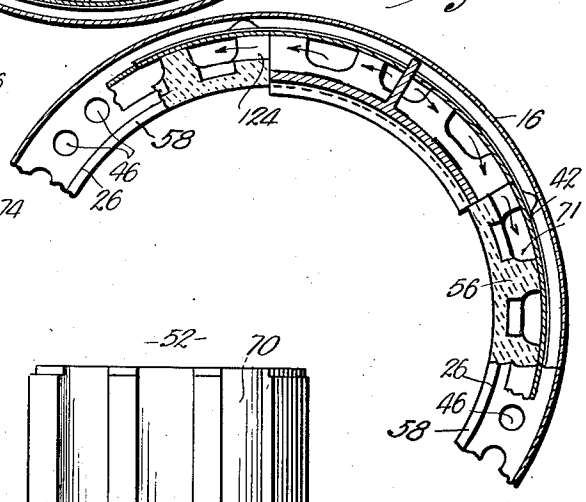


Fig. 6.



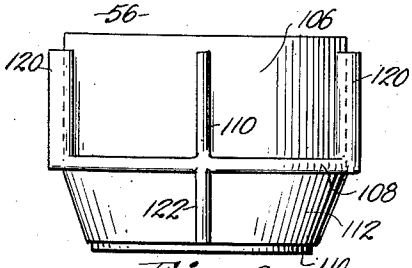


Fig. 8.

Fig. 10.

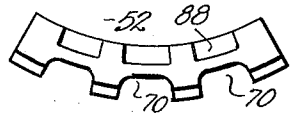


Fig. 11.

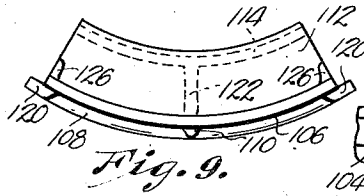


Fig. 9.

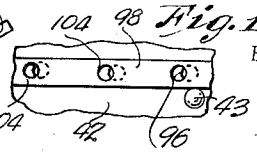


Fig. 12.

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2,365,675

HEATING STOVE

Hugo R. Blumstengel, Kansas City, Mo.

Application December 23, 1940, Serial No. 371,308

14 Claims. (Cl. 126—73)

This invention relates to improvements in heating stoves and has for its principal object the provision of a heating stove wherein gases from the fuel bed are directed to a point above the fuel bed, mixed with air and burned.

A further object of the present invention is the provision of a heating stove having gas ducts and air passageways leading from adjacent the bottom portion of the combustion chamber to the top thereof, whereby gases from the combustion chamber and air from outside the heater are directed to burners adjacent the top of the combustion chamber.

Another object of this invention is the provision of a heating stove having inter-engaging bricks and castings to form the inner lining for the combustion chamber, whereby these parts are easily positioned and removed.

A still further object of this invention includes special arrangement of the parts whereby a maximum heating is obtained with a minimum loss of combustible gases through the flue.

Other objects are simplicity and economy of construction, ease and efficiency of operation, and adaptability for use in burning the various types of fuel.

With these as well as other objects which will appear during the course of the specification, in view, reference will now be had to the drawings wherein;

Figure 1 is a front elevation of a heating stove embodying this invention.

Fig. 2 is a plan view of the heating stove.

Fig. 3 is an enlarged central sectional view taken on line III—III of Fig. 2.

Fig. 4 is a horizontal cross-sectional view taken on line IV—IV of Fig. 3.

Fig. 5 is a horizontal sectional view taken on line V—V of Fig. 3.

Fig. 6 is a fragmentary sectional view taken on line VI—VI of Fig. 3.

Fig. 7 is an inverted plan view of the top ring of the combustion chamber in reduced scale.

Fig. 8 is an outside elevational view of one of the cast iron liners.

Fig. 9 is a plan view of the liner shown in Fig. 8.

Fig. 10 is an outside elevational view of one of fire brick liners.

Fig. 11 is a top plan view of the fire brick liner shown in Fig. 10.

Fig. 12 is a fragmentary view of the air inlet valve.

Throughout the several figures like reference characters refer to similar parts and the numeral 10 designates a base member having an annular body portion 12 supported by legs 14 and outer casing 16 rests in said annular body portion and extends upwardly to support the top member 18 which is provided with a feed door 19 and smoke outlet 20. A base plate 20 is also positioned in the annular body portion 12 to form a bottom for the ash pit 22 which is separated from the combustion chamber 24 by the ring plate 26 and grate members 28 and 30. The ash-pit door 32 provides access thereto and has controlled air draft means 34 whereby the quantity of air fed through the grate to the combustion chamber is regulated. The top member 18 is provided with an adjustable air inlet 36 to admit air to the combustion chamber above the normal fuel level.

Referring to Fig. 1 it will be noted that the base member has standards 38 which extend upwardly to ring plate 26 and are secured thereto by screws 40, to support the load of the grates, fuel and lining members.

An inner lining 42 rests on ring plate 26 and is spaced apart therefrom a sufficient distance to form an air passageway 41 therebetween. To hold lining 42 in concentric relation to outer casing 16, a series of outwardly formed projections 43 are pressed from lining 42 to contact the inner surface of the outer wall. The lower edge of lining 42 is inclined inwardly at 44 so that the lower edge thereof rests on ring plate 26 beyond the openings 46 formed therethrough. Air entering the ash pit 22 through air inlets 34 will pass through opening 46 which are disposed in spaced apart relation entirely around ring plate 26. Since at times it will be necessary to substantially close the air intake means 34 to the ash-pit thereby reducing the air supply to the air passage-way 41 it is found convenient to provide air inlet openings 48 which communicate with passage-way 41 from the outside whereby to supplement or replace the air supply through ring plate 26. These openings are provided with suitable, adjustable cover plates 49 to vary the volume of air.

The combustion chamber 24 is lined adjacent its bottom portion with curved fire bricks 50 which extend therearound. A tier of fire bricks 52 resting on top of fire bricks 50 form an intermediate lining belt while fire bricks 54 and metal liners 56 rest on brick 52 and constitute an upper lining for the combustion chamber. The lower tier of lining bricks 50 are offset along their inner edge at 58 to receive the up-turned annular flange 60 of the ring plate 26. This

flange secures the bricks against inward movement and the in-turned edge 44 of metal lining 42 serves as a bearing to prevent outer movement of said brick.

It will be noted that the lower outer edge of the tile is beveled at 62 and is offset on its outer edge at 64 to receive the depending offset portion 66 of the brick 52 positioned thereabove. The outer wall of brick 50 is grooved at 68 to present vertically disposed ducts. These grooves are so arranged that groove 70 in brick 52 and groove 72 in brick 54 registers with groove 68 to produce a continuous duct 71 from the bottom portion of the combustion chamber to the top thereof. An annular cap ring 74 having an outer depending flange 76 is positioned to rest on top of inner lining 42 and bricks 54 with flange 76 positioned between the outer casing 16 and the inner lining 42. Cap ring 74 is also provided with an inner depending flange 78 which engages the inner edge of bricks 54.

It will be observed openings 80 from the combustion chamber to each of the ducts are produced by forming an upwardly inclined notch 82 in the inner edge of brick 50 and a downwardly and inwardly inclined notch 84 on the outer face of brick 52. It will be noted that the opening 80 is inclined upwardly from the combustion chamber 24 thereby preventing the passage of fuel to the duct 71. The openings 86 between bricks 52 and 54 also are inclined upwardly and are formed by notches 88 formed in the upper inner edge of brick 52 and notches 90 formed in the outer lower portion of bricks 54. The upper edge of each of the bricks 54 are notched at 92 to form transverse outlets for each of the ducts 71. It will be observed that each of the ducts 71 is provided with air flow through an opening 94 formed through the inner lining 42 just below the cap ring flange 76. Openings 96 formed through inner metal lining 42 positioned adjacent the openings 80 and communicating with gas duct 71 are controlled by ring member 98 by simply adjusting the ring 98 circumferentially by means of operating knob 100. The amount of air entering openings 96 can be varied or entirely shut off. A slot 102 formed in the outer case permits a limited movement of knob 100 for the adjustment of band 98.

It will be noted, referring to Fig. 12, that the band 98 is provided with openings 104 which register with openings 96 formed through metal lining 42. When the band 98 is positioned to admit air through openings 96 to duct 71 there will be a burning of the gases entering openings 80 within the duct, however, with certain types of fuel it may be found more practical to close openings 36 to cause the hot gases from the combustion chamber to rise to the top of the gas duct 71 where they will be inter-mixed with fresh air through openings 94 and be discharged through grooves 92 for the burning operation. Each one of these openings 92 constitutes a burner whereby excess gases from the body of the combustion material is burned above the fuel bed. The position of these burners is such that a sufficient heat from the fuel will be present to cause the ignition of the inter-mixed gases and air. Metal liner 56, best shown in Figs. 3, 4, 8 and 9, comprise an arcuate body portion 106 circumferentially ribbed at 108 and provided with vertical ribs 110. An inwardly and downwardly directed flange 112 extends inwardly to rest on the inner edge of brick 52 and has a depending flange 114 which overlaps the upper portion of bricks 52 to hold it in proper relation to the body of the stove. Cap ring 74 is provided with a depending arcuate rib 116 concentric with flange 76 and spaced apart therefrom to present a groove 118 into which is fitted the upper edge of arcuate body member 106.

As a further anchorage for lining 56, edge flanges 120 are provided to fit between the outer casing 16 and the inner metal casing 14 as clearly shown in Fig. 4. This definitely anchors lining 56 against radial and rotary movement. It will be observed that the rib 108 precludes the passage or gases or air upwardly. The radial flange 122 extends from flange 112 to the inner wall of casing 16 to serve as a partition so that gases entering the ducts below liner 56 will be directed through openings 124 formed in tile 54 to communicate with grooves 72 formed therein. Thus the path of gas from the gas ducts below the metal liners 56 will be deflected to the next adjacent ducts through which they will pass to the top burners.

The direction of travel of the gases just referred to is best shown in Fig. 6.

In-turned ribs 126 at the side edges of liner 56 are adapted to engage the inwardly diverging walls of the bricks 54 disposed therebetween and since the ribs 126 and the edge walls of the bricks 54 are radially disposed there will be an interlocking of the parts which will preclude inward movement thereof. Sufficient clearance between these parts to allow for the usual expansion and contraction due to the various temperatures to which they are subjected is provided for.

In the operation of this heating stove the combustion chamber is substantially filled with any desired fuel such as coal, coke, or coke wood, etc., and ignited. The air inlets are adjusted for supplying the proper amount of air for combustion. A portion of the gases developed from combustion in the combustion chamber will pass into air ducts 71 through openings 80 and 86. An air supply to the air passage-way 41 which extends entirely around the stove is supplied through inlet 34 or openings 48. Due to the heating of the air in passage-way 41 it will tend to rise and pass through openings 94 to the intermix with the gases traveling upwardly through ducts 71 to support combustion at the top burners.

These top gas burners further facilitate the burning of combustible gases which arise from the bed or fuel above openings 86. The hot zone created just above the fuel bed together with a sufficient supply of air will greatly increase the combustion and decrease the B. t. u. loss through the chimney.

What I deem as new and desire to cover by Letters Patent is:

I claim:

1. A heating stove comprising a cylindrical housing having a combustion chamber provided with an air inlet and a smoke outlet, a thin cylindrical lining spaced apart from said housing to form an air passage-way therebetween open to said air inlet and extending substantially the full length of said combustion chamber, relatively thick refractory lining members grooved on their outer surfaces to form with said thin lining a plurality of spaced apart gas ducts communicating with said combustion chamber intermediate the top and bottom thereof and extending upwardly to terminate in inwardly directed transverse outlets, said thin lining having openings adjacent its top whereby air will pass

into said gas ducts adjacent the transverse outlets.

2. A heating stove comprising a housing having a combustion chamber provided with an air inlet and a smoke outlet, a thin lining spaced apart from said housing to form an air passageway therebetween open to said air inlet and also having controlled air inlets through said housing wall, relatively thick refractory lining members grooved to form a plurality of spaced apart gas ducts communicating with said combustion chamber at a plurality of vertical levels intermediate the top and bottom thereof and extending upwardly to terminate in transverse outlets communicating with said combustion chamber, said thin lining having openings adjacent its top whereby air will pass into said gas ducts adjacent the transverse outlets.

3. A heating stove comprising a housing having a combustion chamber provided with a bottom air inlet and a top smoke outlet, a thin lining spaced apart from the side wall of said housing to form an air passage-way therebetween, open to said air inlet and having controlled air inlets from the outside through said housing wall, and outlet openings through said thin lining, relatively thick refractory lining members positioned against the inner surfaces of said thin lining and formed to produce a plurality of vertically disposed spaced apart gas ducts communicating with said combustion chamber, and terminating adjacent the top of said combustion chamber in inwardly directed outlets whereby air from said air passage will be mixed with the gas in said gas ducts.

4. A heating stove comprising a housing having a combustion chamber provided with a bottom air inlet and a top smoke outlet, a thin lining spaced apart from the side wall of said housing to form an air passage-way therebetween, open to said air inlet and having controlled air inlets from the outside through said housing wall, and outlet openings through said thin lining, relatively thick lining members formed to produce a plurality of vertically disposed gas ducts communicating with said combustion chamber, and terminating adjacent the top of said combustion chamber in inwardly directed outlets whereby air from said air passage will be mixed with the gas in said gas ducts, and means engaging the top edge and bottom edge of said thick lining whereby it is secured in the operative position.

5. A heating stove comprising a housing having a combustion chamber provided with a bottom air inlet and a top smoke outlet, a thin lining spaced apart from the side wall of said housing to form an air passage-way therebetween, open to said air inlet and having controlled air inlets from the outside through said housing wall, and outlet openings through said thin lining, relatively thick lining members positioned in a plurality of courses and formed to produce a plurality of spaced apart vertically disposed gas ducts communicating with said combustion chamber, and terminating adjacent the top of said combustion chamber in inwardly directed outlets whereby air from said air passage will be mixed with the gas in said gas ducts.

6. A heating stove comprising a housing having a combustion chamber provided with a bottom air inlet and a top smoke outlet, a thin lining spaced apart from the side wall of said housing to form an air passageway therebetween, open to said air inlet and having controlled air inlets from the outside through said housing wall, and vertically spaced apart series of outlet openings through said thin lining means to vary the size or completely close the lower series of openings, relatively thick lining members formed to produce a plurality of vertically disposed gas ducts communicating with said combustion chamber, and terminating adjacent the top of said combustion chamber in inwardly directed outlets whereby air from said air passage will be mixed with the gas in said gas ducts.

7. A heating stove comprising a housing, having an ash-pit, a combustion chamber positioned directly thereabove, and spaced apart therefrom by a grate, a top chamber above said combustion chamber, an air inlet to said ash-pit, a smoke outlet at the top of the housing, a relatively thin lining spaced inwardly from the side wall of said housing to form an air-passage therebetween open to said ash-pit and having outlet openings adjacent the top of said combustion chamber, relative thick lining members positioned in vertically disposed courses in said combustion chamber and formed to present a series of vertically disposed gas ducts communicating with said combustion chamber and terminating adjacent the top of the combustion chamber in openings communicating with the combustion chamber, a liner positioned between adjacent member of the top course of lining members positioned against said housing with its side edges positioned between said housing and the thin liner.

8. A heating stove comprising a housing, having an ash-pit, a combustion chamber positioned directly thereabove, and spaced apart therefrom by a grate, a top chamber above said combustion chamber, an air inlet to said ash-pit, a smoke outlet at the top of the housing, a relatively thin lining spaced inwardly from the side wall of said housing to form an air-passage therebetween open to said ash-pit and having outlet openings adjacent the top of said combustion chamber, relative thick lining members positioned in vertically disposed courses in said combustion chamber and formed to present a series of vertically disposed gas ducts communicating with said combustion chamber and terminating adjacent the top of the combustion chamber in openings communicating with the combustion chamber, a liner positioned bewteen adjacent member of the top course of lining members positioned against said housing with its side edges positioned between said housing and the thin liner, and its lower edge portion formed inwardly to overlap the lining member therebelow and to form a passage-way for the gas from the gas ducts therebelow and direct it to the gas ducts formed in the adjacent lining members.

9. A heating stove comprising a housing, having an ash-pit, a combustion chamber positioned directly thereabove, and spaced apart therefrom by a grate, a top chamber above said combustion chamber, an air inlet to said ash-pit, a smoke outlet at the top of the housing, a relatively thin lining spaced inwardly from the side wall of said housing to form an air-passage therebetween open to said ash-pit and having outlet openings adjacent the top of said combustion chamber, relative thick lining members positioned in vertically disposed courses in said combustion chamber and formed to present a series of vertically disposed gas ducts communicating with said combustion chamber and terminating adjacent the top of the combustion chamber in

openings communicating with the combustion chamber, a liner positioned between adjacent member of the top course of lining members positioned against said housing with its side edges positioned between said housing and the thin liner, and its lower edge portion formed inwardly to overlap the lining member therebelow and to form a passage-way for the gas from the gas ducts therebelow and direct it to the gas ducts formed in the adjacent lining members, and a series of air ports formed through said side housing wall with adjustable closures whereby the amount of air to said air passage-way may be regulated independently of the air inlet to said ash-pit.

10. A heating stove comprising an outer casing, a grate construction in said outer casing carried thereby, above the bottom thereof, a relatively thin liner spaced apart from said outer casing and extending upwardly from said grate construction to form a vertical air passageway communicating with the stove compartment below said grate, fire brick in said outer casing positioned around the inner periphery of said liner above the grate construction to define a fuel magazine with their inner faces, said fire brick having formed outer face portions thereof spaced from said liner to provide a series of spaced apart ducts extending upwardly from the grate construction and communicating with said fuel magazine.

11. A heating stove comprising an outer casing, a grate construction therein, a smoke outlet for said body member, a fuel inlet for said body member, an ash outlet for said body member, a metal lining carried by said grate construction within said casing in spaced relation to said outer casing, whereby an air passageway is formed therebetween to communicate with said ash pit, refractory members in said outer casing mounted on and extending upwardly from the grate construction to rest against the inner periphery of said metal lining, grooves formed in the outer faces of said refractory members whereby vertical ducts are defined by said bricks and said lining, said refractory members being formed to present passageways communicating with said ducts from the interior of said stove and openings formed through said lining intermediate the top and bottom thereof whereby air going through said air passageway will enter said ducts.

12. A heating stove comprising an outer casing, a grate construction in said outer casing and carried thereby above the bottom thereof, a metal liner resting on and extending upwardly from said grate construction and disposed in spaced relation to said outer casing to form an air passage therebetween which communicates with the stove below said grate, refractory slabs in said outer casing above the grate construction defining a fuel magazine with their inner faces and having outer grooved portions thereof spaced from the metal liner to provide vertically disposed flues from the grate construction communicating with the fuel magazine.

13. In a stove including an outer housing, a grate ring in said outer housing having openings formed therethrough, and a grate cooperating with said ring, a metal liner extending upwardly from said grate ring and spaced apart from said outer housing to form an air chamber therebetween communicating with the lower portion of said stove through said grate ring openings, a grooved refractory lining in said outer casing contacting the inner periphery of said metal lining to define a fuel magazine above the grate and cooperating with said metal liner to define flues alongside of the fuel magazine to communicate with said fuel magazine.

14. A heating stove comprising a housing defining the combustion chamber, an apertured grate construction forming the bottom of the combustion chamber, a metal liner resting on and extending upwardly adjacent the top of said combustion chamber from said grate construction to form an air chamber between said housing and said liner, grooved fire brick carried by said grate construction and resting against said metal liner, whereby their inner surfaces form a fuel magazine and their outer surfaces define flues adjacent said magazine and said fire bricks providing passageways joining the magazine with the flues.

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