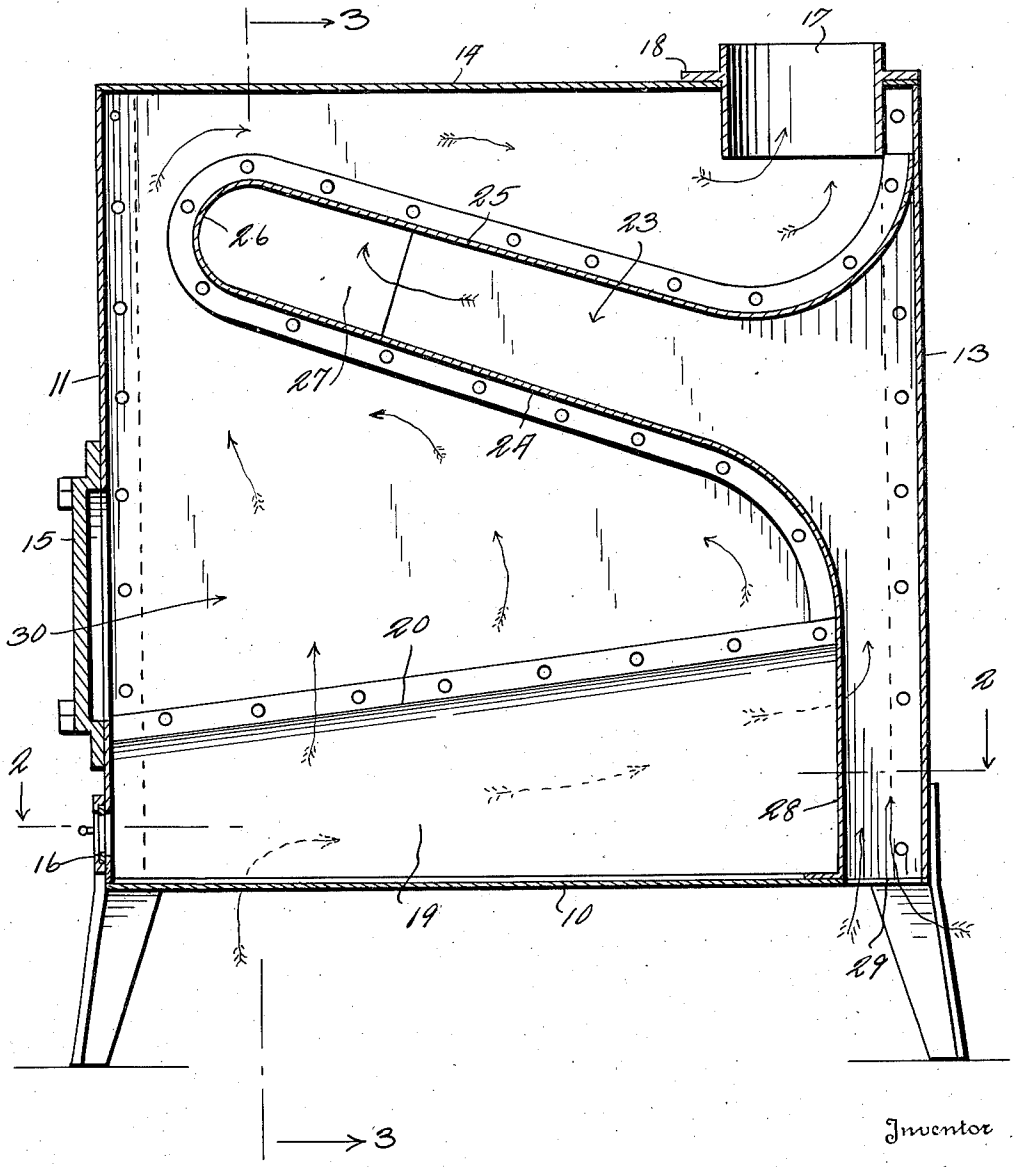
Oct. 20, 1936. W. D. MERRILL 2,058,094

HEATING STOVE

Filed Feb. 25, 1936 2 Sheets-Sheet 1

Fig. 1



Inventor

W. D. Merrill

By Watson E. Coleman

Attorney

Oct. 20, 1936. W. D. MERRILL 2,058,094

HEATING STOVE

Filed Feb. 25, 1936 2 Sheets-Sheet 2

Fig. 2

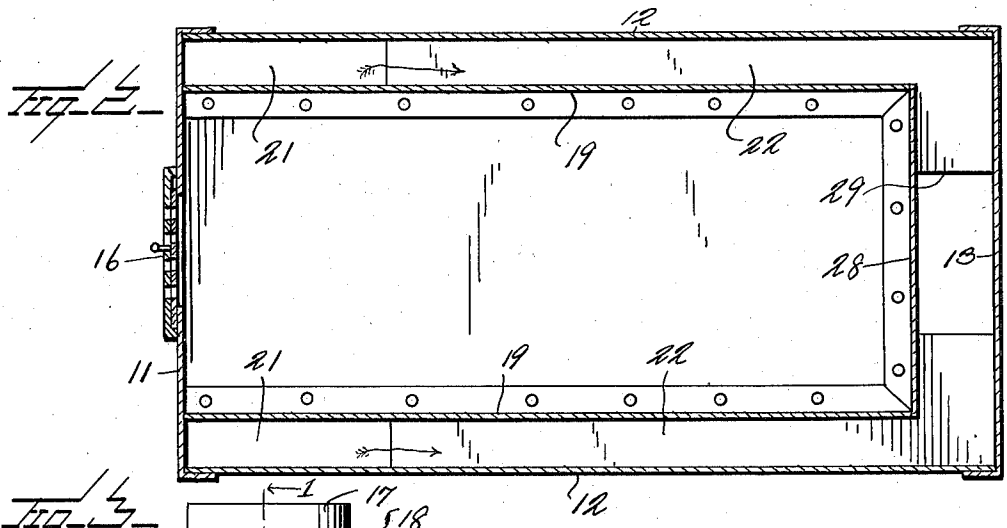


Fig. 3

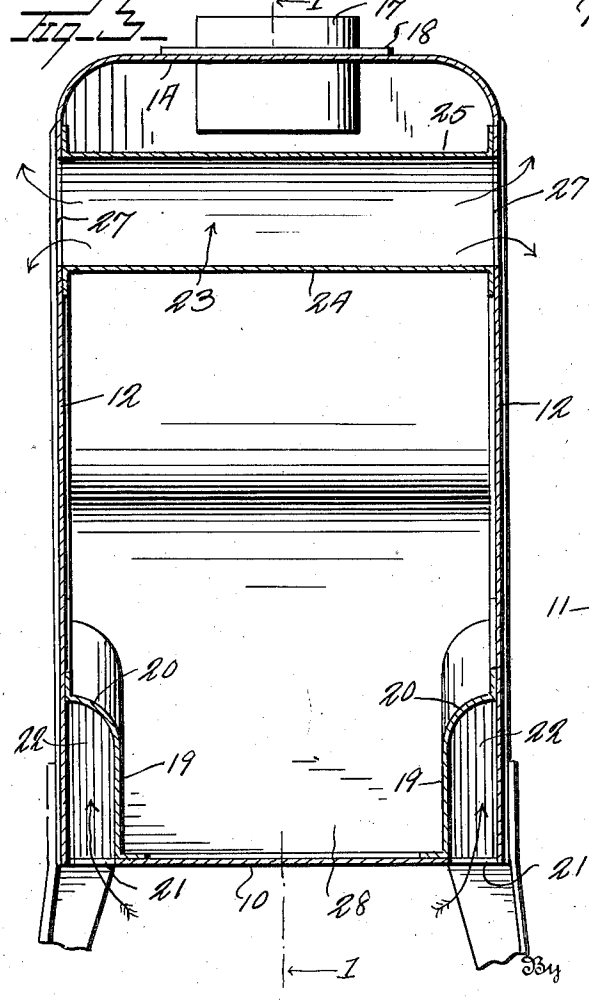


Fig. 5

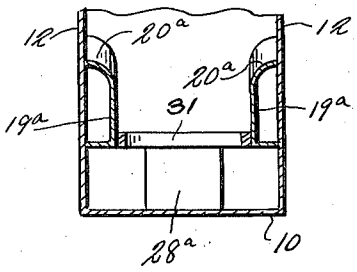
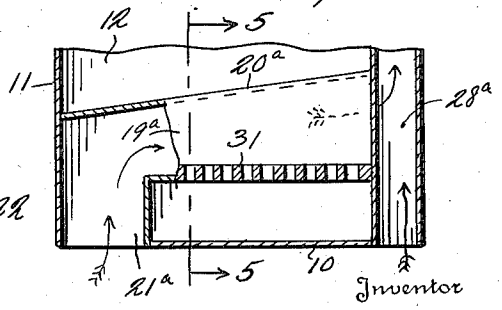


Fig. 4



Inventor

W. D. Merrill

By Watson E. Coleman

Attorney

Patented Oct. 20, 1936 2,058,094

UNITED STATES PATENT OFFICE

2,058,094

HEATING STOVE

William D. Merrill, Everett, Wash.

Application February 25, 1936, Serial No. 65,719

5 Claims. (Cl. 126—61)

This invention relates to heating stoves and particularly to that class of stoves in which an air duct is provided extending through the body of the stove and having an inlet opening and one or more outlet openings whereby the air of the room may be circulated through the stove and absorb heat therefrom and then discharged into the room.

The general object of the present invention is to provide a stove in which an air chamber is provided which extends upward and toward the front of the stove above the fire space and which discharges at its upper end through the lateral walls of the stove, the lower end of this air heating chamber being supplied with air from two air ducts disposed on each side of the fire space, open at their forward ends and extending rearward and discharging into the rear lower portion of the air chamber.

A further object is to so construct the air chamber as to cause the heat given off by the fuel to be directed upward and then rearward in a circuitous course and to provide means for retarding the movement of the heated products of combustion up through the stack so as to permit heat radiation from these products of combustion of heat which has not been absorbed by the air in the air chamber and air ducts.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a vertical sectional view of my improved stove on the line 1—1 of Figure 3;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a fragmentary vertical section of the lower portion of a grated stove with the wall of the air conduit broken away;

Figure 5 is a section on the line 5—5 of Figure 4.

Referring to these drawings, it will be seen that the stove comprises a more or less rectangular shell, though I do not wish to be limited to the exact shape of this outer shell, this shell providing a bottom wall 10, a front wall 11, two side walls 12, a rear wall 13, and a top wall 14. For a wood stove, these walls may be made of thin sheet material. For a coal stove, the shell should be cast and the walls be of thicker material. The front wall above the bottom in Figure 1, is provided with a fuel door 15 of any suitable construction but shown as being a door hinged at the side edge. Below this fuel door the middle of the front is provided with an air inlet opening having a damper 16 of any suitable construction. This damper 16 may be constituted by a door which may be opened to remove ashes or it may be placed to admit air to the rear of the combustion chamber according to the fuel used. At the rear portion of the top sheet 14 of the stove, there is provided a flue thimble 17 which preferably extends down into the stove, as shown in full lines in Figure 1, and of course extends above the top of the stove so that the flue may be connected thereto. This thimble may have a collar 18 riveted to the top sheet of the stove or may be formed in any suitable manner. I do not wish to be limited to the positioning of this flue opening in the top of the stove as it might be disposed at the upper end of the rear wall of the stove.

Extending upward from the bottom wall 10 adjacent the side walls 12 but spaced therefrom are the air duct walls 19. These walls extend down to the bottom sheet 10 and at their upper ends the walls are deflected outward and upward at 20 and riveted or otherwise attached to the side walls. The wall 20 of each air duct wall 19 extends upward and rearward, as shown in Figure 1, and the wall 19 terminates short of the rear wall 13. The bottom plate 10 of the stove is formed at its forward end with inlet openings 21 whereby the air of the room may pass upward into the air ducts 22 formed between the walls 19 and the outer walls 12 of the stove. It will be seen that the space between these walls 19 constitutes either the fire space wherein fuel may be disposed as in wood stoves or may constitute the firepot if a grate is used above the floor 10 and below the opening of the door 15, as shown in Figure 5.

Disposed above the fire space is an air chamber designated 23 formed by a lower wall 24 and an upper wall 25, the wall 24 extending upward and rearward in a reverse curve to a point adjacent to but spaced from the front wall of the stove and then being curved around and merging into the wall 25, as at 26. The wall 25 extends rearward to a point beneath the flue thimble 17 and then is extended upward and rearward into abutting relation to the rear wall 13 of the stove. At the point of junction of the walls 24 and 25, there are disposed two openings 27 which discharge through the walls 12 to the air of the room. The wall 24 and the wall 25 extend entirely across the width of the stove, or in other words, from one side 12 to the other side 12 and

between the inner walls 19 of the air ducts, the wall 24 is carried downward at 28 to the bottom sheet 10 of the stove, and this bottom sheet is provided with an opening 29 permitting the inlet of air into the space between the partition 28 and the wall 13. Thus the air chamber 23 has three sources of air, namely, the two openings 21 in the forward end of the bottom 10 and the single opening 29 in the rear end of the bottom 10.

It will be seen that the fire chamber or space 30 is disposed immediately below the lower wall 24 of the air chamber 23 so that the air chamber receives directly the heat or heated products of combustion uprising from the fuel and that these heated products of combustion are directed upward and forward, as shown by the arrows in Figure 1, against the under face of the wall 24 and then upward between the portion 26 of the air chamber wall and the front plate of the stove. Then these products are directed rearward over the upper wall 25 of the air chamber 23 and so out through the flue thimble 17. Because of the fact that the flue thimble 17 is extended downward into the stove, the outflow of the heated products of combustion is retarded and these products are forced downward into more intimate contact with the upper wall 25 than otherwise would be the case. Inasmuch as this upper wall 25 curves upward and rearward, the flow of the products of combustion will very closely approximate the contour of this wall 25 so that the air within the air chamber 23 will be directly heated along the entire circuitous course taken by the products of combustion. The air entering the openings 21 and passing along the air ducts 22 will likewise be heated by the heat radiated from the fire against the lining walls 19 and 20. By making the upper walls 20 of the air duct downwardly inclined or downwardly and inwardly curved, the lodgement of ashes or fuel upon these upper walls will be prevented to a large extent.

The stove is illustrated as being mounted upon legs as usual, thus permitting the free entrance of air through the openings 21 and 29 into the interior of the air chamber. This stove embodies two methods of securing heat from the fuel, namely, by circuitous circulation of the currents of heated air or combustion products which are prevented from passing outward in a direct line to the flue but are retarded by the circuitous course they are obliged to take and by the lowered stack opening. Second, this permits the heat to be radiated from the side, front and rear walls of the stove as well as it permits the heat to be absorbed by the cool air passing through the air ducts 22 and through the chamber 23. Because of the peculiar shape of the lower wall of the air flue, the heat currents are deflected forward and upward against the whole lower face of the wall 24, exposing this whole lower wall of the air chamber 23 to the most direct and most intense heat. Because of the fact that the lower wall of the air chamber is in line with the most intense heat in the combustion chamber and because of the fact that the lower end of the air chamber is open and communicates with air ducts which open through the bottom of the stove, the circulation starts from a point as near the floor as is consistent with operations.

The walls 24, 25 and 26 of the air chamber 23 may be made of thin sheet metal or of heavier material and the same is true of the walls 19 and 20. The walls of the air chamber are spaced from each other according to the heating capacity of the unit and fill the combustion chamber horizontally to the amount of space equal to the distance between the lower and upper wall of the heating chamber and extending from a point in front of the rear air intakes to the upper end of the discharge ports or openings 27 in the shell of the stove. This stove may be used for coal, gas, oil, briquettes or for electrical heating by the installation of the necessary grates, burners or electrical heating unit and can be used either as a stove or hot air furnace, heating pipes being carried in this instance from the ports or openings 27. In actual practice, this stove has been found to provide a maximum of heat with a relatively small amount of fuel and secures more radiation than other stoves constructed along the same line.

In Figures 4 and 5, I have illustrated how the principle of my construction, as shown in Figures 1 to 3 may be applied to a coal stove or a stove having a grate. In this form of my invention, the air ducts defined by the walls 19a and 20a are disposed with the floors of these air ducts on a level with the grate 31. At the forward ends the ducts extend downward and open through the stove bottom 10 at 21a. The space below the grate, of course, constitutes the ash pit and at the rear a vertical duct 28a opens into the air chamber 23 (not shown) in Figures 4 and 5, this vertical duct being open at its lower end, as shown in Figure 4.

The walls of the air ducts are to be made of no heavier metal and of the same material as the wall 24, because the flow of air through these air ducts eliminates the necessity of the heavy refractory linings used in ordinary stove construction. The continuous flow of cold air through the ducts absorbs the heat that radiates through the wall 24 and through the walls 19 or 19a. The higher the temperature in the fire box, the faster the air current flows through the ducts and through the air chamber and the temperature of the air rises as it flows towards the discharge ports 27.

It will be necessary at all times, regardless of the fuel used, that these walls 19, 19a, 24 and 25 be arranged to present the greatest surface to the heat generated within the fire box in order to get the maximum of air flow.

I have before stated that this stove might be used with oil heaters or with electrical heaters. In this case, the burners or heating elements will be so placed as to apply the maximum of heat generated to the side faces of the walls 19 and the air chamber 23 at points as near as possible to the openings 29 and 21 through the stove bottom.

The cross sectional area of the air chamber 23 determines the flow of air and should be, of course, graduated according to the designed cubic air flow of a stove to meet the requirements of the space to be heated. Therefore, it is obvious that the area of the air chamber 23 must be co-ordinated with the size of the openings 21, air ducts 22, opening 29 and discharge ports 27.

As before remarked, I do not wish to be limited to the exact form of the stove nor to the details of construction except as they are called for in the appended claims.

What is claimed is:—

1. A stove including an outer shell constituting front, rear, side, top and bottom walls, a partition extending transversely across the interior of the shell from one side wall to the other side wall and extending from a point adjacent

to but spaced from the rear wall upward and forward to a point spaced from the front wall and then extending rearward to the rear wall, said partition defining an upwardly and forwardly directed air heating chamber, the forward upper end of the chamber having outlet openings, lining walls extending parallel to and engaged with the side walls of the stove and defining air inlet ducts opening at their forward ends to the exterior of the shell and at their rear ends discharging into the rear end of said air heating chamber, the front wall of the shell having a fuel door and below the fuel door having a draft inlet opening and damper, the upper rear portion of the shell having a flue opening.

2. A stove including an outer shell providing front, rear, side, top and bottom walls, a wall defining an air chamber extending upward and forward and extending entirely across the space between the side walls, the lower wall of the air chamber terminating short of the rear wall of the shell and extending downward to the bottom of the shell, means forming air passages extending rearward from the front of the shell and discharging into the rear end of the air chamber, the passages opening at their forward ends to the exterior of the shell, the top wall of the shell having a flue thimble extending downward into the shell, the front wall of the shell having a flue door, and a draft damper below the flue door.

3. A stove including an outer shell providing front, rear, side, top and bottom walls, a partition extending upward from the bottom wall adjacent the rear wall, then extending upward and forward to a point adjacent the upper portion of the front wall of the shell, then extending rearward and then upward and rearward to the rear wall of the shell, the top wall of the shell immediately above said upward and rearward portion of the partition being provided with a flue opening defined by a downwardly depending thimble, the said partition defining an air chamber extending the full width of the shell and being attached to the side walls thereof, the shell having openings into the interior of the air chamber at the forward end thereof, lining walls extending upward from the bottom wall of the shell and then inward to the side walls thereof and extending rearward from the front end of the shell to the lower end of said partition, the lining walls defining air ducts discharging into the lower end of said air chamber, the bottom wall of the shell at its forward end being provided with air inlet openings discharging into the forward ends of the air ducts, the rear end of the bottom wall of the shell at its middle between the said air ducts having an air opening discharging into the lower portion of the air chamber, the front of the shell having a fuel door and a draft damper below the fuel door.

4. A stove including an outer shell constituting front, rear, side, top and bottom walls, a wall defining an air chamber, the wall extending transversely across the interior of the shell from one side wall to the other side wall and extending from a point adjacent to but spaced from the rear wall upward and forward to a point spaced from the front wall and then extending rearward to the rear wall of the shell, the forward upper end of the air chamber having outlet openings discharging through the shell, means forming air ducts extending parallel to the side walls of the stove, opening at their forward ends to the exterior of the shell and at their rear ends discharging into the rear end of the air heating chamber, the walls of said air ducts being disposed level with the fire chamber of the stove.

5. A stove including an outer shell constituting front, rear, side, top and bottom walls, a wall defining an air chamber extending transversely across the interior of the shell from one side wall to the other side wall and extending from a point adjacent to but spaced from the rear wall upward and forward to a point spaced from the front wall and then extending rearward to the rear wall of the shell, the forward upper end of the air chamber having outlet openings discharging through the shell, a grate disposed within the stove above the bottom thereof, and means forming air ducts on each side of the grate, the lower walls of the ducts being on the same level as the grate, the forward ends of the air ducts opening to the exterior of the shell, the rear ends of the air ducts discharging into the rear end of the air heating chamber.

WILLIAM D. MERRILL.