Oct. 26, 1943. R. MARTIN 2,332,736

OIL BURNING HEATING UNIT

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Fig. 1.

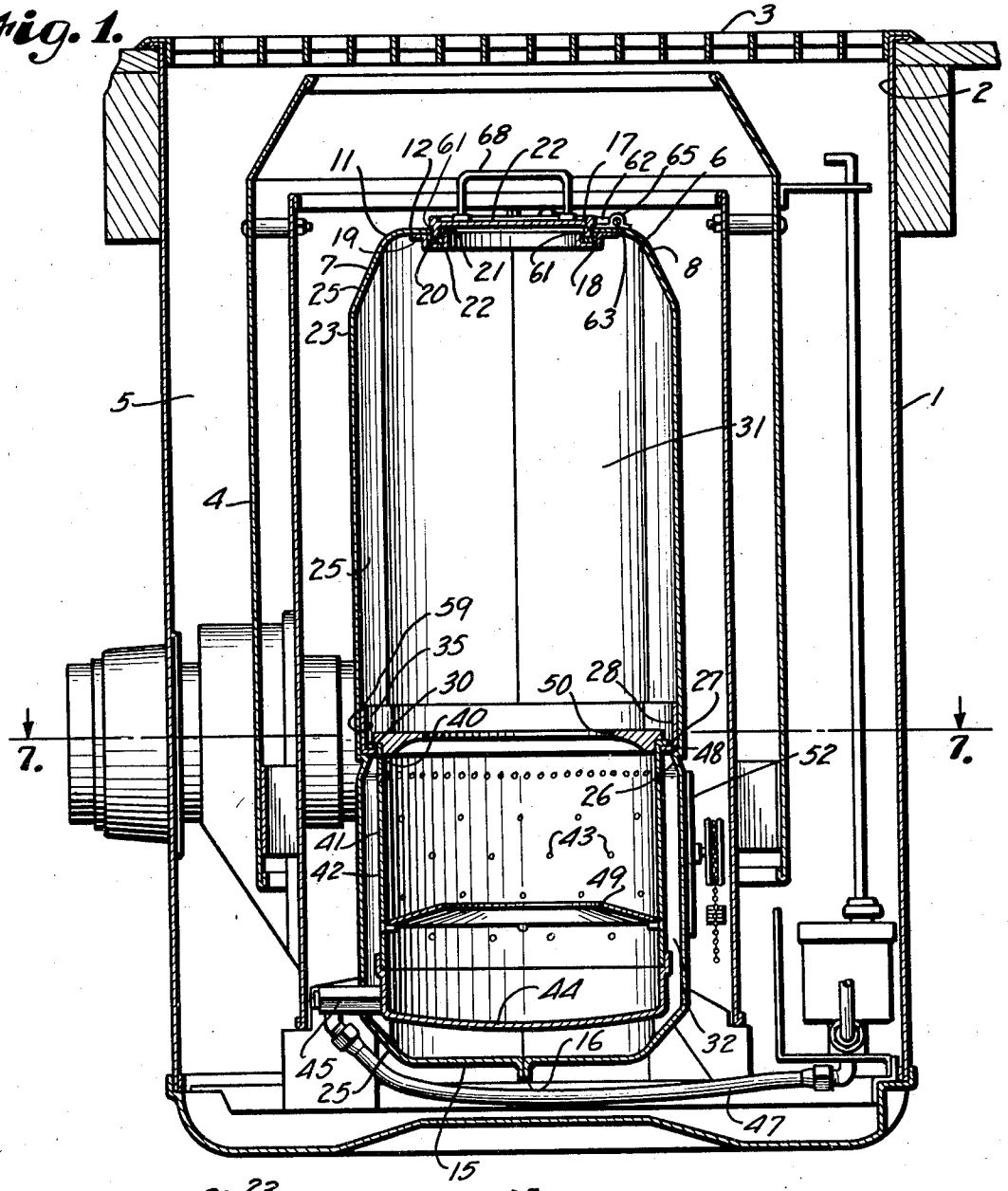
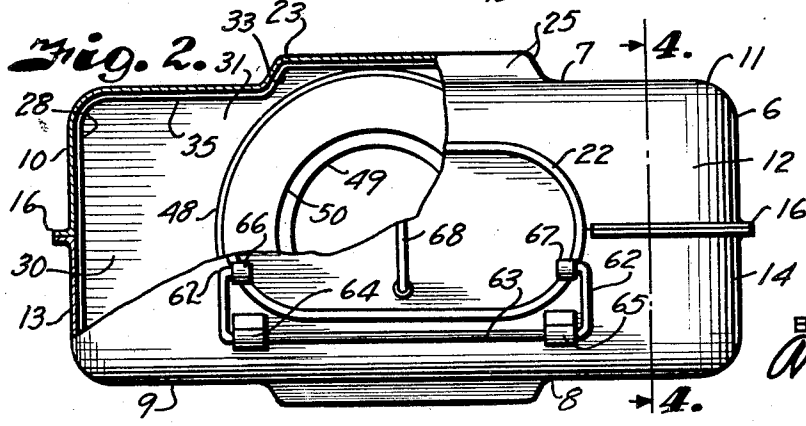



Fig. 2.




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Fig. 3.

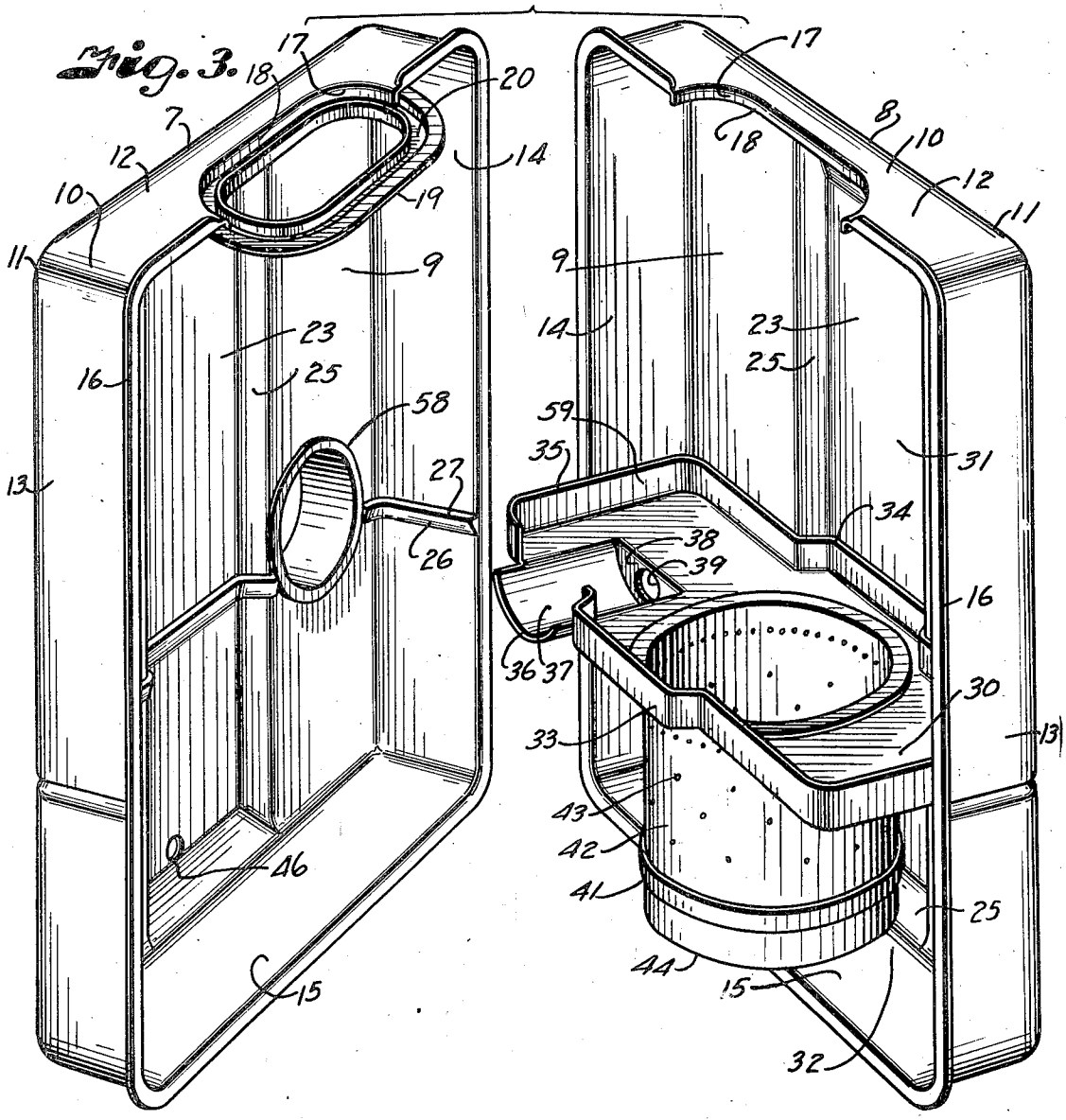



Fig. 4.

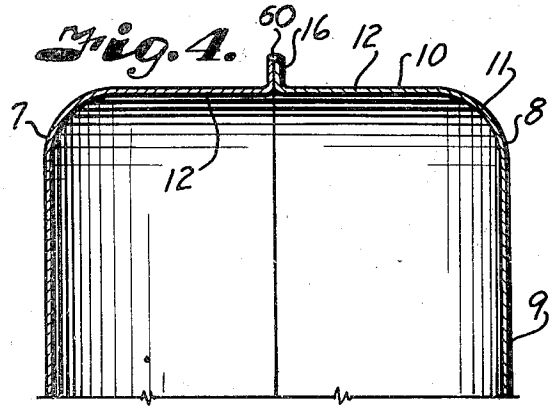
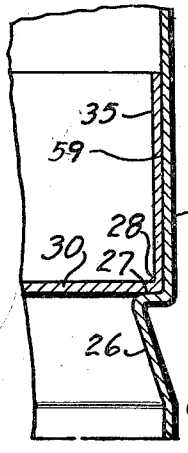



Fig. 5.




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Fig. 6.

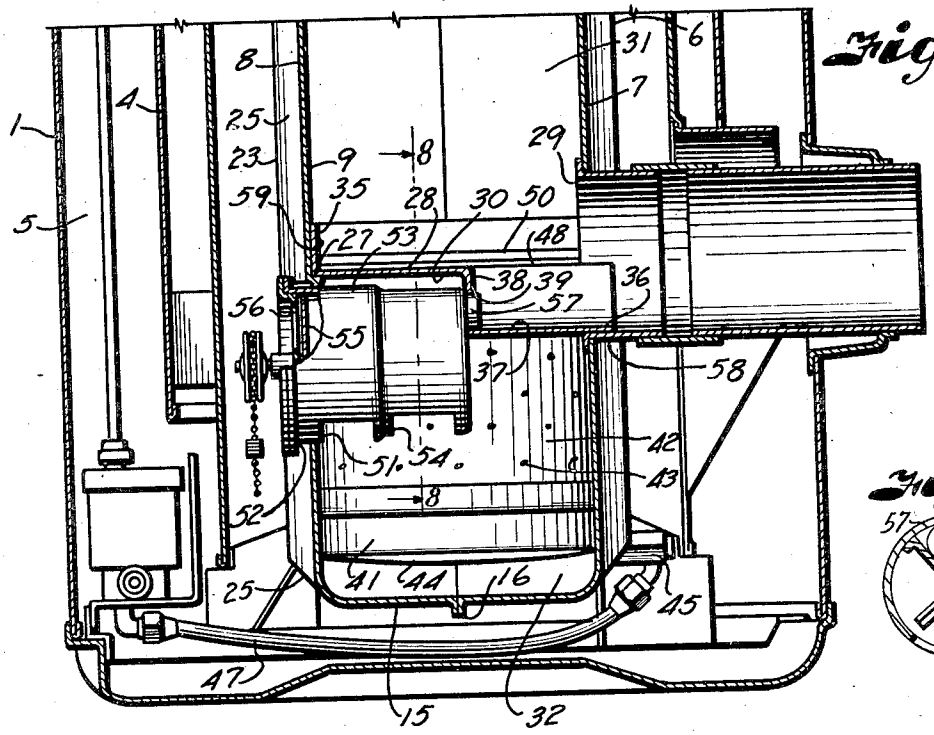



Fig. 8.

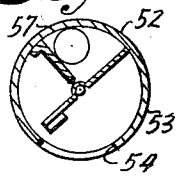
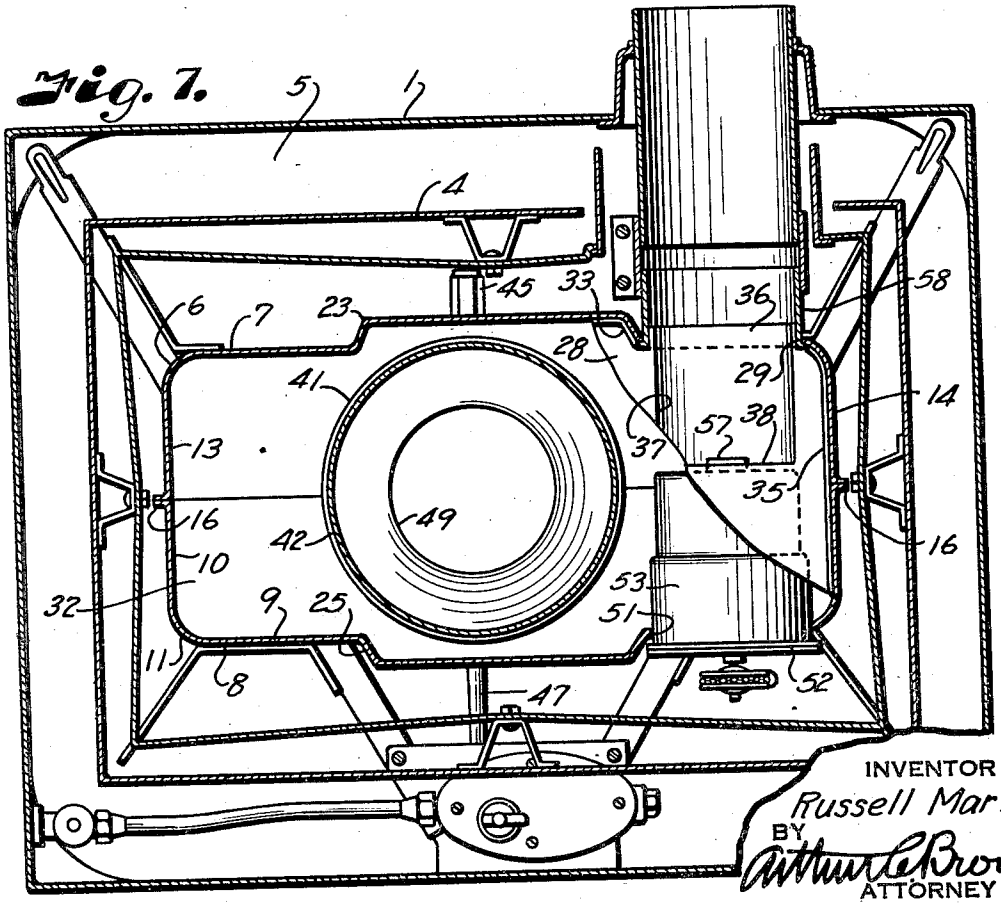



Fig. 7.




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Patented Oct. 26, 1943 2,332,736

# UNITED STATES PATENT OFFICE

2,332,736

## OIL BURNING HEATING UNIT

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Application September 2, 1941, Serial No. 409,223

11 Claims. (Cl. 126—116)

This invention relates to air circulating type heating units, particularly those burning fluid fuels, and has for its principal objects to provide a unitary structure of low production cost and having a relatively small cross-sectional area to conserve air circulating space and having a relatively large heat transferring surface for securing high efficiency; to provide a simplified heating unit consisting of two drawn metal shells which, when assembled with a partition member, provide two separate chambers, one for combustion and the other of ample size and shape to contain a conventional round pot-type burner and an air intake governor of the type which controls, by differential pressures in the respective chambers, the flow of combustion supporting air to the burner chamber; and to provide a structure which facilitates making an inexpensive connection from the low pressure side of the air governor to the combustion chamber.

Other objects of the invention are to provide a combustion chamber of such construction and shape as to reduce expansion and contraction noises; and to provide a combustion chamber with a service door which is conveniently opened and closed in the limited space provided between the top of the combustion chamber and the top of the enclosing casing.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a vertical section through a floor furnace equipped with a heating unit embodying the features of the present invention.

Fig. 2 is a plan view of the heating unit showing a part of the top broken away to show the interior.

Fig. 3 is a perspective view of the parts composing the heating unit structure showing the metal shells in spaced relation and ready to be assembled.

Fig. 4 is a fragmentary section through a portion of the combustion chamber unit on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary section showing the formed ledge for supporting the partition which carries the burner and forms the bottom of the combustion chamber and the top of the burner chamber.

Fig. 6 is a vertical section through the lower portion of the heating unit, particularly illustrating the air governor.

Fig. 7 is a horizontal section taken through the lower portion of the heating unit on the line 7—7 of Fig. 1.

Fig. 8 is a cross-section through the air intake governor on the line 8—8 of Fig. 6.

Referring more in detail to the drawings:

While a heating unit constructed in accordance with the present invention is adaptable to various types of heating devices, I have illustrated and described it in connection with a floor furnace including an outer casing 1 adapted for suspension through a floor opening 2 and having its top covered by a grill 3. Supported in the outer casing is an inner casing 4 cooperating with vertical walls of the outer casing to form downdraft passageways 5 wherethrough air moves downwardly from the marginal portions of the grill and upwardly around the heater or combustion chamber unit 6 which is supported within the inner casing as shown in Fig. 1. The air, upon travelling upwardly along the sides of the heating unit, is heated and discharged into the room through the central portion of the grill as in conventional floor furnace construction.

With the exception of the heating unit 6, the above structure forms no part of the present invention but is illustrated for the purpose of showing an adaptation of my improved unit, it being understood that the unit is as readily adapted to radiant and circulating heaters and other heating devices.

The heating unit is designed for simplicity and economy of manufacture and therefore includes a minimum of parts which are particularly adapted to be constructed of sheet metal plates pressed into the desired shape. The unit includes a shell-like body composed of a pair of half shells 7 and 8, as shown in Fig. 3, of similar construction and preferably formed by the same dies. Each half shell is of pan-like shape and of substantially rectangular construction having a wall provided with an integrally formed laterally extending perimetrical flange 10 of a width to form one-half the fore and aft depth of the heating unit. The junctures of the flange 10 are formed on smoothly rounding curves 11, as shown in Fig. 4. The flange 10 constitutes a top portion 12, sides 13 and 14 and a bottom 15, which in turn are provided with an outwardly extending rim-like flange 16 whereby the respective half shells are connected together as later described. The top portion 12 of each half shell is provided with an elongated, notch-like opening 17 defined by an inwardly extending flange 18 which cooperates with a door frame 19 to form an upwardly opening channel-like groove

20 to receive a gasket 21 against which a door 22 seats, as later described.

In order that the body of the heating unit may be relatively narrow in one direction to conserve air circulating space and at the same time accommodate a fire-pot of sufficiently large diameter, the walls 9 are each provided with a central offset 23 projecting outwardly and extending from the top of the combustion chamber to a point near the bottom of the burner chamber. The ends of the offset are closed by inclined portions 25 merging into the top and bottom flange portions 12 and 15 respectively, as clearly shown in Fig. 1.

Extending transversely of the wall 9, and across the side portions 13 and 14 is a rib 26 constituting a ledge 27 for locating a partition member 28, later described. The rib is interrupted between one side of the offset 23 and the adjacent side flange, for example 14, to leave space for the formation of a flue opening 29, part of which is located below the ledge 27 for a purpose later described. The partition member 28 is also formed as a stamping of pan-like shape having a bottom 30 shaped in conformity with the horizontal cross-section of the assembled half shells to divide them into an upper combustion chamber proper 31 and a lower burner chamber 32. The partition therefore is provided with offsets 33 and 34 adapted to fit within the offsets 23 as shown in Fig. 3. The partition member includes an upwardly extending marginal flange 35, cut away adjacent the flue opening. Aligning with the flue opening is a trough member having a lip 36 of arcuate cross-section and which is adapted to project through the lower portion of the flue opening 29 when the partition member is seated upon the ledge 27. The trough member also provides a depressed portion 37 in the combustion chamber bottom 30, the end of which, opposite the lip, is closed by a wall portion 38, having an opening 39 therethrough for a purpose later described. The bottom 30 of the partition member is provided approximately in the center thereof with a circular opening 40 of a size to accommodate a burner or fire-pot 41, best shown in Figs. 1, 2 and 6. It is obvious that great economy in production is thus provided as only two main forming dies are required to produce with low cost the three parts, which can be assembled with a minimum of labor cost into a unitary structure including the spacious combustion chamber and a burner chamber of ample size to accommodate a burner of the pot-type illustrated and also a suitable air intake governor, later described.

The pot 41 includes a cylindrical body 42, having a plurality of air inlet openings 43 whereby air is admitted from the burner chamber 32 to support combustion of the fuel admitted into a concaved bottom 44 of the burner pot by way of a fitting 45 extending through a suitable opening 46 in the stamping 7 and having connection with a supply pipe 47, Fig. 1. The upper rim of the burner pot has a laterally extending annular flange 48 which seats upon the partition member 28. The burner pot further includes a low flame ring 49 suitably supported by the wall of the pot and an upper high fire ring 50 that is seated upon the flange 48.

Formed in the flange portion of the wall 9 for the stamping 8 is an opening 51 located in lateral alignment with the depressed portion 37 of the partition member to accommodate an air intake governor 52 which is illustrated and described in detail in my copending application Serial No. 407,156, filed August 16, 1941. Briefly, the governor includes a cylindrical body 53 snugly engaged with the opening 51 and having slot-like openings 54 wherethrough air is admitted into the burner chamber responsive to pressure differential between the burner chamber 32 and the pressure in the combustion chamber 31, the air intake governor having an actuating vane 55' subject to this pressure differential by connection through a neck 57 projecting through the opening 39, previously referred to and through slots 54. The actuating vane 55' effects throttling of the opening 56 by controlling a damper 55.

In assembling the combustion chamber unit, a flue outlet collar 58 is spot welded in the flue opening 29 of the half shell 7. The door frame 19 is then spot welded to the flange portion 18 of the half shell 7. The burner pot assembly is then passed through the opening 40 and the flange thereof spot welded to the partition member 28. The trough member having the lip 36 is spot welded to the partition member. The partition member 28 is then inserted within the half shell 8 so that it seats upon the ledge 27 thereof and is spot welded in position as indicated at 59, Fig. 5. The half shells 7 and 8 are then placed together with the flanges thereof in abutting relation, after which the flanges are interconnected preferably by spot or seam welding as indicated at 60. The door frame is then fastened to the half shell 8 by use of a portable clamp type resistance welder, one arm being positioned inside the combustion chamber and the other on the outside, the door opening being shaped to accommodate this type of equipment. The remaining unwelded half of the partition member flange is then welded to the contacting portions of the half shell 7. This is effected by telescoping the combustion chamber over one arm of a conventional spot welder, the arm extending through the door opening 17. The air intake governor 52 may then be inserted through the opening 51 with the neck 57 thereof extending through the opening 39 and suitably secured in position. The door 22 is hinged over the opening 17. The door and hinging thereof also form a part of the present invention, as now to be described.

The door is of a shape to cover the door opening and has a perimetrical flange 61. In order to hinge the door so that it may be moved to and from covering relation with the opening without exposing the under side thereof and to permit opening of the door in the space available under the grill 3, the door is trunnioned on terminal ends of arms 62 extending laterally from the ends of a hinge rod 63 oscillatably mounted in ears 64 and 65 attached to the top of the combustion chamber in laterally offset relation with the door opening, the terminal ends being trunnioned in lugs 66 and 67 on the door. To facilitate opening of the door, it is provided with a handle 68 extending across the top thereof. With this construction it is obvious that the door is readily opened by lifting on the handle 68 to raise the door from the opening with the arms 62 pivoting within the ears 64 and 65 and the door trunnioning upon the terminals. The door is thus swung retractively while being maintained parallel to the plane of the top of the combustion chamber. With this construction the door is opened within the limited vertical space and the

outer side of the door always faces upwardly and the inner or lower portion of the door remains face downwardly, eliminating the usual exposure of a sooty surface. This construction also permits the hinged door to swing completely away from the opening for cleaning purposes.

From the foregoing it is obvious that I have provided a heating unit which is capable of being manufactured at a minimum cost and wherein the parts are readily assembled and secured together, further reducing cost of construction. It is obvious that the offsets formed in the relatively large front and rear walls of the combustion chamber provide the required space for the burner with a minimum cross-sectional area of the chambers, thereby conserving the required space for warm air circulation exteriorly of the chambers and sufficient curves are provided to take care of expansion and contraction, and prevent booming noises incidental to springing of the chamber sides in and out of their normal planes.

It is obvious that the partition member cooperates to form a burner chamber which encloses both the burner pot and air intake governor. The pressure therein with respect to the pressure in the combustion chamber is maintained at the desired differential to cause combustion supporting air to flow through the fire-pot in desired quantity to maintain efficient combustion of the fuel as set forth in copending application previously referred to.

What I claim and desire to secure by Letters Patent is:

1. A heating unit including, a shell, a partition member located intermediate the height thereof and dividing said shell into an upper combustion chamber and a lower burner chamber, a burner in the burner chamber and supported by said partition, and an air intake governor supported in the burner chamber having connections with both chambers and subject to variation of pressure differential of the chambers through said connections for controlling admission of air to the burner chamber when the heating unit is in operation.

2. A heating unit including, mating sections to form a shell having ledge portions formed intermediate the length thereof, a partition member located on said ledge portions and dividing said shell into an upper combustion chamber and a lower burner chamber, a burner in the burner chamber and attached to said partition, and an air intake governor communicating with the burner chamber and the combustion chamber and subject to pressures therein for controlling admission of air to the burner chamber.

3. A heating unit including, a shell, a partition dividing the shell into a combustion chamber and a burner chamber, said partition having a recessed portion extending into the burner chamber and provided with an opening therethrough, a burner supported in the burner chamber, and an air intake governor supported in the burner chamber and having a connection with the combustion chamber through the opening in the recessed portion and provided with an air inlet from outside the burner chamber and an air outlet into the burner chamber.

4. A heating unit including, mating sections to form a shell, a partition member supported by said sections and dividing the shell into an upper combustion chamber and a lower burner chamber, a burner in the burner chamber and communicating with the combustion chamber through said partition, and an air intake governor supported in the burner chamber and having connection with the combustion and burner chambers for controlling admission of air to the burner chamber.

5. A heating unit including a shell, a partition dividing the shell into a combustion chamber and a burner chamber, said partition having a recess formed by an offset of said partition into the burner chamber and provided with an opening in said offset, a burner supported in the burner chamber, and an air intake governor seated in said recess of the burner chamber and having a neck-like connection extending through said opening to connect with the combustion chamber, said air intake governor being provided with an outside air inlet and an air outlet supplying air to the burner chamber.

6. A heating unit including, mating sections of pan-like shape and having interconnected flange portions to form an enclosed shell, said pan-like sections having enlarged central portions to accommodate a burner pot of substantially large diameter, a partition supported in the shell and having offsets extending into the enlarged portions of the pan-like sections to divide the shell into an upper combustion chamber and a lower burner chamber, one of said pan-like sections having an opening extending through a side wall thereof, and an air intake governor supported in said opening and extending into the burner chamber and having connection with the combustion chamber.

7. A heating unit including, a shell, a partition within said shell dividing the shell into a combustion chamber and a burner chamber, a burner pot carried by the partition, an air intake governor connected with the burner chamber for admitting air to the burner chamber, and a connection between the combustion chamber and the governor to subject the governor to combustion chamber pressure when the heating unit is in operation.

8. A heating unit including, symmetrical pan-like mating sections arranged vertically and having outwardly projecting portions intermediate the width of said sections and extending vertically thereof to accommodate a liquid fuel burner pot within said sections, and a partition for supporting the burner pot and having portions extending into said projecting portions to close the burner chamber from the combustion chamber, said pan-like sections being secured together around marginal edges thereof.

9. A heating unit including, symmetrical pan-like mating sections, each having a wall portion and an integrally formed laterally extending perimetrical flange terminating in an outwardly extending rim-like flange, said sections being arranged with said rim-like flanges in abutting contact and welded together along the edges of said rim-like flanges, a partition conforming to the cross-sectional shape of the connected sections and having a marginal flange secured to said sections for dividing the interior of the sections into a combustion chamber and a burner chamber, and a burner pot supported by the partition and suspended within the burner chamber.

10. A heating unit including, symmetrical pan-like mating sections, each having a wall portion and an integrally formed laterally extending perimetrical flange terminating in an outwardly extending rim-like flange, said sections being arranged with said rim-like flanges in abutting contact and welded together along the edges of said rim-like flanges, a partition conforming to

the cross-sectional shape of the connected sections and having a marginal flange secured to said sections for dividing the interior of the sections into a combustion chamber and a burner chamber, and a burner pot supported by the partition and suspended within the burner chamber, said sections having an instruck ledge for facilitating location of the partition upon assembly of said sections.

11. A heating unit including, symmetrical pan-like mating sections, each having a wall portion and an integrally formed laterally extending perimetrical flange terminating in an outwardly extending rim-like flange, said sections being arranged with said rim-like flanges in abutting contact and welded together along the edges of said rim-like flanges, a partition conforming to the cross-sectional shape of the connected sections and having a marginal flange secured to said sections for dividing the interior of the sections into a combustion chamber and a burner chamber, a burner pot supported by the partition and suspended within the burner chamber, the top lateral flange portions of said sections having flanges extending from edges thereof, and a grooved frame receiving said flanged edges for forming a framed opening in the assembled sections, said flanged edges being welded to the groove of said frame.

RUSSELL MARTIN.