Jan. 20, 1931. W. T. RASCH 1,789,597

GAS RADIATOR

Filed Aug. 2, 1929 2 Sheets-Sheet 1

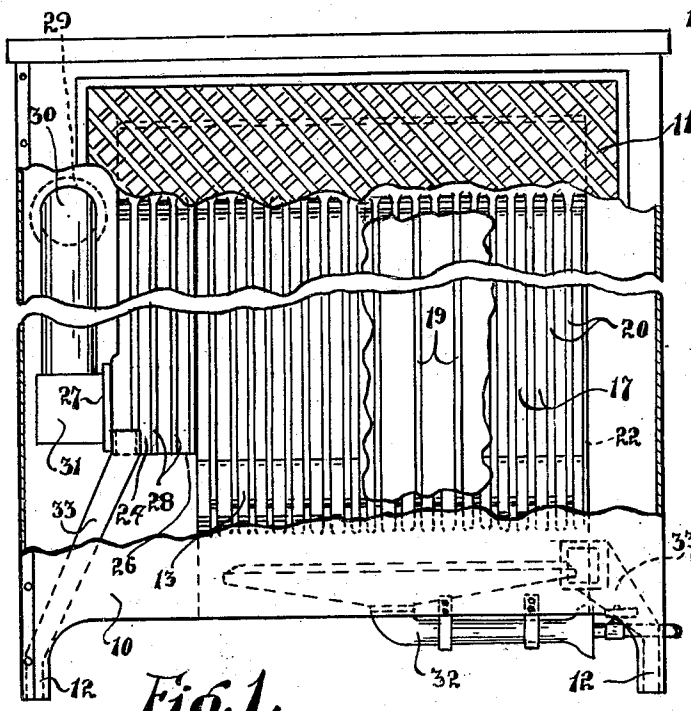


Fig. 1.

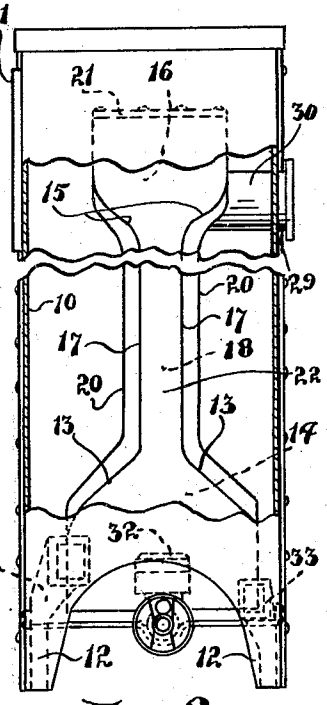


Fig. 2.

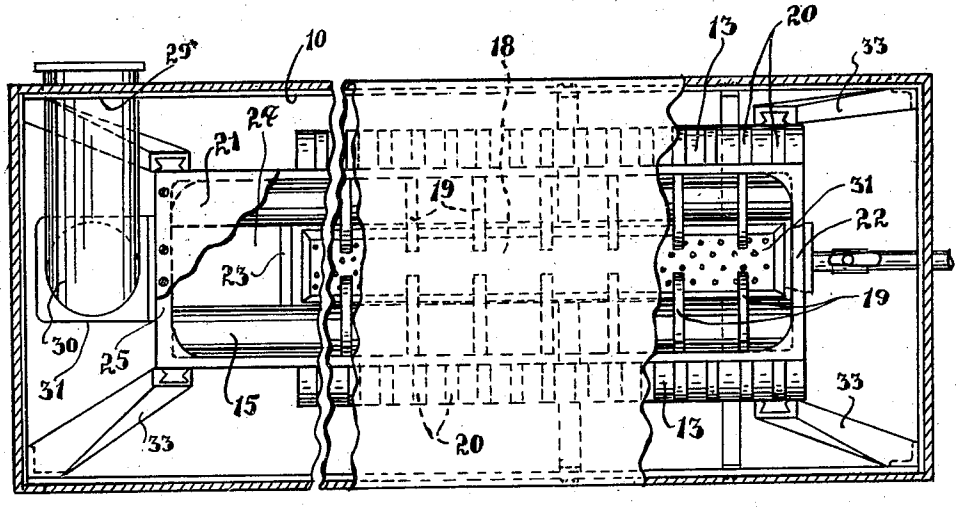


Fig. 3.

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INVENTOR

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Fig. 4.

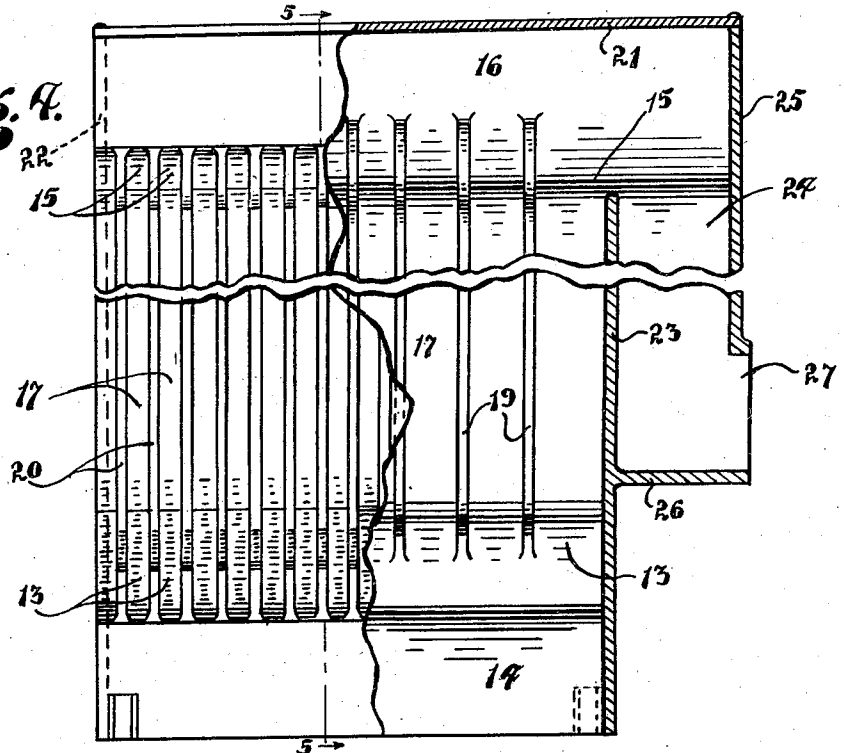
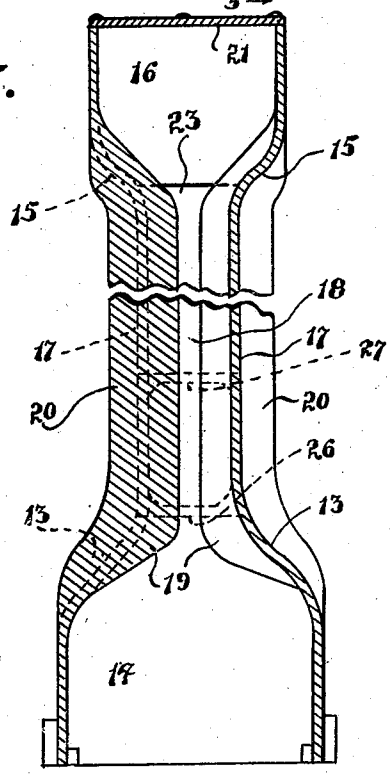


Fig. 5.



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Patented Jan. 20, 1931 1,789,597

UNITED STATES PATENT OFFICE

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GAS RADIATOR

Application filed August 2, 1929. Serial No. 382,955.

My invention relates to gas radiators, and more particularly to a radiator for use in residences for heating purposes.

Gas radiators of the type to which my invention relates have been extensively used for heating purposes, particularly in apartments, and in such radiators, the heat for distribution is produced solely by a gas burner located within a metallic housing by means of which a desired radiation of the heat is secured.

The housing of such radiators ordinarily consisted of a plurality of vertical, looped sections, each having combustion chamber forming means adjacent the bottom thereof. The various loops were connected by tie rods so as to form a continuous combustion chamber, and each of the loops was provided with vent openings toward the top thereof so as to ensure a circulation of heated air throughout each of the loops upwardly from the combustion chamber, which latter also had openings toward the bottom thereof for the admission of air.

Such gas radiators were ordinarily made of sheet metal of a plurality of connected units, and in appearance closely resembled the ordinary radiator used in steam heating systems.

It is well known that in all loop radiators there is an upward circulation of air about the loops of the radiator, which in time will deface a wall closely adjacent and above the radiator, and even the ceiling immediately above the radiator, this condition apparently being due to the presence in the heated air being circulated of minute particles of dust and dirt accumulated about and upon the radiator.

To correct this difficulty it has, of recent years, been the practice to provide a decorative top for radiators of various kinds to check this upward current of air with the suspended particles of dirt and dust therein.

With the above conditions in mind, I have provided a gas radiator in which the products of combustion and the air to support combustion will be confined within an element so constructed as to ensure the accumulation and distribution of a high percentage of the heat units developed by the flame from the gas burner while avoiding the escape of the products of combustion into a room being heated by the radiator. This element is enclosed within and supported from a housing so constructed as to prevent a direct convection circulation of air heated by said element, such heated air being directed in a general horizontal direction when passing from the casing, thus securing a more effective distribution of the heat.

The air for heating a room is circulated through the housing inclosing the heating element, being heated as a result of radiation from said element and containing none of the products of combustion which are all confined within said element.

In order to permit the effective and economical consumption of gas, the heating element is so constructed as to present heat absorptive members having large surface areas both in the path of the circulating products of combustion, and exteriorly of such element. Furthermore, the interior formation of the element is such as to ensure a combustion chamber adjacent the gas burner, a constricted passageway above said burner having inwardly directed therein heat absorbing members extending lengthwise of said constricted passage, and an expansion chamber above this passage for the purpose of retarding to a limited extent, the speed of flow of the products of combustion and hot air prior to their delivery to a flue compartment through which they are conducted from the element to an ordinary chimney flue or other means of egress of the gas from the room being heated. In this manner, the heat generated by the gas burner is caused to intimately contact with a considerable area of the heat absorbing members for a time sufficient to secure a transfer of a high percentage of the heat units to such members, which heat by conduction will pass to the exterior of the element and be radiated into the space within the housing, and thus set up a convection circulation of air through this housing.

By means of a radiator embodying the invention, I secure a highly effective indirect

heating of the air for use in heating a room, which air is free from products of combustion and unconsumed gas resulting from the use of a gas burner.

The invention consists primarily in a gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing members projecting from the inner walls of said passageway, radiating members projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a front elevation vertically condensed with portions of the outer housing and of the heat distributing element broken away;

Fig. 2 is a side view thereof with the housing broken away;

Fig. 3 is a plan view upon a larger scale with the top of the housing broken away and the top of the heat distributing element also broken away;

Fig. 4 is a condensed view of the heat distributing element shown partly in section; and

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

Like numerals refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawings, I employ an outer housing 10 open at the bottom and having a closed top. The front wall of this housing, particularly the upper portion, is provided with open grill work as at 11 to permit heated air to flow from the housing into a room. This housing preferably is made of sheet metal and provided with angular legs 12.

Positioned within the housing 10 is a heat distributing element, preferably consisting of a light casting, the walls of which are laterally extended toward the bottom of the element as at 13 to form within such extended portion, a combustion chamber 14, and towards the top thereof as at 15, to form an expansion chamber 16, the capacity of which is relatively lower than that of said combustion chamber 14, the portion of the wall 17 between the laterally extended bottom and top portions forming a constricted passageway 18. Interiorly of the walls 17 are vertically extending inwardly projecting heat absorbing ribs or fins 19, positioned in the path of the rising heated gases in their passage from the combustion chamber 14 to the expansion chamber 16. Said ribs or fins also act as baffles to more or less check a horizontal flow of such gases in their passage from said combustion chamber 14 to said expansion chamber 16. These ribs or fins preferably possess considerable bulk and are formed integrally with the walls 17 of the constricted portion of the element.

Exteriorly of the walls 17 of this constricted portion, and extending across the top of the combustion chamber 14 and the bottom of the expansion chamber 16, are radiating fins or ribs 20 which serve to conduct the heat from the walls of the element and from the ribs or fins 19 and distribute it throughout the housing 10. Preferably the exterior ribs or fins 20 are more numerous than the interior ribs or fins 19 in order to secure a rapid conduction and radiation of the heat, both from the fins 19 and from the material of the side walls of the element.

The expansion chamber 16 is closed by a top plate 21. One end wall 22 closes the combustion chamber 14, the expansion chamber and the constricted passageway 18. The other end wall 23, however, closes only the end of the combustion chamber 14 and the constricted passageway 18.

Beyond the end wall 23 and above the laterally extended portion 13, the element is provided with an extension 24, the upper portion of which conforms to and communicates with the expansion chamber 16, and the lower portion of which conforms to the constricted passageway 18. The top of this extension is closed by the top plate 21 and its end is closed by a wall 25. The bottom of the extension is closed by a wall 26 positioned above the combusion chamber 14. The end wall 25 is provided with a flue opening 27 positioned adjacent the bottom 26 of said extension.

Exteriorly of the extension are heat radiating ribs or fins 28.

The back of the housing 10 has an opening extending therethrough at 29 through which a flue pipe 30 extends, this flue pipe being connected with a box 31 which in turn communicates with the outlet opening 27 of the heat distributing element.

Supported in any desired manner within the combustion chamber 14 is a gas burner 32 of any desired construction, this burner being positioned below the passageway 18 so that the flame from the burner openings will be directed within the constricted passageway 18.

The heat distributing element is supported within the housing 10 by means of legs 33 connected therewith and extending into close juxtaposition to and within the corner legs of said housing. Said legs 33 may be

connected in any desired manner with the heat distributing element.

The operation of the herein described gas radiator is substantially as follows:—

The burner 32 being located in the combustion chamber 14, which latter is open at the bottom, there is not only an adequate supply of air to support combustion, but a circulation of heated air upwardly from the combustion chamber 14 through the constricted passageway 18 to the expansion chamber 16. The flame from the burner openings passes into the passageway 18, particularly if a long flame burner be used, and may or may not impinge upon the ribs or fins 19 which are positioned in the path of the circulating heated gases so as to absorb a fairly high percentage of the heat units present in such gases.

It will be noted that the ribs or fins 19 project well into the passageway 18 so as to limit the flow of the heated gases in large measure to a directly vertical path, for a reason which will more fully appear hereinafter.

The converging top walls of the laterally extended portion 13 of the heating element will direct the gases into the passageway 18, thus avoiding the pocketing of the gases in the combustion chamber.

By having the expansion chamber 16 of lower capacity than the combustion chamber 14, and limiting the capacity of the outlet flue, a too rapid circulation of the heated air and gases is avoided and a more complete absorption of the heat units therefrom by the walls of the heating element and the interior ribs or fins 19 is secured.

The exterior ribs or fins 20 serve merely to conduct heat from the walls 17 of the passageway 18, from the ribs or fins 19, from the top walls of the combustion chamber 14 and from the bottom walls of the expansion chamber 16, and to distribute such heat by radiation within the housing 10 about the heating element.

It will be noted that the number of external ribs or fins 20 is greater than the number of interior ribs or fins 19, which arrangement I prefer to use as it increases the radiating surfaces exteriorly of the heating element in a degree to make such radiating surfaces relatively greater than the heat absorptive surfaces, including the sides of the wall 17.

These exterior fins or ribs 20 also form a series of vertically extending ducts or channels through which the air entering the bottom of the housing 10 may readily flow to ensure the rapid removal of the heat radiated from the fins and from the wall of the heating element between such ribs or fins. The bottom of the expansion chamber 16 will tend to deflect such air outwardly toward the front and back walls of the housing 10, that air flowing between the heating element and the back of the housing passing over the top 21 of the heating element.

By the arrangement of the heating element described, there is a rapid conduction of heat from the ribs or fins 19 and the walls 17 of the constricted passageway, and a rapid radiation of such heat by reason of the arrangement and number of the external ribs or fins 20.

The heated gases, after passing into the expansion chamber 16, flow horizontally along this chamber into the upper portion of the extension 24, passing between the end walls 23 and 25 with a downward direction of flow until they pass through the flue opening 27 adjacent the bottom wall 26 of said extension. The downward course of these gases between the walls 23 and 25 will heat the side walls of this extension, which heat will be radiated by the fins or ribs 28 exteriorly of this extension. The heated gases flowing adjacent the wall 23 will also tend to minimize loss through radiation from this wall.

The arrangement of the interior ribs or fins 19 will tend to check an excessive horizontal component of flow of the gases passing through the constricted passageway 18 toward and over the end wall 23.

While a high percentage of heat units will have been extracted from the gases flowing from the combustion chamber 14 to the expansion chamber 16, it will be noted that the manner of controlling the flow of such gases after leaving the passageway 18 will assure a transfer of some of the heat from said gases to the top plate 21 and to the walls of the extension 24, thus securing added efficiency in the operation of the radiator.

As I have heretofore stated, there is a free circulation of air through the housing 10 and about the heating element, which air is rapidly heated as a result of the large surface areas presented exteriorly of the heating element. The air so heated flows horizontally, or in a general horizontal direction, through the upper portion of the housing. The top of said housing being closed will prevent the vertical circulation of air closely adjacent the wall near which the radiator is located.

The enlarged combustion chamber 14 of the heating element, the relatively smaller expansion chamber 16 and the constricted passageway 18 connecting these chambers will ensure at all times an adequate supply of air to support combustion, and the direction of heated air into the passageway 18 about the flame so as to promote combustion within this passageway. The gases flowing through this passageway will have an accelerated flow in small volume, but this rate of flow will immediately be checked upon the gases reaching the expansion chamber 16.

By making the heating element of cast iron and in one piece excepting as to the top 21

which is made removable, I secure economy of production.

The general construction of the radiator permits the use of an unfinished casting for the heating element without making the radiator at all unsightly, since this element is completely concealed by the housing 10.

It is not my intention to limit the invention to the precise number or arrangement of the heat absorbing and heat radiating ribs or fins, it being desirable, however, to extend them about the tops of the wall forming the combustion chamber and the bottom of the wall forming the expansion chamber.

The general construction and arrangement of parts herein described has been found to give highly satisfactory results in use and to permit the economical operation of a gas radiator without possibility of the presence of noxious or injurious fumes, since all of the products of combustion are confined within the heating element which has no communication with the housing 10 through which the air used for heating purposes is circulated.

It is not my intention to limit the invention to the details of construction shown in the accompanying drawings, it being obvious that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing members projecting from the inner walls of said passageway, radiating members projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

2. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber and said passageway, radiating fins projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

3. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

4. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber and said passage, radiating fins projecting from the exterior walls of said passageway and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

5. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway and the bottom of said expansion chamber, radiating fins projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

6. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway and the bottom of said expansion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

7. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended

to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway and the bottom of said expansion chamber, radiating fins projecting from the exterior walls of said passageway and the bottom of said expansion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

8. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber, the bottom of said expansion chamber and said passageway, radiating fins projecting from the exterior walls of said passageway, the bottom of said expansion chamber and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

9. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof having relatively lower capacity than said combustion chamber, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

10. A gas radiator embodying therein an outer housing, an element within said housing the side walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway, a wall closing one end of said combustion chamber, said expansion chamber and said passageway, a wall closing the opposite end of said combustion chamber and said passageway, an extension adjacent said last named end wall conforming to and communicating with said expansion chamber, and conforming to said passageway, said extension having a closed bottom adjacent the top of said combustion chamber, and a flue opening above said bottom, and closure means for the top of said expansion chamber and said extension, and a gas burner within said combustion chamber.

11. A gas radiator embodying therein an outer housing, an element within said housing the side walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway, a wall closing one end of said combustion chamber, said expansion chamber and said passageway, a wall closing the opposite end of said combustion chamber and said passageway, an extension adjacent said last named end wall conforming to and communicating with said expansion chamber, and conforming to said passageway, said extension having a closed bottom adjacent the top of said combustion chamber, and a flue opening above said bottom, closure means for the top of said expansion chamber and said extension, and exterior radiating ribs upon the side walls of said extension throughout the portion thereof conforming with the walls of said passageway, and a gas burner within said combustion chamber.

12. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins of relatively greater number than said heat absorbing ribs projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

13. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber and said passageway, radiating fins of relatively greater number than said heat absorbing ribs projecting from the exterior walls of said passageway and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber,

whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

14. A gas radiator embodying therein an outer housing, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber, the bottom of said expansion chamber and said passageway, radiating fins of relatively greater number than said heat absorbing ribs projecting from the exterior walls of said passageway, the bottom of said expansion chamber and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

15. A gas radiator embodying therein an outer housing having a closed top and openings in the side wall thereof below and adjacent said top, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

16. A gas radiator embodying therein an outer housing having a closed top and openings in the side wall thereof below and adjacent said top, an element within said housing the walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chamber, heat absorbing ribs projecting from the inner walls of the top of said combustion chamber and said passageway, radiating fins projecting from the exterior walls of said passageway and the top of said combustion chamber, and means forming a passageway leading from said expansion chamber, whereby said chamber may be connected with an offtake flue, and a gas burner within said combustion chamber.

17. A gas radiator embodying therein an outer housing having a closed top and openings in the side wall thereof below and adjacent said top, an element within said housing the side walls of which are laterally extended to form a combustion chamber toward the bottom thereof, an expansion chamber toward the top thereof, and a constricted passageway connecting said chambers, heat absorbing ribs projecting from the inner walls of said passageway, radiating fins projecting from the exterior walls of said passageway, a wall closing one end of said combustion chamber, said expansion chamber and said passageway, a wall closing the opposite end of said combustion chamber and said passageway, an extension adjacent said last named end wall conforming to and communicating with said expansion chamber, and conforming to said passageway, said extension having a closed bottom adjacent the top of said combustion chamber, and a flue opening above said bottom, and closure means for the top of said expansion chamber and said extension, and a gas burner within said combustion chamber.

In witness whereof I have hereunto affixed my signature, this 22nd day of July, 1929.

WILLIAM T. RASCH.