June 22, 1937. J. R. WARFIELD 2,084,566

GAS LOG

Original Filed May 29, 1934

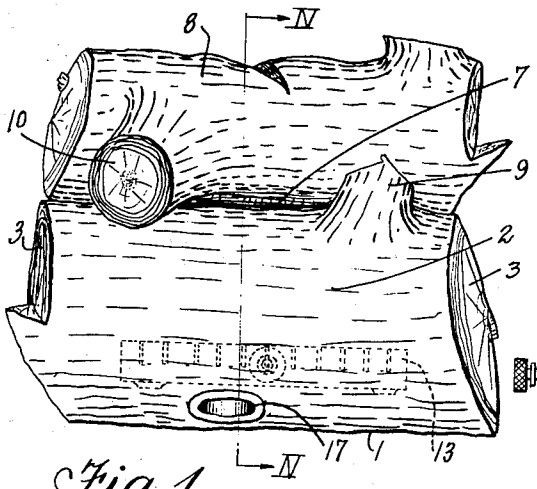


Fig. 1.

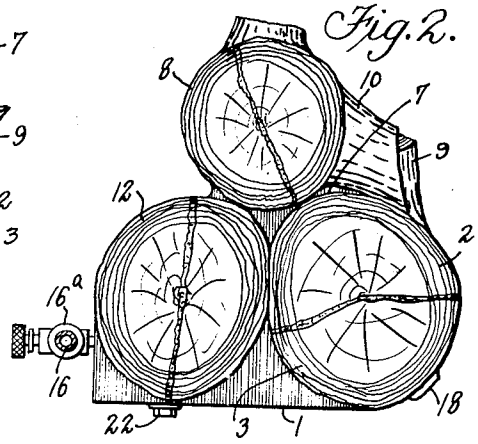


Fig. 2.

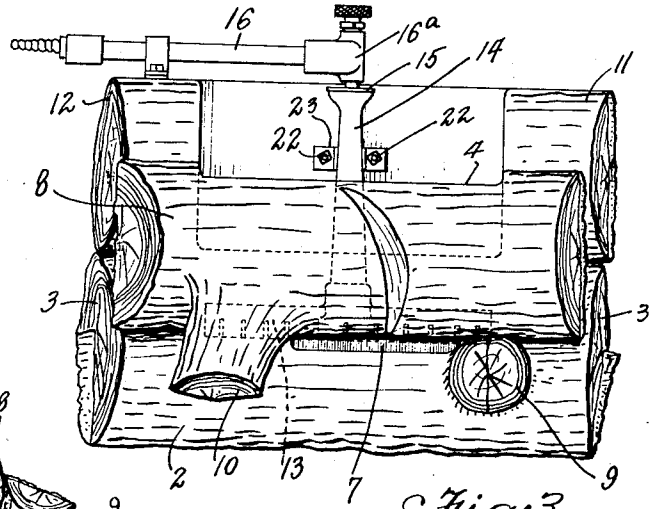


Fig. 3.

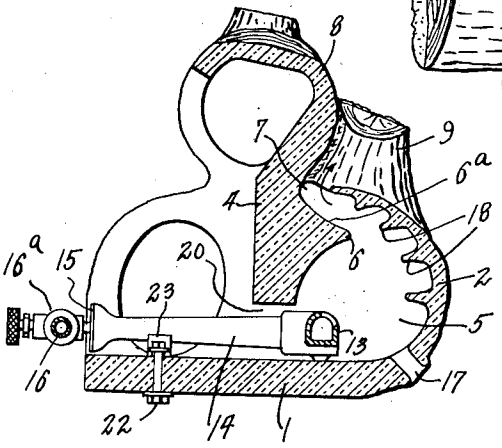


Fig. 4.

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GAS LOG

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5 Claims. (Cl. 126—92)

My invention relates to gas heating appliances and more particularly to ornamental heaters designed to produce an imitation of a wood fire and commonly termed "gas logs".

Appliances of the general type to which this invention relates are very old, but to the best of my knowledge the devices heretofore used all operate on the same general principle and have a common fault. This fault is that the gas is incompletely burned, thus producing carbon monoxide, which is poisonous. Because they produce carbon monoxide, prior known gas logs should be used only in fire places or niches provided with a flue or vent to carry the products of combustion out of the room.

Most, if not all, prior known gas logs comprise hollow imitation logs of clay or similar refractory material having small openings or perforations extending to the exterior, through which openings gas or a mixture of gas and air is supplied. The gas burns on the outside of the log as it escapes through the openings and seldom burns completely; carbon monoxide is therefore often produced by these devices.

An object of the present invention is to produce the illusion of a real wood fire with gas as a fuel and at the same time burn the gas completely so that no carbon monoxide will be produced.

Another object of the invention is to produce a gas heating appliance simulating a wood fire, wherein the gaseous fuel is so minutely dispersed that combustion is complete and all of the heat value is obtained therefrom.

Another object of this invention is to produce a heating appliance simulating a wood fire, in which the air of the room or space to be heated is continuously circulated through the combustion chamber, so that an approximately even temperature is obtained throughout the room or space.

I achieve these results with a gas log of special design that differs essentially from prior known structures in that the gaseous fuel is burned completely within the log instead of being projected through openings in the log and burned on the exterior thereof.

In the drawing:

Fig. 1 is a front elevation view of a gas log in accordance with the invention;

Fig. 2 is a side elevation of the device;

Fig. 3 is a plan view of the device; and

Fig. 4 is a side sectional view in the plane IV—IV of Fig. 3.

Referring to the drawing, my device comprises a gas heating unit which is adapted to be inserted in any fire place or niche where the effect of a log fire is to be had. The unit is preferably constructed of clay or other refractory material and may be formed in a single piece, as shown in Fig. 4. Thus it may comprise a base member 1 which is curved upwardly and rearwardly at its forward end to constitute a rounded front wall 2 which simulates the front surface of a bottom log. End walls 3 shaped to simulate the ax-hewn ends of a log, and a rear wall 4, extended inwardly from the end walls 3 back of the front wall 2, cooperate with the latter and with the front wall to form a combustion chamber 5. The rear wall 4 is extended forwardly to an edge 6 to constitute a baffle, and the upper edge of front wall 2 terminates just short of the rear wall 4 to provide a vent 7 therebetween.

Positioned above and to the rear of the front wall 2, and supported upon the rear wall 4, is a wall portion shaped to simulate a wood log 8 somewhat smaller than the bottom log 2. The upper edge of the front wall 2 and the lower surface of the top log 8 may be considered as baffles that deflect the gases as they pass out of the combustion chamber 5. As shown in Fig. 1, imitation knots 9 and 10 may be formed on the upper edge of the front wall 2 and the lower edge of the top log 8, respectively, to give the illusion of a support for the top log 8. To give the appearance of a third log positioned back of the front lower log, imitation log ends 11 and 12 (Fig. 3) may be formed to the rear of the wall 4.

To heat the structure described, a gas burner 13 is positioned in the lower part of the combustion chamber 5, this burner preferably extending substantially the full length of chamber 5, as shown by the dotted lines in Fig. 1, and being supplied with a mixture of gas and air by a conventional mixing tube 14 which receives air through an inlet aperture 15 and receives gas from the gas line 16. A cock 16a may be inserted in the gas line 16 to control the flow of gas. The burner assembly may be secured in position by bolts 22, which clamp against a bracket 23 formed on the mixing tube 14.

The burner 13 may under certain conditions be supplied with a substantially completely combustible mixture of gas and air by the mixing tube 14 so that the gas will burn completely as it issues from the burner 13. However, to insure complete combustion, it is desirable to provide a draft opening 17 in the lower portion of the front wall 2 and/or a slot 20 below the rear wall 4, as shown. The opening 17 may be made to appear as a knot hole, as shown in Fig. 1. The slot 20 is

slightly longer than the burner 13 and permits the ready insertion and removal of the burner. The mixing tube 14, slot 20, and the draft apertures 17, together supply air far in excess of that required for complete combustion so that all of the gas will be burned completely to carbon dioxide and water and substantially no carbon monoxide will be produced. The forwardly projecting baffle 6 tends to deflect the gas flame forwardly toward the front wall 2 and the latter is provided with horizontal corrugations or other suitable protrusions 18 to expose a large heat-absorbing surface to the burning gas. As a result, the front wall 2 is heated to incandescence and simulates the appearance of a glowing wood log. The corrugations 18 are further advantageous in that they provide relatively thin wall portions, thus facilitating the transfer of heat to the exterior, without reducing the structural strength of the wall below a safe value. The products of combustion, as they escape upward through vent 7 and forwardly below the top log 8, are still highly heated, and the lower portion of log 8 against which they impinge may also become incandescent.

I have found that a gas log of the type described is very economical in gas consumption for the amount of heat produced. This is due primarily to the fact that combustion is complete and no heat units originally present in the gas are wasted by incomplete combustion. I have further found that the heat radiated through the walls of the lower chamber by reason of the direct impingement against it of the confined and retarded hot gases, and the consequent incandescence of the log is, in proportion to the amount of gas consumed, greatly in excess of that obtained with other known types of heaters. I have found further that the incandescence caused by the combustion of the gas entirely within the interior produces a more natural effect and a better simulation of a real wood fire than is obtainable by the projection of gas mixtures through apertures in a log for external combustion, or by viewing glowing back radiants through apertures in a log.

If desired, certain areas of the forward wall 2 of the lower front log may be made thinner than other portions so that they will heat more quickly to an incandescent temperature and radiate more heat.

I find that combustion is also rendered more complete by the use of the forwardly projecting rear baffle 6 and the corrugated inside surface of the front wall 2. The surfaces of these baffles and corrugations become heated to an extremely high temperature, thus heating any unburned mixture of gas and air impinging thereon so that the gas is thereafter completely burned. Complete combustion is also encouraged by the fact that the air entering through the aperture 17 and slot 20 is heated by contact with the hot walls before it mixes with the gas issuing from the burner 13.

The area of the vent 7 is so proportioned that, together with the baffling effect of the crooked passage produced by the rearwardly projecting upper edge of wall 2 and the forwardly projecting lower wall of the upper log 8, the flow of the burned gases from the combustion chamber 5 is sufficiently slow to insure complete combustion of all gas before the latter emerges from the highly heated chamber. At the same time, the escape of the gases must not be too greatly retarded or the resultant increased pressure within the chamber 5 will unnecessarily reduce the amount of air circulated through the chamber 5. The vent 7 should therefore be so proportioned that a substantial excess of air over that necessary for combustion is supplied to chamber 5, thus insuring complete combustion and directly heating the excess circulated air; and yet permitting the wall 2 to be heated to incandescence.

The particular shape and positioning of baffle 6 is important in promoting complete combustion. The smoothly curved lower surface of this baffle creates a desired swirling or eddying of the burning gases that more thoroughly mixes the fuel and air and causes them to burn completely. It is also highly important that the wall 4 adjacent the baffle 6 be of substantial thickness, much greater than the thickness of the wall 2, to prevent excessively rapid conduction of heat through wall 4, and thereby maintain the surface of the baffle 6 at such a high temperature that most of the radiant heat from the gases adjacent thereto is reflected forwardly to the front wall 2, heating the latter to incandescence and thereby causing it in turn to radiate heat into the room.

It has been found that if the baffle 6 is so positioned and shaped as to provide a passage between the upper surface 6a of the baffle and the upper portion of wall 2 of width substantially the same as that of the vent 7, maximum incandescence of that portion of the wall 2 is obtained.

I claim:

1. A radiant gas-heating appliance comprising a hollow shell of refractory material defining a combustion chamber and having an imperforate outwardly curved relatively thin front wall of ceramic material, a rear wall of ceramic material, the lower portion of which is spaced a substantial distance rearwardly from the lower portion of the front wall, whereby said two walls define a combustion chamber of substantial depth (fore and aft) in the lower portion of said shell, the inner face of said rear wall curved forwardly and upwardly from said lower portion and thence rearwardly in the general direction of the upper portion of the front wall, whereby the depth of the upper portion of the combustion chamber is greatly reduced, said upper portion of said chamber terminating in a vent of limited area for discharge of the products of combustion from the appliance into the surrounding space, a gas burner in the lower relatively deep portion of said combustion chamber immediately below the lower inner face of the rear wall for discharging a burning mixture of fuel gas and air into said chamber, and an auxiliary air inlet opening in said shell immediately adjacent said burner and between it and the lower end of said rear wall whereby substantially all air admitted to said combustion chamber enters the latter adjacent the flame issuing from the burner and is highly heated by the flame and by the highly heated enclosing ceramic walls before it reaches the upper or constricted portion of the combustion chamber, thereby insuring complete combustion within the upper portion of the chamber of all gas prior to its discharge through the vent.

2. A radiant gas-heating appliance, comprising a hollow shell of ceramic material defining a combustion chamber that is relatively large at the bottom and gradually narrows to a vent at the top, said shell comprising a relatively thin curved front wall extending upwardly and then rearwardly and a rear wall having a curved in-

ner face extending upwardly and then forwardly toward said front wall and then rearwardly substantially parallel to the juxtaposed portion of the front wall, said rear wall having an elongated opening in the lower portion thereof for supplying auxiliary air, an asperating gas burner positioned near the bottom of said chamber and immediately in front of said opening and below said upwardly and forwardly curved face of said rear wall for discharging a combustible mixture of gas and air toward the curved face of said rear wall, the walls of said shell above said auxiliary air inlet opening and below said vent being imperforate and of relatively low heat conductivity whereby their inner surfaces become heated to incandescence, the highly heated, curved inner surface of said rear wall functioning to heat auxiliary air admitted through said opening prior to its admixture with the burning gases from said burner, and to deflect the gas flame forwardly toward the front wall to heat the latter to incandescence.

3. A gas-heating appliance comprising a hollow shell of refractory material defining a combustion chamber, said shell comprising an imperforate convexly curved, relatively thin front wall and an oppositely curved rear wall of low heat conductivity, whereby its inner surface acquires a high temperature from combustion within said chamber, an asperating gas burner in the lower portion of said chamber for supplying a mixture of gas with sufficient air to effect partial combustion of said gas, means for admitting auxiliary air to said chamber immediately below and adjacent the lower end of said rear wall of said chamber at substantially the level of said burner and between the burning gas issuing from the burner and said rear wall, whereby said auxiliary air is preheated within said chamber before admixture with said burning gases, said admixture taking place in the upper portion of said combustion chamber, the latter being vented at the top for the discharge of the products of combustion.

4. An internal combustion gas log comprising a hollow relatively thin shell of refractory material having an outwardly curved imperforate front wall of ceramic material simulating the appearance of a log, a back wall spaced substantially from said front wall to provide a combustion chamber, curved upwardly and forwardly, thence rearwardly to a vent, a burner for supplying a combustible mixture of gas and air located below and closely adjacent to the lower termination of said rear wall so as to direct the flame against said wall, said burner being spaced from the lower edge of said wall a sufficient distance to provide a narrow inlet duct for auxiliary air which is admitted at a point to flow upwardly over and be preheated by the heat derived from said rear wall, the combustion of gases in said combustion chamber being sufficient to render said front wall incandescent, and a second refractory element shaped to simulate a log positioned above and rearwardly of said front wall, and the rear wall of said chamber continuing up to and sealing with the lower edge of said second refractory element whereby the heated products of combustion that escape from the vent leading from said combustion chamber flow upwardly over the front wall of said second refractory element.

5. An internal combustion gas log comprising a hollow shell of refractory material having an outwardly curved relatively thin imperforate front wall of ceramic material simulating the appearance of a log, an upwardly and forwardly curved rear wall of ceramic material spaced a substantial distance from said front wall so as to enclose with the latter a space constituting the combustion chamber, said rear wall extending rearwardly from its uppermost forwardly projecting portion and terminating, with said front wall, in a vent, a gas burner located immediately below the lower terminus of said rear wall and in position to project a flame of gas against said wall upwardly and forwardly thereon, said burner being spaced a slight distance from the lower edge of said rear wall to provide an auxiliary air inlet opening whereby auxiliary air may pass in above the burner and along the forwardly and upwardly curved surface of the rear wall to be thereby preheated by said wall before it is ignited in the combustion chamber, the heat in said chamber being sufficient to cause the front wall to become incandescent, and a draft opening in the lower portion of the front wall below said burner.

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