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(54) Domestic gas fires.

(57) A simulated solid fuel gas fire burner has a chamber (15) with at least one exit port (26) through which aerated gas is supplied to a combustion region of the fire. The port (26) extends upwardly through a resilient bed or layer of refractory insulating material (22) and is formed independently of the material.

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DOMESTIC GAS FIRES

In our GB Patent 2,193,802B we describe an improved domestic coal or log effect gas fire in which gas from a domestic supply is distributed over the area of a fire burner tray using a ceramic fibre blanket. Refractory bodies in the form of imitation coal or logs are then supported on the blanket in the combustion region of the fire. The blanket not only distributes the gas but also reduces heat loss to the metal tray and improves the radiant heat output from the fire.

This fire has proved successful when burning neat gas. It is well known, however, that improved combustion efficiency can be achieved if air is mixed with the gas before it reaches the combustion region.

One particular problem associated with pre-aerated gas fires is the risk of back-ignition. If the burner exit ports are too large, the velocity of the gas falls below the flame speed and the fire lights back to the gas injector. On the other hand, small exit ports may not provide sufficient gas for a satisfactory fire. One proposal for overcoming this problem has been to replace the conventional metal burner head with a burner head of moulded ceramic fibre material so that the heat of combustion at the outer surface of the head is not readily conducted to the inner surface of the head. This solution has not been entirely satisfactory, however, because the moulded ceramic material is prone to cracking and the slots forming the exit ports in the moulded ceramic fibre material of the head tend to open up after a period of use.

Another major problem associated with pre-aerated gas fires is that of noise, particularly gas hiss.

According to the present invention, the burner of a coal or log effect gas fire includes at least one independently formed exit port through which pre-aerated gas flows to the combustion region of the fire, the port extending through a resilient bed or layer of insulating material.

The introduction of independently formed exit ports into a resilient bed of insulating material overcomes many of the problems associated with previous coal or log effect gas fires using primary aeration. The resilient bed of insulating material serves a dual function. It acts firstly as an insulator so that it assists in preventing back-ignition (thereby allowing larger exit ports), reduces heat loss to the metal parts of the burner, and substantially increases the radiant heat output from the fire. It acts secondly to absorb sound and therefore produces a quieter fire. It has the further advantage that it does not crack and is not friable.

Where the burner comprises a metal tray, the bed or layer of insulating material is preferably spaced from the base of the tray to provide a passage for the flow of aerated gas in the space beneath the insulating material. In this case the sound absorbing properties of the bed or layer are enhanced if a rigid support member for the bed or layer is provided with apertures through which the sound waves can pass to the sound-absorbing insulating material.

The resilient bed or layer may comprise loose particulate or fibrous insulating material, but preferably comprises a fibrous blanket. The insulating material is preferably a refractory material conforming to British Standard 3446 :1962 (No. 1042). The exit port or ports are preferably formed of metal and may have any desired shape. A preferred exit port is in the form of an elongate slot. The preferred arrangement is a ceramic fibrous blanket supported on a perforated metal plate. The or each metal exit port extends upwardly from the perforated plate such that the aerated gas passes through the plate into the port or ports. The passage of gas through the perforations further reduces the risk of back-ignition.

According to another aspect of the present invention, the burner includes a chamber having separate air and gas inlets, and means disposed within the chamber for entraining the inlet air into the gas flow, the inlet air being directed along a folded path and at least part of the said path being lined by sound-absorbing material. We have found that this arrangement substantially reduces the noise normally associated with pre-aerated domestic gas fires.

One example of the invention is illustrated in the accompanying drawings in which :

Fig. 1 is a front elevation of a gas fire embodying the invention ;

Fig. 2 is a plan view of the fire shown in Fig. 1 ;

Fig. 3 is a section on the line A-A in Fig. 2,

Fig. 4 is a perspective sketch of the air inlet box, and

Fig. 5 is a perspective sketch of a refractory block used in the fire.

Referring to these drawings, gas from a domestic supply is fed through a pipe 10 to a gas jet 11 (not shown in Fig. 4) located in a primary air inlet box 12. The metal box 12 has a front wall 40, opposed side walls 41, 42 and a rear wall 43. The front wall 40 has an air inlet 13, and also receives the gas pipe 10. The gas jet 11 is aligned inside the box with a venturi duct 14 (not shown in Fig. 4) so that air drawn in through the inlet 13 is entrained into the gas stream flowing through the duct 14. The walls 40, 41, 42 and 43 are each lined with a sound attenuating material 32 such as mineral wool.

The lining 32 on the front wall 40 includes a projection 33 extending back part-way across the box and forming a partition between the air inlet 13 and the gas jet 11. The air entering the inlet 13 is therefore forced to follow a labyrinth path (shown by the arrows in Fig. 4) before being entrained into the gas stream 45. This substantially reduces the audible noise gener-

ated by the venturi 14 because the sound waves must travel back along the same labyrinth path before emerging from the inlet 13. Each time the waves strike the lining material 32, a proportion of the sound is absorbed. The top and bottom walls 34, 35 of the box 12 are also lined with, or consist of, the sound absorbing material 32.

The aerated gas from the duct 14 emerges through an opening in the rear wall 43 of the box 12 into a chamber 15 forming part of a burner tray 16. The tray has a flat base 17 with a rear downward step 30 forming the lower chamber 15, and upstanding side walls 18, 19, 20 and 21.

A ceramic fibre blanket 22 is supported within the tray 16 by a perforated metal plate 24. The blanket 22 is disposed on each side of an exit port 26. The two parts of the blanket each consist of a resilient block of insulating refractory material conforming to British Standard 3446 :1962 (No. 1042) and made from bulk fibre without the inclusion of binders. The ceramic fibre is an alumino-silicate fibre made from blends of high purity alumina and silica. The perforated plate 24 supporting the blanket 22 rests on, or is secured to, metal brackets 25 fixed to the opposing side walls 19, 21. Accordingly, gas from the chamber 15 is able to flow between the base 17 of the tray and the perforated metal plate 24.

A small proportion of the gas/air mixture may diffuse upwardly through the perforated plate 24 and the ceramic fibre blanket, but the major portion flows beneath the blanket toward the front of the tray and then passes upwardly through the exit port 26 extending across the width of the tray.

The exit port 26 is formed independently of the blanket 22 by two opposing metal strips 27, 28 upstanding from the plate 24 and spot welded to one another at intervals along the exit orifice 44 at the top of the slot. These spot welds 29 ensure that the width of the exit orifice remains constant at high temperatures. The strips 27, 28 are shaped such that at least the uppermost portion of the slot 26 is inclined rearwardly and gas emerging from the slot is directed toward the back of the fire. Each strip is spot welded to the perforated plate 24.

The blanket 22 is cut slightly oversize before installing it in the tray 16 such that the blanket is resiliently compressed between each of the strips 26, 27 forming the slot 26 and the respective side walls 19, 21 of the tray. This prevents any significant leakage of gas around the edges of the blanket.

The exit port 26 provides a passage for the uninterrupted flow of gas through the blanket 22 to the combustion region of the fire. The aerated gas enters the port 26 through the perforations in the plate 24. The perforations increase the velocity of the gas and ensure that this velocity exceeds the flame speed when the fire is burning.

Gas emerges from the slot 26 into the combustion region of the fire and is drawn toward the rear of the fire by the chimney draught.

As shown in Figs. 3 and 5, a non-resilient block 50 of refractory material is preferably superposed over the portion of the blanket 22 located to the rear of the slot 26. The front portion of the block 50 has a series of spaced channels 51 cut into its top surface. It has been found that the addition of this refractory board or block leads to a cleaner fire with reduced carbon monoxide being produced (improved CO/CO_2 ratio). Moreover, the shape of the block 50 and/or of the channels 51 can be varied to provide a predetermined flame pattern.

The combustion region contains randomly disposed and/or prearranged refractory bodies 30 in the form of imitation coal or logs (not shown in Figs. 2 and 3), and the gas/air mixture burns within the spaces between these bodies to produce a simulated coal or log fire.

The ceramic fibre blanket 22 insulates the metal parts of the burner from the heat of combustion since only the top edge of the metal tray 16 and the top edge 44 of the exit port 26 are exposed to this heat. Substantially all the heat is therefore reflected upwards by the blanket which acts as a hot-face, and this adds to the radiant heat output of the fire. The insulation of the exit port 26 prevents the port being damaged by overheating. Furthermore, the metal tray 16 and the perforated metal plate 24 remain relatively cool and are therefore able to conduct heat away from the gas/air mixture, thereby further reducing any risk of back-ignition.

The blanket 22 also acts as an efficient sound attenuator, further reducing the noise of the fire. The perforations in the plate 24 ensure that sound waves produced by the flow of gas through the burner are able to pass into the sound-absorbing blanket.

Claims

1. A simulated solid fuel gas fire burner comprising a chamber (15) for supplying aerated gas through at least one exit port (26) to a combustion region of the fire, characterised in that the port (26) extends upwardly through a resilient bed or layer of refractory insulating material (22) and is formed independently of the material (22).

2. A burner according to claim 1 wherein the port (26) is formed of metal and the refractory insulating material (22) comprises a flexible ceramic fibrous blanket.

3. A burner according to claim 1 or claim 2 wherein the port (26) has a pair of opposing side walls (27, 28) forming an elongate slot.

4. A burner according to claim 3 wherein the refrac-

tory insulating material (22) is resiliently compressed against at least one of the side walls (27, 28).

5. A burner according to claim 3 wherein at least the uppermost portion of the slot (26) is inclined rearwardly such that the aerated gas is directed toward the rear of the combustion region.

6. A burner according to any one of the preceding claims wherein a non-resilient refractory block (50) is superposed over a rear portion of the resilient bed or layer of refractory material (22), the front portion of the block being located adjacent the port (26) and having preformed channels (51) for the flow of aerated gas to the combustion region.

7. A burner according to any one of the preceding claims of refractory material (22) in an open-top metal tray (16), the support means (24) being spaced above a base portion (17) of the tray to provide a passage for the flow of aerated gas to the exit port (26).

8. A burner according to claim 7 wherein the support means comprises a perforated support member (24).

9. A burner according to any one of the preceding claims wherein the chamber (15) includes means (14) for entraining air into a flow of gas from a gas inlet (11).

10. A burner according to claim 9 in which the air is directed along a folded path prior to entrainment in the gas flow, at least part of the said path being lined by a sound-absorbing material (32).

11. A simulated solid fuel gas fire burner comprising a chamber (12, 15) having separate gas (10, 11) and air (13) inlets, means (14) disposed within the chamber (12) for entraining the inlet air into a flow of gas from the gas inlet, an exit port (26) through which aerated gas flows from the chamber (15) to a combustion region, and means (25, 24, 22) for supporting simulated solid fuel elements in the combustion region, characterised by means (33) directing the inlet air along a folded path in the said chamber (12) prior to entrainment of the air in the gas flow, at least part of the said path being lined with a sound-absorbing material (32).

Fig.1.

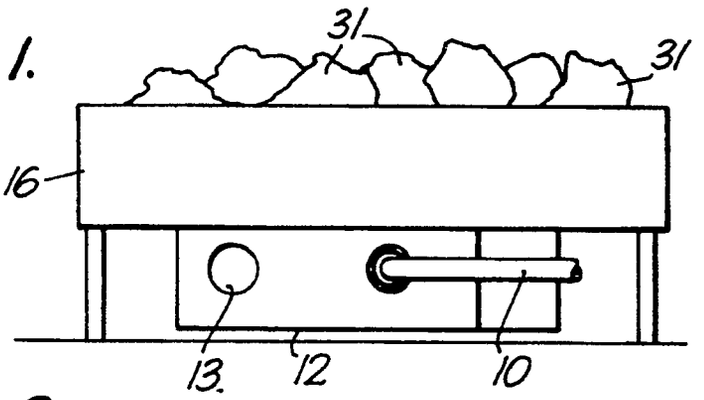

Fig.2.

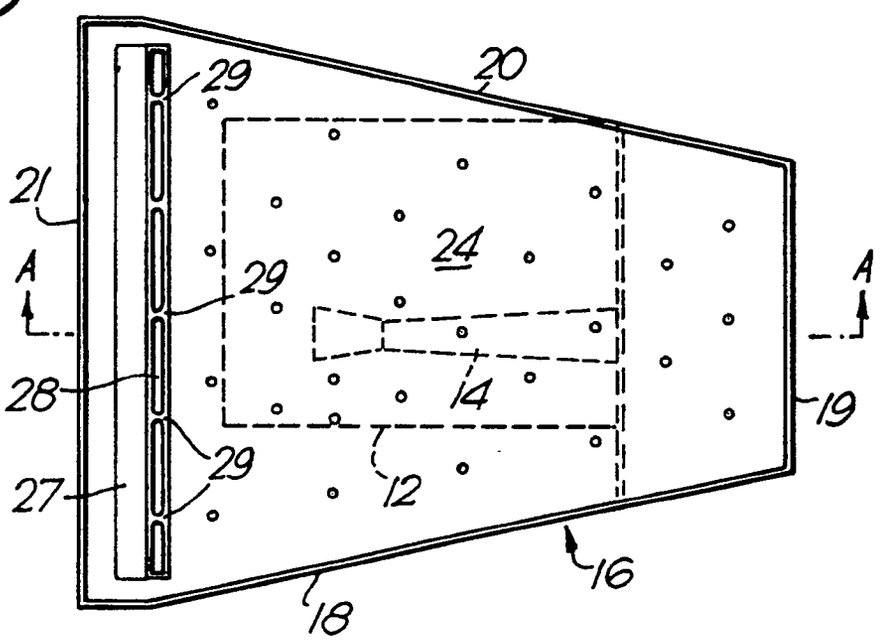

Fig.3.

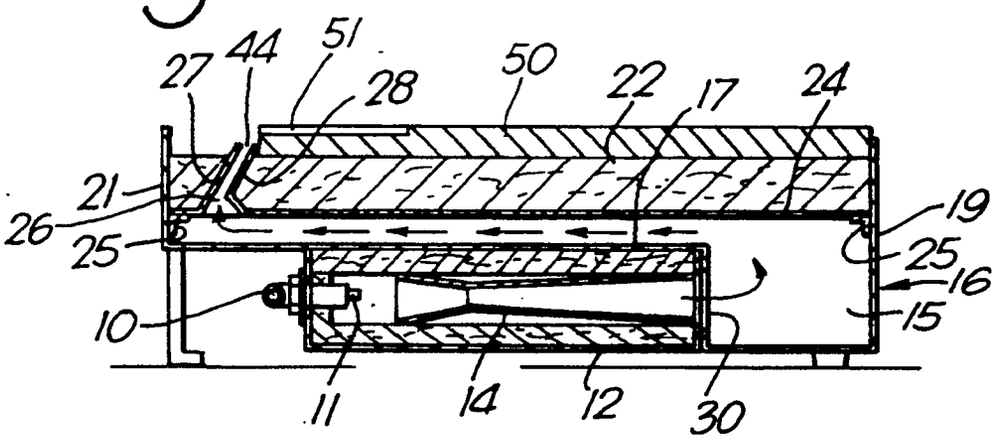

Fig.4.

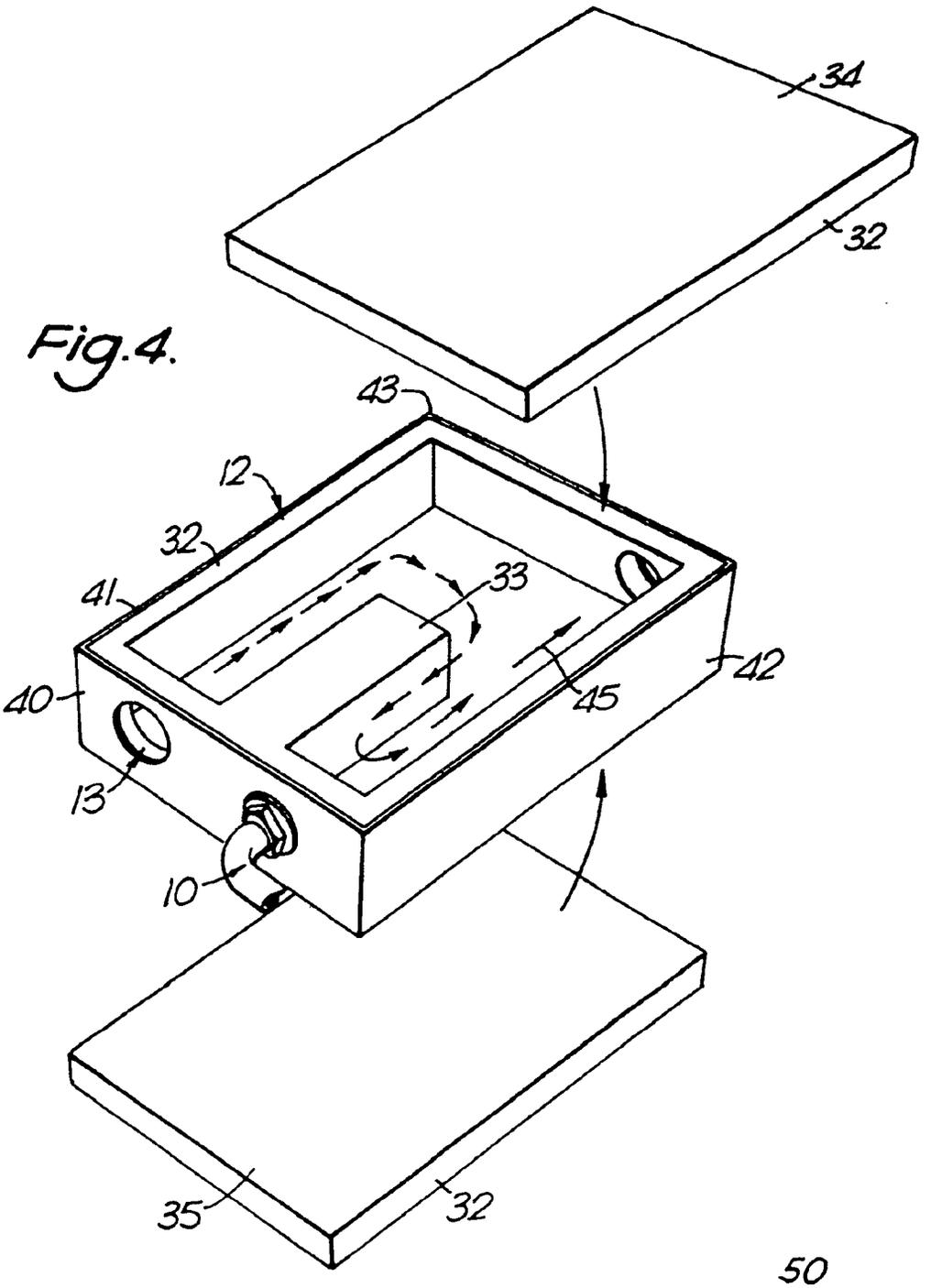

Fig.5.