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(54) **Gas burner**

(57) For suppressing noise a tube (3) having an open end and a closed end is mounted co-axially with a flue duct (1) of a gas burner with the open end of the

tube (3) in communication with the interior of the flue duct (1), and the tube (3) has a length equal to one quarter the wavelength of the noise to be suppressed.

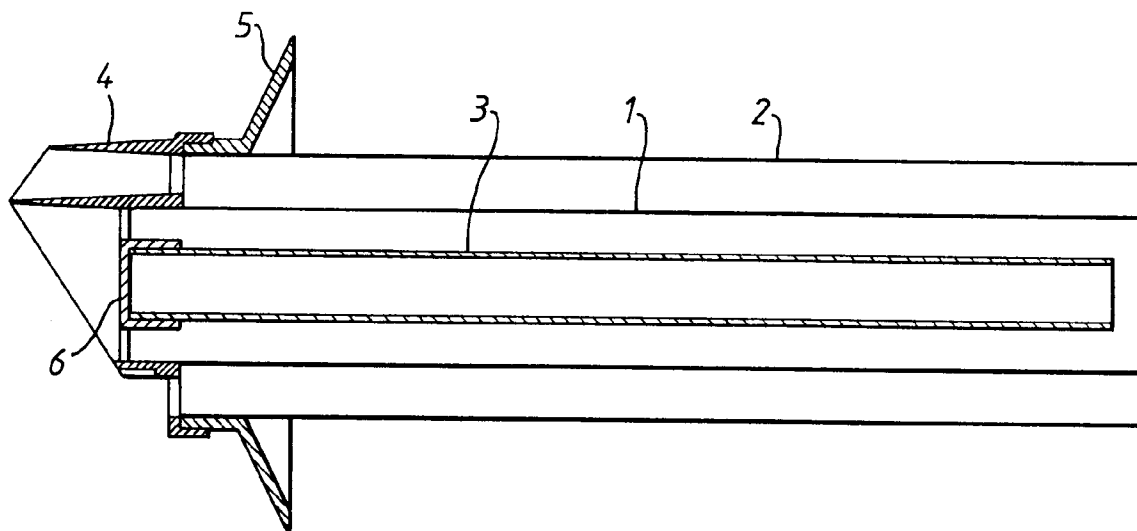


Fig. 1a

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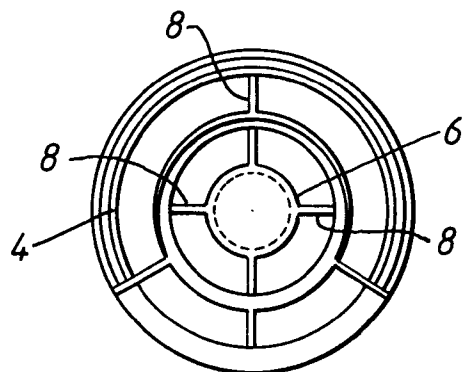


Fig.1b

Description

This invention relates to gas burners, and is concerned especially, but not necessarily exclusively, with gas burners suitable for domestic boilers.

It is known that gas burners can suffer from resonant noise generation upon ignition. Various attempts have been made to alleviate this problem, such as modification of combustion chamber geometry, provision of pressure-release orifices at appropriate places, and fitting tuneable acoustic filters to the combustion chamber where the acoustic pressure is at a maxima.

The present invention seeks to provide a simple and economic solution to the problem of noise generation and in accordance with the invention there is provided a gas burner with a combustion chamber and a flue duct for conducting flue gases from the combustion chamber, wherein a tube is mounted in parallel with a section of the flue duct and has an open end communicating with the interior of the flue duct, the other end of the tube being closed and the length of the tube being substantially equal to one quarter the wave length of the noise to be suppressed.

It has been found that the simple addition of a so-called "quarter wave tube" to a gas burner's flue can reduce unwanted resonant noise without the expense associated with more complex solutions. Because the quarter wave tube can be remote from the combustion chamber, it does not demand space within the casing of a boiler, which is advantageous where a compact design is desirable. The spatial location and directional orientation of the tube in the flue are not crucial to successful performance of the invention, but in preferred embodiments the tube is supported coaxially with the flue duct.

The invention also provides a boiler comprising a gas burner and a flue, the flue including a quarter wave tube as described above.

To assist in a clear understanding of the invention a detailed description of some embodiments is given below with reference to the accompanying drawings, in which:

Figure 1a is an axial cross-section through a terminal end section of the flue of a gas boiler;
Figure 1b is an end view of the flue;
Figures 2a-d show alternative locations and orientations for the quarter wave tube.

The concentric flue illustrated in Figure 1 includes a portion of an inner duct 1 surrounded coaxially by an outer duct 2. The inner duct defines an outlet for combustion gases from the combustion chamber of the gas, whereas the annular passage defined between the inner and outer ducts forms an inlet through which air for combustion is drawn into the boiler. A rubber weather seal surrounds the end of the outer duct and a grille 4 is fitted to the ends of the ducts 1,2. A noise suppressing tube 3 is mounted coaxially within the inner flue duct 1. The

length of this tube is chosen to be one quarter the wavelength of the resonant noise to be attenuated, the wavelength typically being between 0.5 m and 1.5 m. The upstream end of the tube is open to the interior of the flue duct, and the other end of the tube is closed. Conveniently, the downstream end of the tube is fitted to a socket 6 formed integrally with the grille 4 and supported by radial spokes 8 whereby the socket seals the end of the tube 3 and supports the tube in the flue duct 1.

The diameter of the tube 3 is between 20mm and 30mm, and the diameter of the inner flue duct 1 is approximately 60mm. To avoid undesirable impediment of escaping flue gases by the tube, and hence any adverse effect on the available pressure in the boiler, the ratio of inner flue duct diameter to tube diameter is preferable greater than 2:1.

Figures 2a-d show other possible arrangements of the tube and a flue duct, but other arrangements are possible without departing from the scope of the invention. As shown in Figure 2a, the tube is mounted at an elbow of the flue duct and branches from the duct. In the arrangement of Figures 2b the quarter wave tube is also mounted at the elbow but is accommodated within the flue duct and has its downstream end open. Figures 2c and 2d show arrangements in which the quarter wave tube is positioned at an intermediate location along the flue duct, in one case with the open end upstream and in the other case with the open end downstream.

Claims

1. A gas burner with a combustion chamber and a flue duct (1) for conducting flue gases from the combustion chamber, characterised in that a tube (3) is mounted in parallel with a section of the flue duct (1) and has an open end communicating with the interior of the flue duct, the other end of the tube being closed and the length of the tube being substantially equal to one quarter the wavelength of noise to be suppressed.
2. A gas burner according to claim 1, wherein the section of the flue duct and the tube (3) are co-axial.
3. A gas burner according to claim 1 or 2, wherein the tube (3) is mounted interiorly of the section of the flue duct.
4. A gas burner according to claim 1 or 2, wherein the tube (3) is mounted exteriorly of the section of the flue duct.
5. A gas burner according to any one of the preceding claims, wherein the open end of the tube is disposed upstream of the closed end.
6. A gas burner according to any one of claims 1 to 3

wherein the open end of the tube is disposed downstream of the closed end.

7. A gas burner according to any one of the preceding claims, wherein the other end of the tube is received in a socket (6) arranged to support and seal closed the end of the tube. 5
8. A gas burner according to any one of the preceding claims, wherein the wavelength of noise to be attenuated is between 0.5m and 1.5m. 10
9. A gas burner according to claim 8, wherein the ratio of the inner flue duct (1) diameter to be tube (3) diameter is greater than 2:1. 15
10. A boiler comprising a gas burner as defined in any one of the preceding claims. 20

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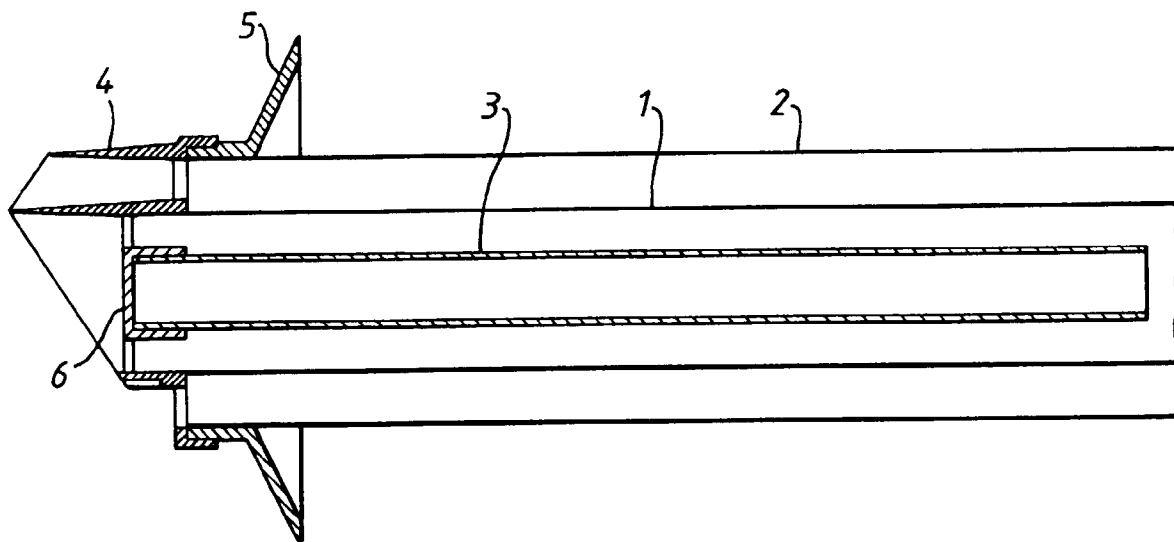


Fig. 1a

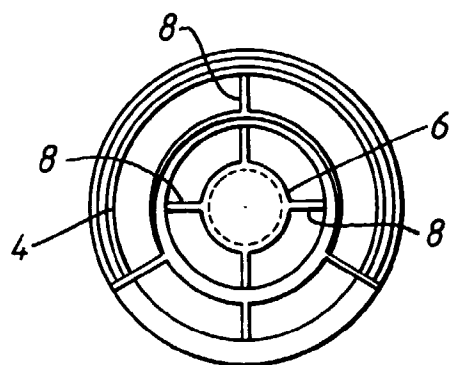


Fig. 1b

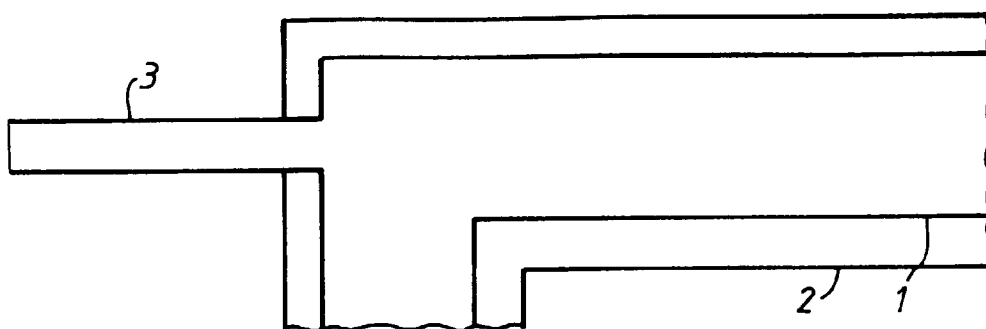


Fig. 2a

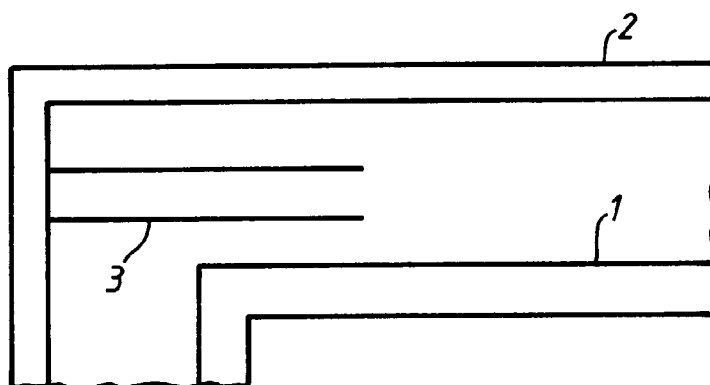


Fig. 2b

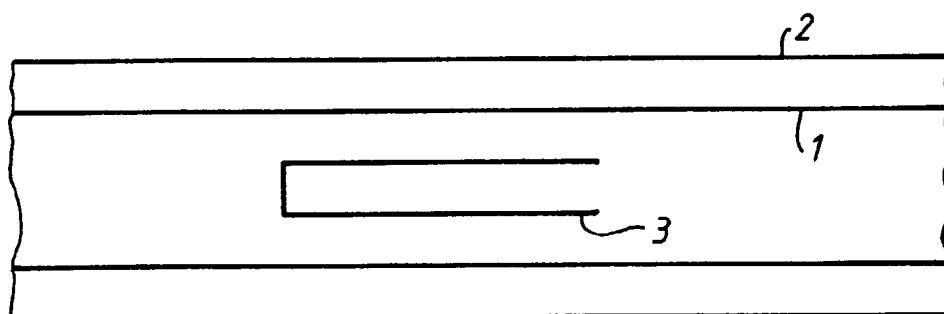


Fig. 2c

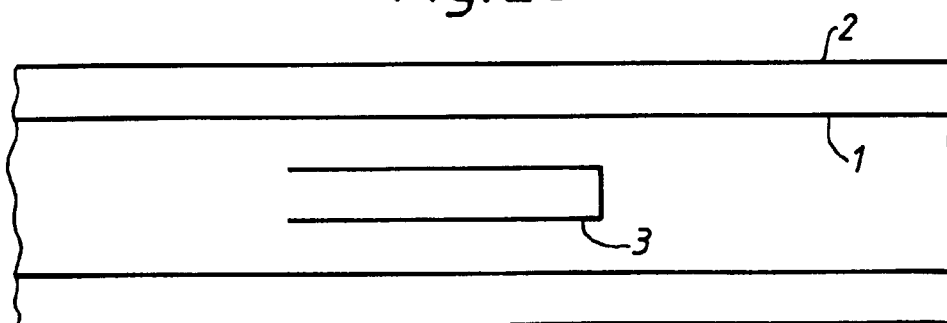


Fig. 2d