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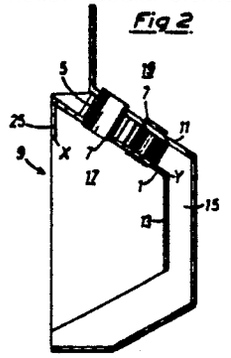
(54) Improvements relating to gas fires.

(57) The present specification discloses a gas fire incorporating a heat exchanger (1) for use in transferring heat from the gaseous products of combustion in the gas fire (9) to a path (15) through the fire (9) for convection air. In certain such gas fires the heat exchanger is of a complex and expensive construction.

The present invention provides a gas fire (9) with a simple and inexpensive heat exchanger (1). A number of these heat exchangers (1) are provided, each being in the form of a hollow tubular element (1) made of a thermally conducting material. Each hollow tubular element (1) extends across a path (15) for convection air in the fire (9), and provides a passage therethrough for gaseous combustion products passing to a flue at the rear (19) of the fire (9). To aid heat transfer fins (5) can be provided on the outside of the hollow tubular element (1).

Fig 2



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IMPROVEMENTS RELATING TO GAS FIRES.

The present invention relates to a gas fire.

In particular, the present invention relates to a gas fire incorporating a heat exchanger for use in transferring heat from the gaseous products of combustion in the gas fire to a passage through the fire for convection air. In certain such gas fires, the heat exchanger is of a complex and expensive construction providing a tortuous path for both the convection air and the combustion products so that the air gains the maximum exposure to surfaces heated by the combustion products.

The aim of the present invention is to provide a gas fire with a simple heat exchanger which is relatively cheap to manufacture whilst being efficient in operation.

According to the present invention there is provided a gas fire comprising at least one heat exchanger in the form of a hollow tubular element made of a thermally conducting material, which extends across a path for convection air in the fire and provides a passage for gaseous combustion products passing to a flue from the fire.

In one embodiment of the present invention the hollow tubular element is generally cylindrical and preferably made of aluminium, with a number of groups of three generally radially projecting fins formed on its outer periphery, the fins each extending axially of the element. It is envisaged that the element may be formed by extrusion and cut into the desired lengths. Alternatively, however, the tubular element may be fabricated or die cast.

In another embodiment of the present invention, the generally radially projecting fins extend circumferentially of the hollow tubular element, the element being die cast or fabricated.

In a still further embodiment of the present invention, the or each heat exchanger is formed by a hollow tubular element which is partially flattened to present an oval transverse cross-section, i.e. a lozenge-shaped cross-section. This design maximises the surface area available for heat transfer but reduces the resistance to convection air flow; the narrow section facing into the air flow. If desired, one or more fins may project from the outer surface of the tubular element to further enhance heat transfer, e.g. a fin can project from each end of the flattened transverse cross-section.

A number of these generally cylindrical heat exchanger elements are positionned between the walls defining a convection air passage through a gas fire, with the passage through each element interconnecting the front of the fire with an appropriate flue. Thus, hot combustion products pass through the elements and convection air passes over the outside of the elements which the fins, if provided, scrubbing i.e. imparting turbulence, to the air flow to enhance heat transfer. If desired, fins may be provided on the inside wall of the tubular element defining said passage, to thus improve heat transfer.

As an alternative to securing the heat exchanger element of the present invention between the walls defining a convection air passage, part of one of the walls may be formed by casting with the tubular elements cast integrally therewith. The precast wall section may also include a multi-fin facia for use in radiating heat from the front of the fire.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:-

Fig.1 is a perspective view of one embodiment of a heat exchanger for use in the present invention;

Fig.2 is a cross-sectional view through part of a gas fire incorporating a number of the heat exchangers shown in Fig.1;

Fig.3 is a rear perspective view of the fire shown in Fig.2;

Fig.4 is a perspective view of another embodiment of a heat exchanger suitable for use in the present invention;

Fig.5 is a perspective view of a precast section of a wall of the convection air passage including integrally cast heat exchanger elements as per Fig.4,

Fig.6 is a perspective view of a further embodiment of heat exchanger for use in the present invention; and

Fig.7 is a schematic illustration of the preferred relative arrangement of the heat exchangers of Fig.6, in a gas fire.

The gas fire constructed according to the present invention and illustrated in Figs. 1, 2 and 3 of the accompanying drawings, comprises a hollow generally cylindrical heat exchanger element 1 made of aluminium, with three groups 3 of three generally radially projecting fins 5 which extend axially of the element 1. The heat exchanger element 1 is formed by extrusion, the extrusion being cut to the desired length and the end regions machined to form axial extensions 7 for use in sealingly mounting the element 1 in a gas fire as shown in Fig.2 of the accompanying drawings.

As seen in Fig.2, a number of the elements 1 are in use located in the top part of a fire 9, between the walls 11 and 13 defining a convection air passage 15. The elements 1 each connect the upper region 17 of the front of the fire 9 with the rear region 19 of the fire which is in use sealingly

connected with a flue (not shown). Thus, in use the hot combustion products pass through the heat exchanger elements 1 to the flue, the convection air being moved over the outside of the heat exchanger elements 1 and scrubbed by the fins 15 to enhance heat transfer.

Whilst the elements 1 are described hereabove as being made by the extrusion of aluminium, any suitable thermally conductive material can be alternatively used, as can any suitable method of manufacture, e.g. fabrication or die casting.

An alternative construction of heat exchanger is illustrated in Figs. 4 and 5 of the accompanying drawings. This heat exchanger comprises a hollow generally cylindrical element 21 with a number of axially spaced apart, circumferentially extending fins 23 projecting generally radially outwardly from the outside surface thereof. As shown in Fig.5, these heat exchangers (Fig.4) can be integrally formed, e.g. by casting, as part of the convection air passage wall 13 - see Fig.1 between points 'X' and 'Y' - this section of wall being provided with a front facia portion 25 carrying a number of fins 27 for radiating conducted heat from the front of the fire. Alternatively, the heat exchanger of Fig. 1 or any other heat exchanger within the scope of the present invention, can be formed as part of the wall section X-Y.

A still further embodiment of heat exchanger element 25 is shown in Figs. 6 and 7 of the accompanying drawings, the element being formed by a partially flattened tubular element which has a generally oval or lozenge-shaped transverse cross-section. These heat exchanger elements 25 are arranged in a gas fire such as shown in part in Fig.1, with the heat exchanger elements relatively positioned as shown in Fig.7, with the narrow cross-section being presented to the air flow. In this way the surface area available for heat transfer is maximised whilst the resistance to air flow is minimised. Fins 28, as shown in dashed lines, can be provided one at each end region of the flattened transverse cross-section, to increase surface area and further enhance heat transfer. Alternatively any number of fins can be provided in any desired configuration and arrangement.

In any of the heat exchangers 1, 21, 25 described hereabove heat transfer can be further enhanced by the provision of fins 29 on the inside wall of the passage through the heat exchangers, said fins extending generally radially inwardly and axially of the passage. Again, any desired number, configuration and/or arrangement of fins 29 can be selected.

The present invention thus provides an efficient heat exchanger for use in a gas fire, which is both simple and inexpensive to manufacture.

Claims

1. A gas fire characterised by at least one heat exchanger in the form of a hollow tubular element (1;21;25) made of a thermally conducting material, which extends across a path (15) for convection air in the fire (9) and provides a passage for gaseous combustion products passing to a flue (19) from the fire (9).

2. A gas fire as claimed in claim 1, wherein the hollow tubular element (1;21;25) is generally cylindrical.

3. A gas fire as claimed in claim 1 or claim 2, wherein a number of fins (5) project outwardly from the hollow tubular element (1), each fin (5) extending axially of said hollow tubular element (1).

4. A gas fire as claimed in claim 3, wherein the fins (5) are arranged in groups (3) of three fins.

5. A gas fire as claimed in claim 3 or 4, wherein the hollow tubular element (1;25) is formed by extrusion.

6. A gas fire as claimed in claim 1 or claim 2, wherein a number of fins (23) project outwardly from the hollow tubular element (21), each fin (23) extending circumferentially of the hollow tubular element (21).

7. A gas fire as claimed in claim 1, wherein the hollow tubular element (25) has a partially flattened transverse cross-section.

8. A gas fire as claimed in claim 7, wherein a fin (28) projects outwardly from each end region of the partially flattened hollow tubular element (25), each fin (28) extending axially of the hollow tubular element (25).

9. A gas fire as claimed in claim 7 or 8, wherein the hollow tubular element (25) is arranged so that its reduced transverse dimension is, in use, presented to the flow of convection air along said path (15).

10. A gas fire as claimed in any one of the preceding claims, wherein fins (29) are provided on the inside wall of the tubular element (1;21;25) defining the said passage for gaseous combustion products.

11. A gas fire as claimed in claim 1, wherein a number of said hollow tubular elements (21) are cast as an integral part of a section of a wall (13) used to define said path (15) for convection air.

Fig 2

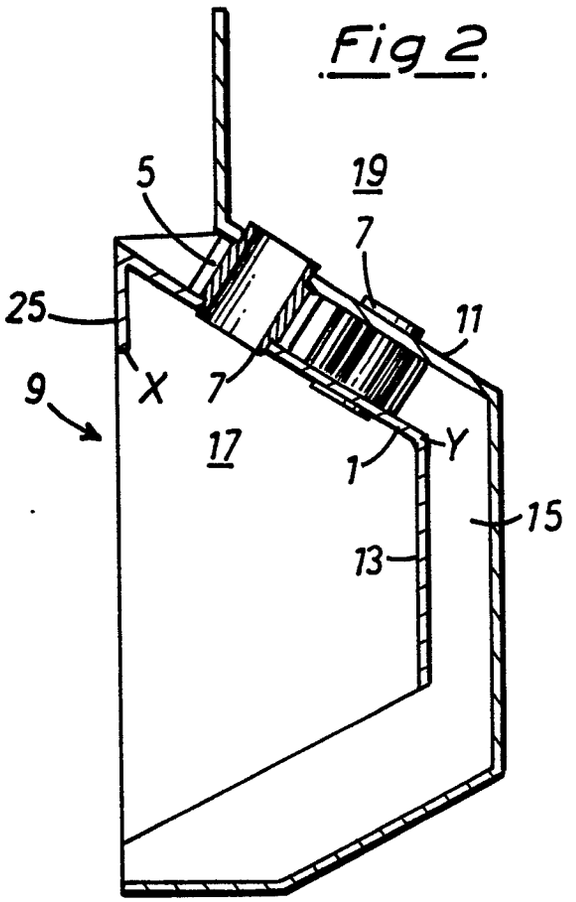
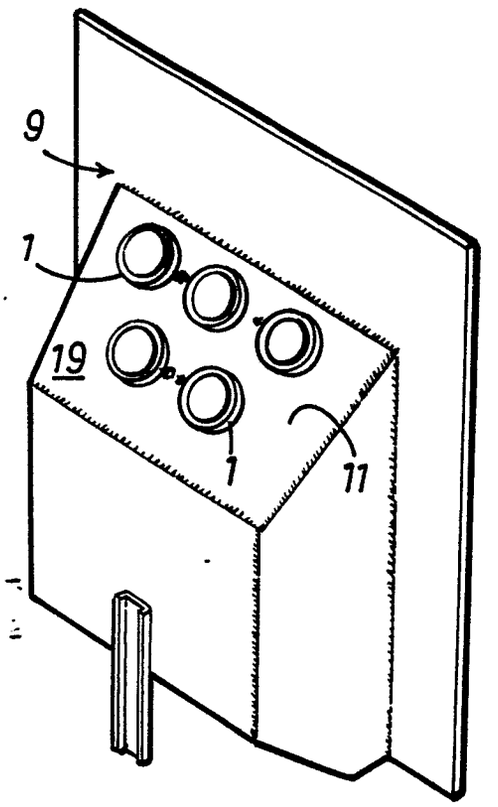


Fig 3



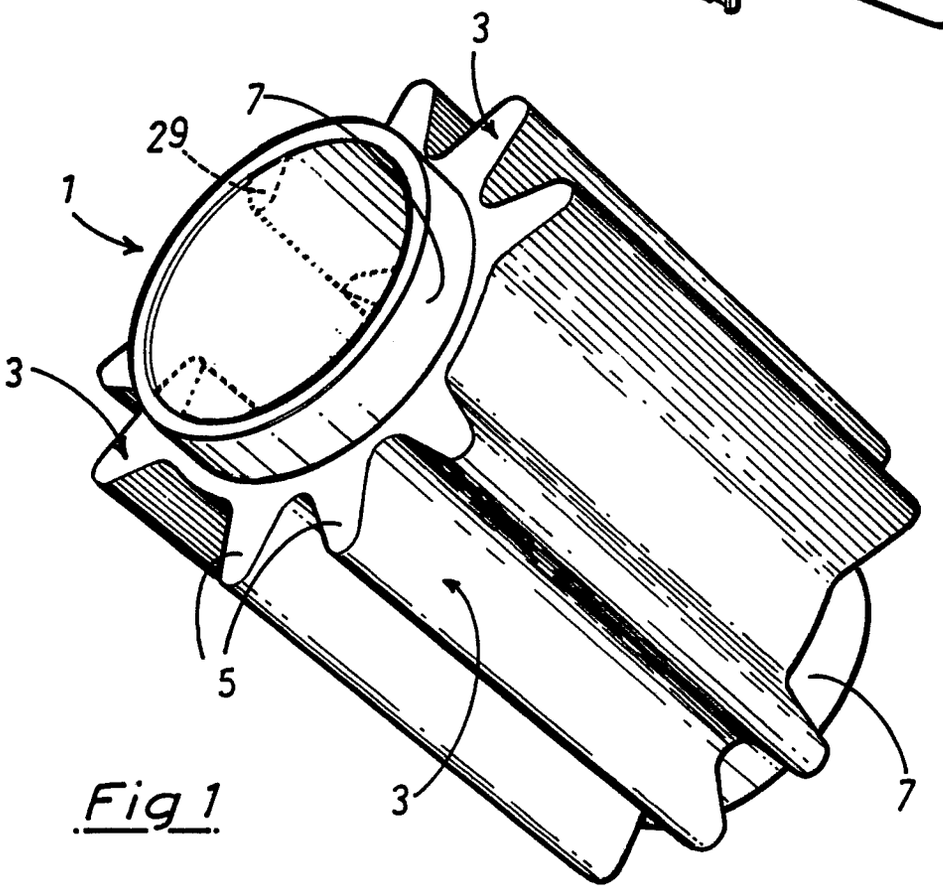


Fig 1

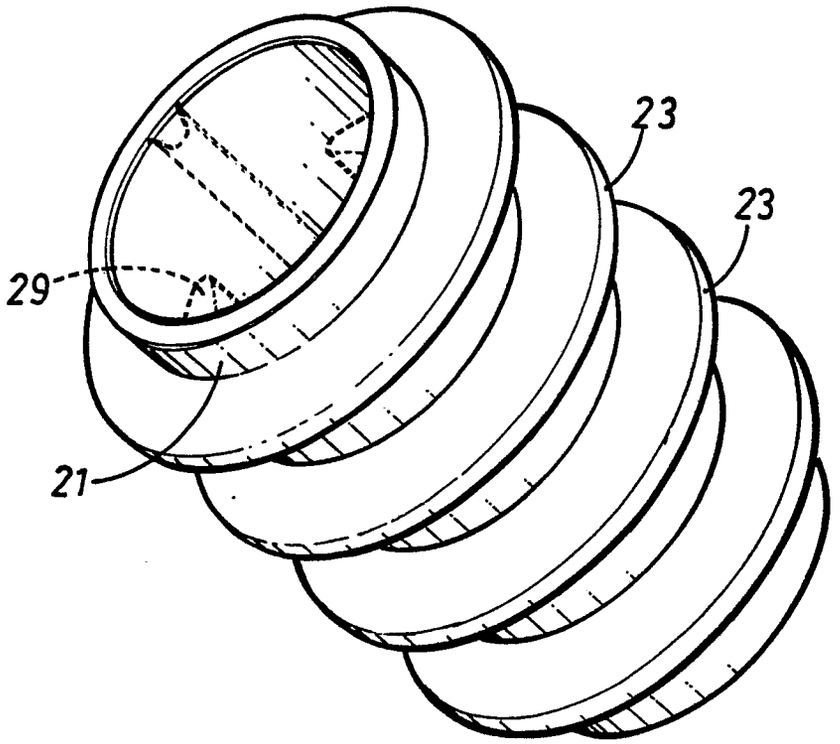


Fig 4

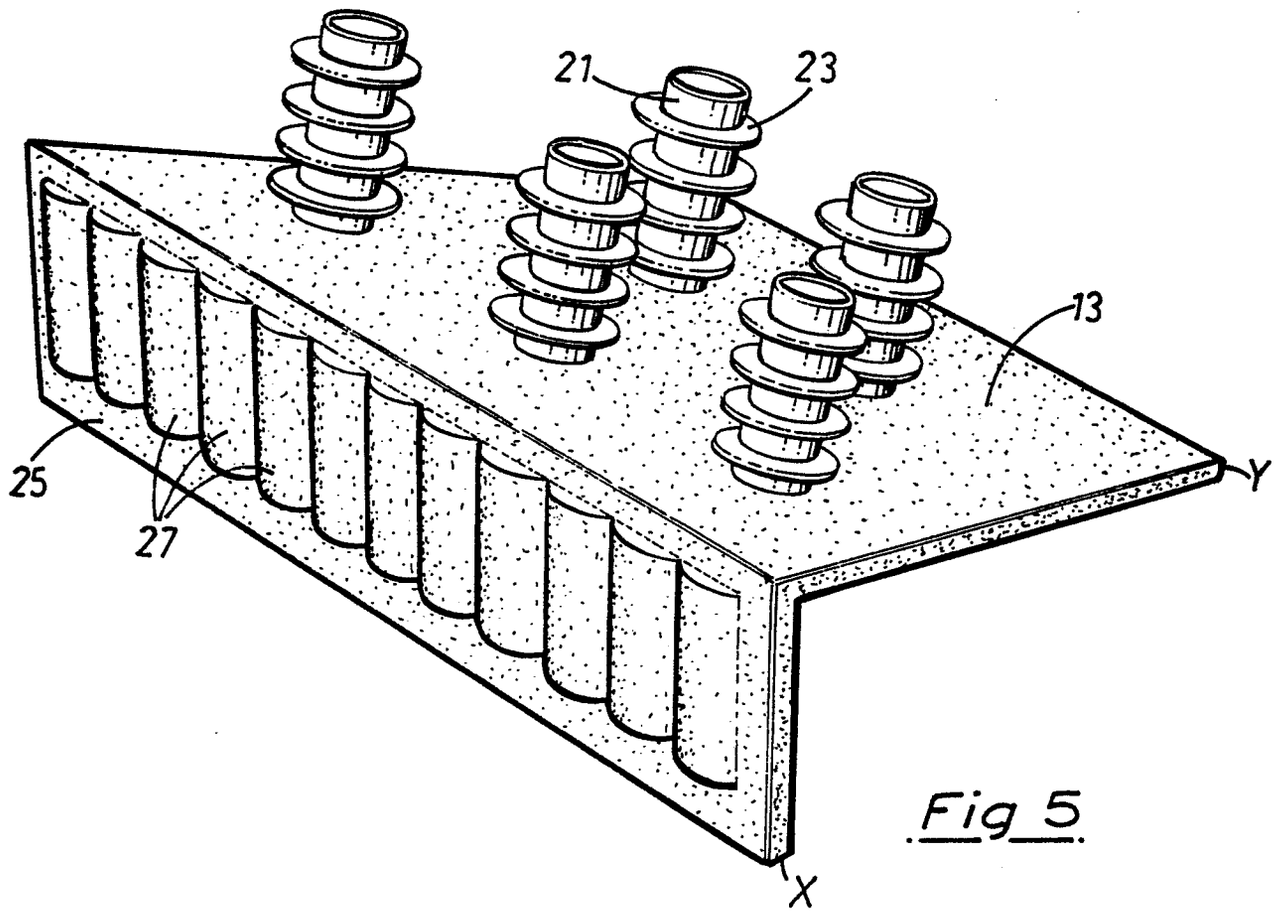


Fig 5

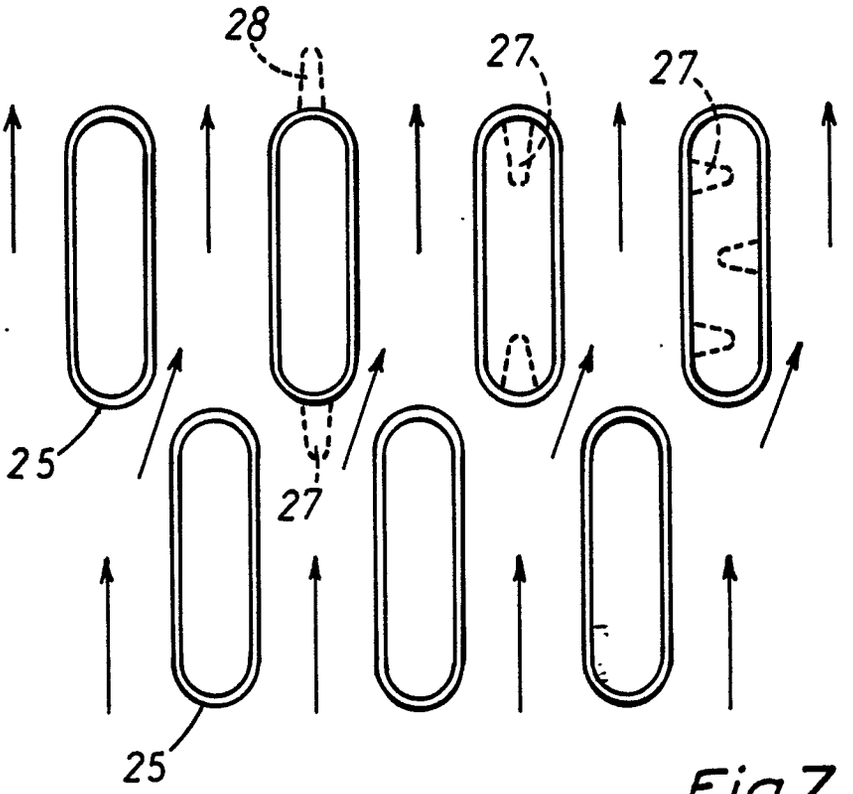


Fig 7

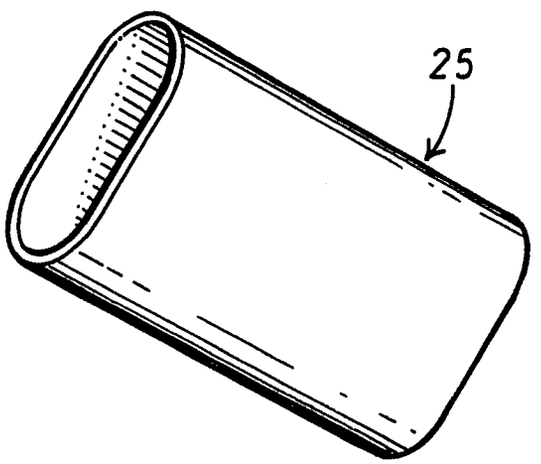


Fig 6