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GB 2184827 A **EP 0244724 A**
DE 029807361 U **DE 019533649 A**
US 6527005 B

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(54) Abstract Title: **Flue condensation trap**

(57) A flue system includes a flue 14, a sump 13 and a condensate trap or collector 20 located between the two. The trap is made of a non-corrodible or corrosion-resistant material and directs liquid collected therein to drainage means. The material may be a chemically-inert synthetic plastic such as glass-filled polyamide. A shallow dish-shaped member 21 sloping down to a central aperture 22 may be included in the trap. The central aperture is connected to a drainage outlet 29. The trap may be used in a condensing boiler with a combustion chamber 10, heat exchanger 11 and flue passage 12.

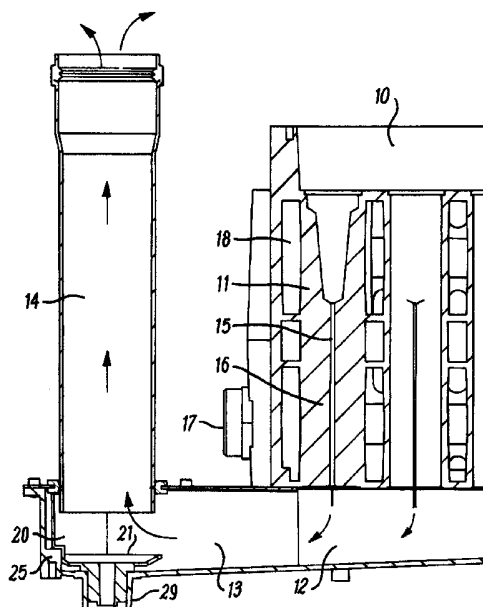


Fig. 1

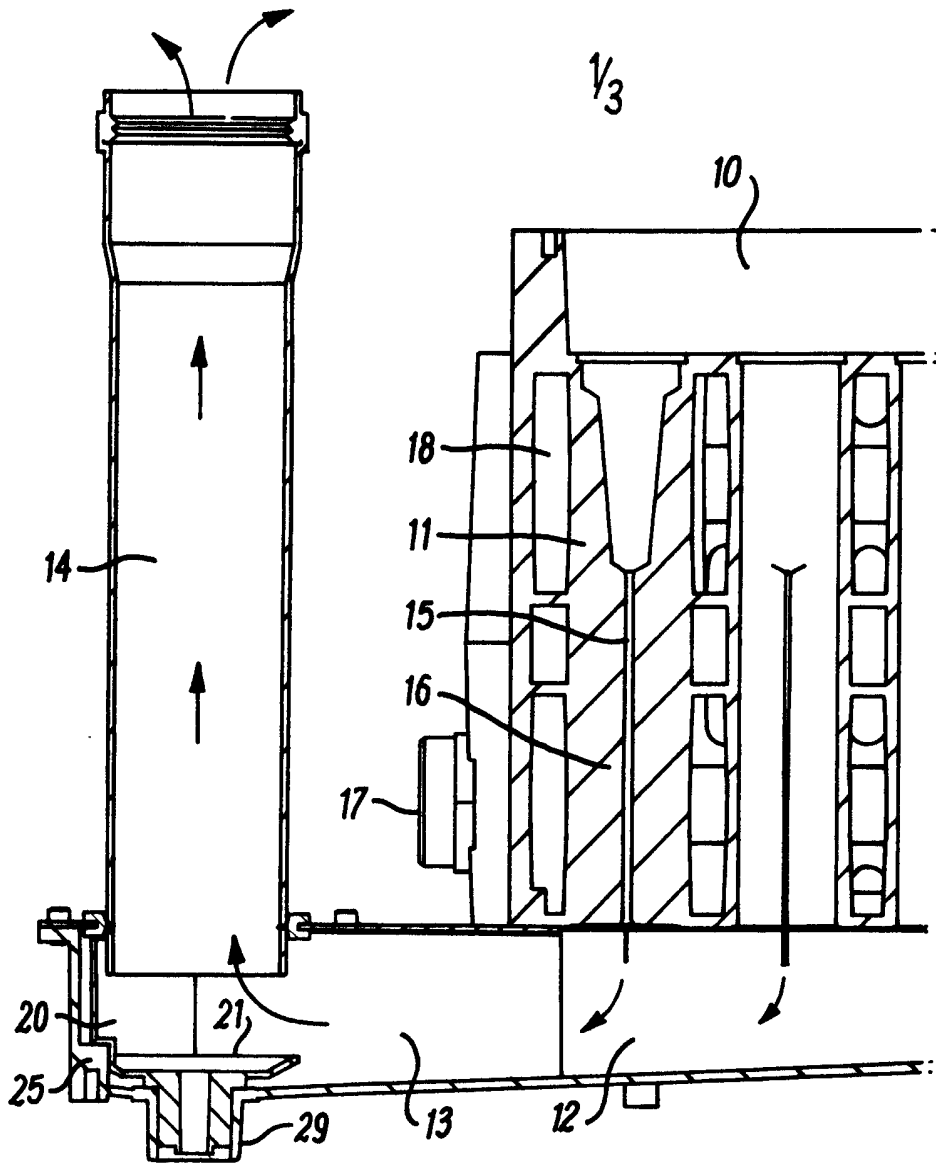
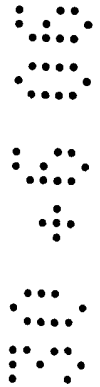
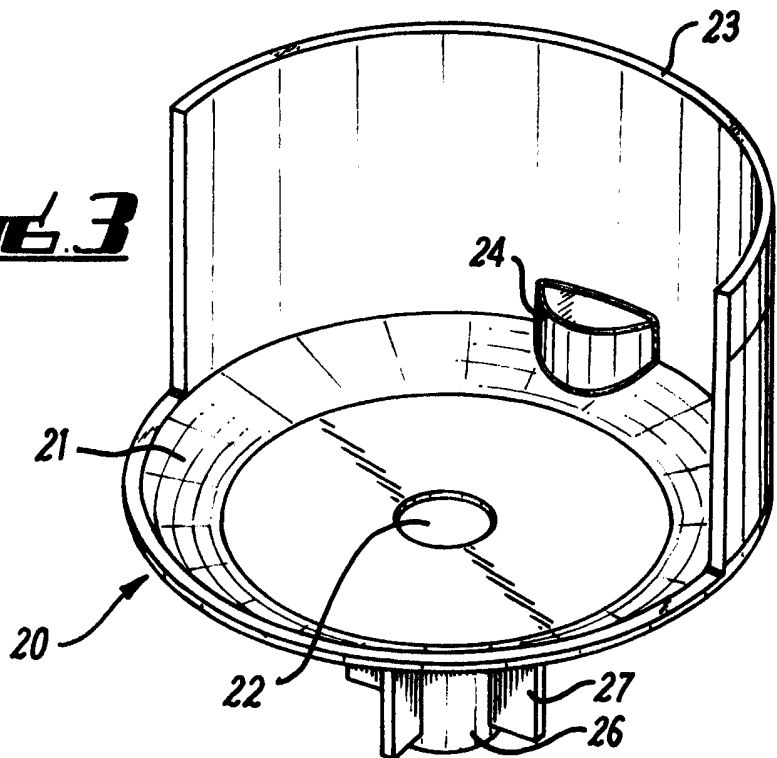
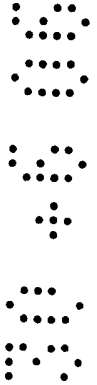
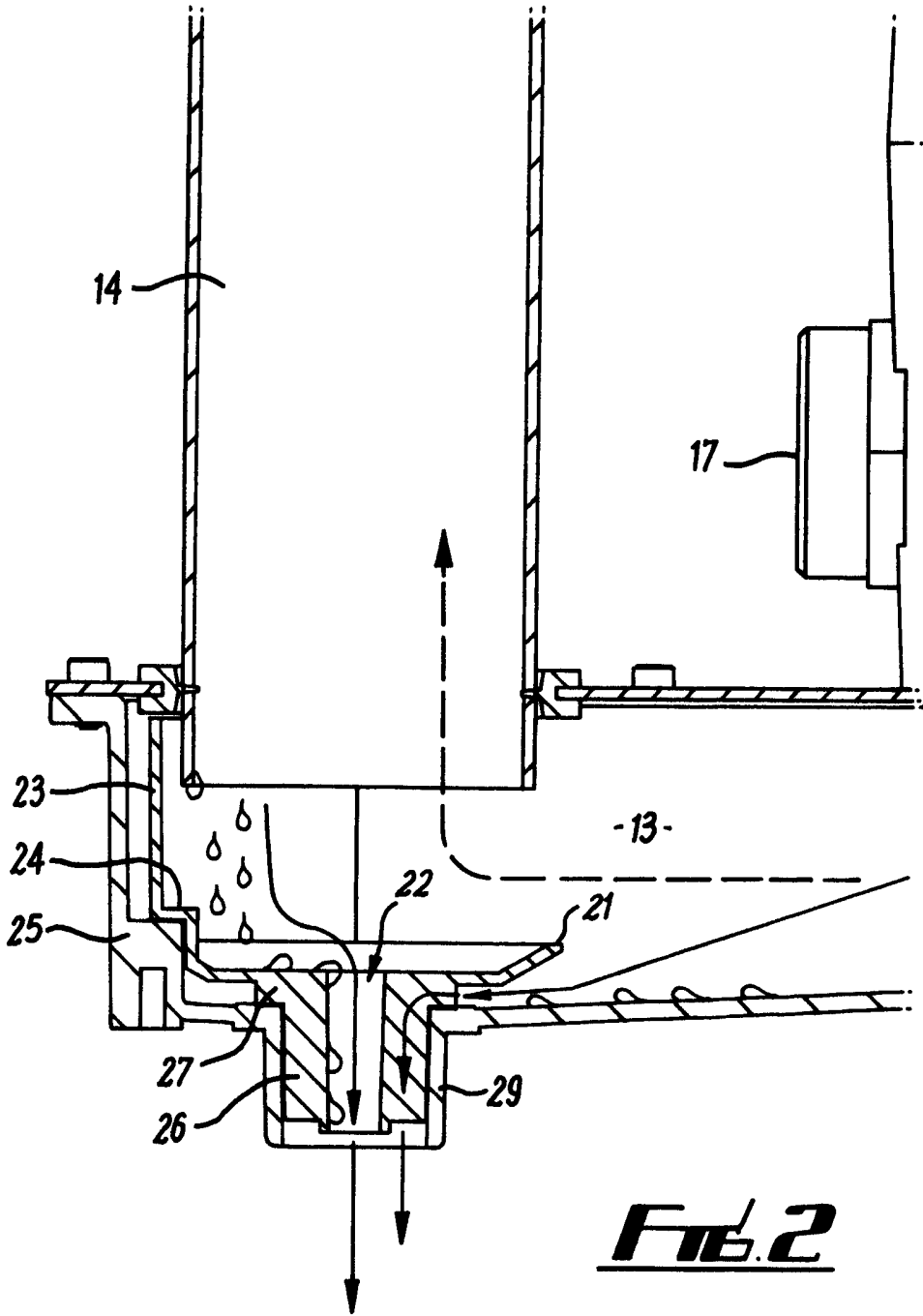


FIG. 1

FIG. 3





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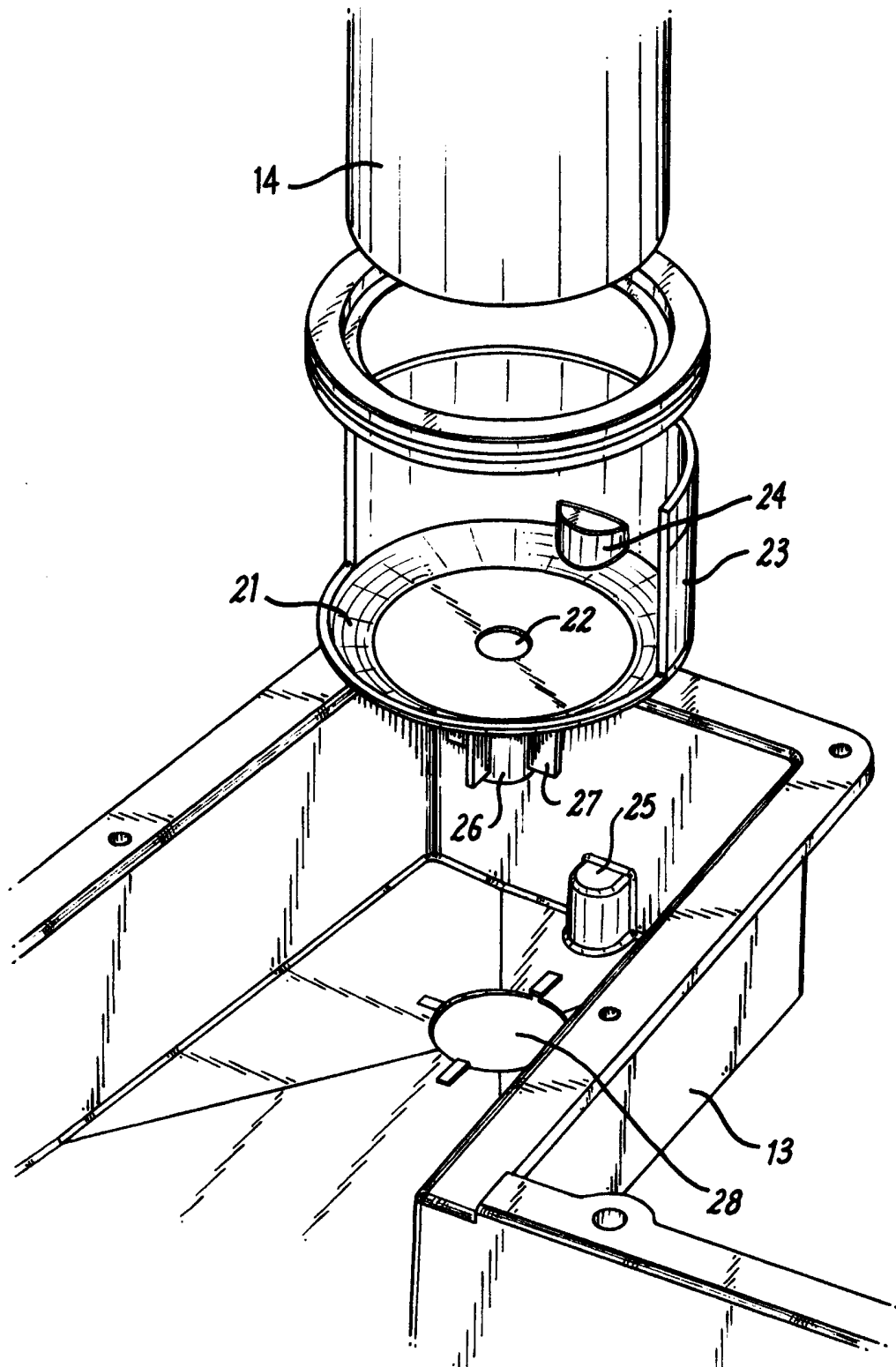
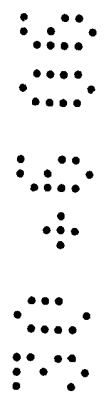


FIG. 4



Flue Condensation Trap

This invention relates to a flue condensation trap for use in conjunction with a condensing boiler.

A condensing boiler produces condensate in a heat-exchanger section, latent
5 heat of vapour in the combustion gases being given up to the fluid in the heating system; and also in flue system, as the gases from the burner further expand and cool and preheat the combustion air in a concentric feed whilst themselves being cooled.

Flue gases contain water vapour, and combustion product gases such as SO₂ and CO₂. The flue itself is usually of aluminium or plastics, and condensed water
10 contains dissolved flue gases and is therefore acidic. The condensate does not react with the flue walls, but tends to run down into the sump which is usually aluminium or stainless steel, and therefore vulnerable to acid corrosion.

It is thus desirable to avoid run down of condensate into the sump, and it is accordingly an object of the invention to provide apparatus for preventing the
15 condensate from collecting in the sump.

According to the invention, a trap or capture device is located between the flue and the sump, which is of non-corrodible or corrosion-resistant material and is adapted to direct liquid collected therein to drainage means.

The trap or collector is advantageously of a chemically inert synthetic plastics
20 material such as a glass-filled polyamide, e.g. containing 30% glass fibre by weight, or a polyolefin such as polypropylene.

The trap or collector is preferably adapted to extend over the sump below the flue, and may comprise a shallow dish-shaped member with a central aperture which is connected to a drainage outlet.

Provision is preferably also made, in addition to catching condensation from the flue stack, to allow condensation from the heat exchanger to enter the drainage outlet. This may be achieved by a clearance being provided below the dish-shaped member so that such condensate from the heat exchanger can drain down on inclined
5 floor below the heat exchanger towards the flue, and pass below the collector into the drainage outlet.

The trap or collector may comprise, in addition to the shallow dish-shaped part, a semi-cylindrical wall or baffle about one half-circular edge, and provided with a locating recess, which forms a step or bulge on the inner surface of the wall or
10 baffle, to cooperate with a matching protrusion in the sump.

The collector may also have a downwardly extending tubular stub, which may be provided with radial fins, below the central aperture and adapted to locate in a boss and centralise the collector in the floor of the sump, which provides the drainage aperture.

15 A preferred embodiment of boiler and flue arrangement, with a flue condensate trap according to the invention, will now be described with reference to the accompanying drawings, wherein:-

Figure 1 is a diagrammatic sectional view of a part of a heat exchanger and associated flue, incorporating a flue condensate trap according to the
20 invention;

Figure 2 is an enlarged detail view showing the lower part of the flue stack, showing the condensate trap in more detail;

Figure 3 is a perspective view of the condensate trap or collector used in Figures 1 and 2; and

Figure 4 is an exploded perspective view showing the assembly comprising the flue stack, trap and sump structure.

As shown in the drawings, a condensing boiler includes a combustion chamber 10, a heat exchanger 11, flue passage 12 below the heat exchanger leading to a sump 13 and a flue stack 14.

Hot gases produced by combustion of a fuel, such as oil or natural gas in the combustion chamber 10, are drawn down via passages 15 through a heat exchange body 16 to the flue passage 12.

Heat distributing medium such as water to be circulated from the boiler after heating is drawn in through inlet 17 and circulated through cooling jacket spaces 18 where it forms a heating medium for circulation from the boiler installation.

Heating of the circulated water in spaces 18, cools the combustion gases so that water condenses out of the gases and runs down into the passage 12. This water is acidic as it has dissolved in it acid oxides such as SO_2 and CO_2 which are produced in the combustion stage. The condensate is this highly corrosive, particularly but not exclusively, to iron and steel. The passage 12 has a floor which slopes down towards the sump to allow the condensate to run down to the sump.

The flue gases pass along the passage 12 and then rise up the flue stack 14, cooling further as they do so partially due to adiabatic cooling, and partially due to conduction to the air-cooled walls of the stack, and vent to atmosphere from the top of the stack.

This further cooling allows further condensation to occur, and the condensate runs down the inner surface of the stack 14 into the sump 13.

In accordance with the invention, a condensate trap 20 or catcher is provided in the sump, below the lower end of the stack 14. This trap 20 comprises a shallow dished member 21, which slopes down to a central aperture 22.

The member 21 has a circular rim, half of which is exposed and faces towards the passage 12 to allow flue gasses to access the bottom of the stack 14. The other half of the rim carries a semi-cylindrical wall or baffle 23, which prevents contact by the flue gasses with the outer wall of the sump 13. The wall 23 is formed with a locating step 24, which forms a projection into the member 21, and a recess to the outer face of the wall 23 and member 21. This cooperates with a projection 25 on the inside of the wall of the sump, which serves to locate the trap in the sump below the flue stack 14.

The dish-shaped member carries on its underside a downwardly projecting tubular stub 26, which is formed with locating fins 27, which enters and protrudes down from a drainage aperture 28 formed in the floor of the sump 13, within a boss 29. The fins 26 rest on the floor of the sump and create a clearance between the underside of the member 21 and the floor of the sump and centralise the trap in the sump, so that condensate running down the floor of the sump can enter the drainage aperture 28.

The trap or collector 20, and the boss 29 defining the drainage aperture are advantageously formed of a chemically inert plastics material, such as a glass fibre filled polyamide, e.g. with 30% glass fibre by weight a polyolefin, i.e. polyethylene or polypropylene. These parts prevent the acidic condensate from contacting or collecting on surfaces of metallic especially ferrous parts which might be susceptible to chemical attack or corrosion due to being contacted with acid containing water.

Within the scope of the invention, the shape and configuration of the parts forming the trap may be varied as desired or necessary, for example to fit in different embodiments of flue construction.

Claims

1. A flue condensation trap in a flue system including a flue and a sump, wherein in order to prevent condensate from collecting in the sump, a trap or collector device is located between the flue and the sump which is of
5 non-corrodible or corrosion-resistant material and is adapted to direct liquid collected therein to drainage means.
2. A trap according to claim 1, wherein the trap or collector is of a chemically inert-synthetic plastics material.
3. A trap according to claim 2, wherein the plastics material is a glass-filled
10 polyamide.
4. A trap according to any preceding claim which extends over the sump below the flue and comprises a shallow dish shaped member with a central aperture which is connected to a drainage outlet.
5. A trap according to claim 4, wherein a clearance is provided below the dish
15 shaped member whereby condensate from a heat exchanger can drain down an inclined floor between the heat exchanger towards the flow and pass below the trap or collector into the drainage outlet.
6. A trap according to claim 4, wherein the collector comprises, in addition to the shallow dish-shaped part, a semi-cylindrical wall or baffle about one
20 half circular edge, the wall being provided with a locating recess, which forms a step or bulge on the inner surface of the wall or baffle to cooperate with a matching protrusion in the sump.
7. A trap according to claim 6, wherein the collector further has a downwardly extending tubular stub, below the central aperture and adapted

to locate in a boss on the floor of the sump which provides the drainage aperture.

8. A trap according to claim 7, wherein the tubular stub is provided with radial fins to centralise the component within the sump outlet.
- 5 9. A flue installation comprising a flue passage and a flue stack, provided with a flue condensation trap according to any one of claims 1 to 8.



For Innovation

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Application No: GB0606499.2

Examiner: Ian Blackmore

Claims searched: 1-9

Date of search: 21 July 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1,2,3,4,9	DE19533649 A (KEUL) see abstract and figures 1-6
X	1,2,3,9	US6527005 B (WEAVER) see figures 6-11
X	1,2,3,9	DE29807361 U (STIEBEL) see abstract and figure
X	1,2,3,9	EP0244724 A (PLEIN et al) see figure 1 and 2
X	1,2,3,9	GB2184827 A (EISING) see figures 1 and 3

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

F4A

Worldwide search of patent documents classified in the following areas of the IPC

F24D; F24H

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI