(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 232 990**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **87300461.8**

(51) Int. Cl.[4]: **F 24 D 5/08**

(22) Date of filing: **20.01.87**

(30) Priority: **20.01.86 DE 3601457**

(43) Date of publication of application:
19.08.87 Bulletin 87/34

(84) Designated Contracting States:
AT BE CH DE FR GB LI LU NL

(71) Applicant: **COLT INTERNATIONAL HOLDINGS A.G.**
Alpenstrasse 14
CH-6300 Zug (CH)

(72) Inventor: **Janssen, Norbert**
Schwaneneck 5
D-4194 Bedburg-Hau 1 (DE)

Suerick, Johannes
Dechantshof 8
D-4194 Bedburg-Hau 1 (DE)

(74) Representative: **Slight, Geoffrey Charles et al**
Graham Watt & Co. Riverhead
Sevenoaks Kent TN13 2BN (GB)

(54) **Heating appliance.**

(57) To obtain more uniform heating of a radiator tube (2), heated internally by gases from a gas burner (4), the tube is provided, in a first longitudinal portion (11), with a multi-walled construction wherein an inner tube (7, 10) is disposed in the portion (11) co-axially to and with radial spacing from an outer tube (8), and only the inner tube (7, 10) is acted upon by heating gases from the burner (4), there being a continuous gap (9) formed between the inner tube (7, 10) and outer tube (8) that opens freely into the outside air at one end.

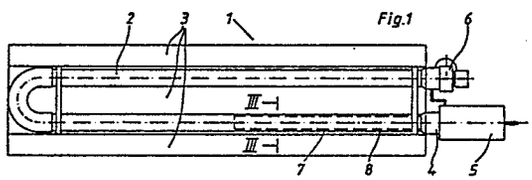

Fig.1

EP 0 232 990 A1

Description

HEATING APPLIANCE

The invention relates to a heating appliance having a radiator tube which is acted upon internally by heating gases from a gas burner connected to the tube at one end.

Heating appliances of this type are used, in particular, for large area or open places of work in which a temperature-stabilization of the (room) air would be difficult or impossible. It has been found that heating a place of work with heat radiators, particularly with low-temperature heat radiators with internal heating by gas, is not only effective but also economical.

In case of heating appliances of the type here under consideration, a particular advantage lies in the fact that a long radiator tube with relatively low temperatures produces a long-wave and therefore gentle radiation of heat which can be well apportioned and purposefully directed in a place of work without heavy losses of waste gas or heat occurring.

A particular difficulty in this case, however, is to adhere to an optimum working range wherein the tube temperature is sufficiently high for the required heat output but not so high that, with common materials such as steel, it leads to destruction of the tube or exceeds a limiting temperature of 500°C for example prescribed for such installations. Accordingly, it can happen that the radiator tube is above the desired or prescribed temperatures near the gas burner but carries a temperature which is ineffectual for the radiation at the other end as a result of cooling down.

To mitigate this problem it has been proposed e.g. in U.S. - A - 4,529,123 to provide a first longitudinal portion of the radiator tube with internal shielding limiting the heating of the radiator tube.

The object of the invention is to provide a radiant heating appliance which is heated by a gas burner and which renders possible the most effective and large-area radiation possible without dropping below or exceeding preset limiting temperatures of the tube surface.

According to the invention, this problem is solved starting from a heating appliance in accordance with the preamble to Claim 1 with the characterising features of Claim 1.

With shielding in a first portion of the radiator tube, in part by room air conveyed through the tube, the heat transfer to the tube surface and hence its temperature can be reduced so that overheating above the temperature range to be regarded as particularly favourable and particularly also above prescribed temperature values is avoided in this part of the tube. At the same time, the effect can thus be achieved that, in the further course of the tube, the heating gases supplemented by the conveyed air cause a higher surface temperature and so also better activate the rear end of the radiator tube.

Whereas the radiator tube is preferably of thick-walled design so that, with great thermal inertia, it ensures a uniform temperature radiation even when the gas burner is adjusted to an average preset heating power in intermittent operation, the inner tube can be thin walled in construction. In order to avoid oxidizing, it is preferably formed of stainless steel.

Further features and advantages of the invention are apparent from the Claims and the following description in which two examples of embodiment of the subject of the invention are explained in more detail with reference to a drawing. In the drawing:

Figure 1 shows a view of a heating appliance from below,

Figure 2 shows a side view of the heating appliance of Figure 1,

Figure 3 shows a section through a radiator tube on the line III-III in Figure 1 and

Figure 4 shows a section corresponding to Figure 3 through a modified radiator tube.

A heating appliance 1 as shown in Figures 1 and 2 comprises an elongated radiator tube 2 of U-shape which is mounted in a shell-shaped reflector 3 and is connected at one end to a gas burner 4 which projects with its combustion chamber out of a combustion housing 5 in which a solenoid valve is also accommodated to control the supply of gas, and at the other end to a waste-gas blower 6.

Such a heating appliance, heated by the heating gases supplied by the gas burner 4 and drawn through the radiator tube 2 by the waste-gas blower 6, acts essentially as a radiator even if the heating gases also deliver a residual proportion of heat as warm air which can be used for the heating. Operation of the radiator tube at relatively low temperatures of 300°C for example, is particularly advantageous, with low-frequency heat radiation which can be directed, without great dispersion losses and convention losses, onto a place of work where it acts with a satisfactory consistency.

The radiator tube may, for example, be constructed in the form of a thick-walled steel tube in order to provide a heat storage capacity which can bridge the intervals in combustion even in intermittent operation with periodic switching-on times of the gas burner and even out the radiation.

The temperature drop of the heating gases and the resulting temperature drop of the radiator tube may stand in the way of an effective and uniform utilization of the radiator tube. Thus, at the beginning of the radiator tube, for example, shortly behind the gas burner, no temperature of more than 500°C should occur which would stress the tube material, shift the heat radiation into a shorter wave range which is already no longer desirable and in addition may be contrary to the building regulations. On the other hand, the end at the blower side should not be cooled down too much to be able to contribute appreciably to the total radiation.

Here this is met by a partial internal shielding of the radiator tube 2 in the form of an inner tube 7 which lies coaxially to an outer tube 8 as a continuation of the rest of the radiator tube in this region and forms in cross-section, in relation to the

outer tube, a free annular gap which extends over the whole length of the inner tube.

The inner tube 7 is connected directly and tightly to the gas burner 4 so that the gas burner only feeds into the inner tube 7. In the region of the gas burner 4, the annular gap between inner tube and outer tube is open to the ambient air; it is also open continuously as far as the rest of the radiator tube 2 so that the waste-gas blower 6 can draw in additional air through the annular gap. Thus relative cooling of the first, thermally highly stressed region of the tube and an extension of the emission of heat over the radiator tube 2 are achieved.

Because of the high temperature loading, the inner tube 7 is preferably made of stainless steel. It may, however, since it is only intended to have a shielding function and not a heat storage function, be of thin-walled construction with a view to a saving in costs, for example having a wall thickness of 0.8 to 1.22 mm, while the annular gap between the tubes has a gap width of preferably 3 to 3.5 mm. The length of the inner tube 7 is 45% to 55% of the length of the straight portion of the radiator tube in which it is disposed and accordingly constitutes about 1/4 of the total length of the radiator tube.

Figure 3 illustrates the cross-sectional relationships between inner tube 7, outer tube (and radiator tube) 8 and an annular gap 9 situated in between. In comparison Figure 4 shows a modified form of embodiment wherein a hexagonal inner tube 10 is disposed in an identical outer tube 8. It is understood that other polygonal cross-sections may also be provided in order to obtain exteriors favourable to flow or simple possibilities for centering the inner tube.

It will be understood that the shielding aimed at here is achieved in the first instance by the multi-wall construction in a first longitudinal portion 11 determined by the length of the inner tube 7 while the conveying of additional air round the shielding inner tube further distributes the heating along the radiator.

It will further be understood that the inner tube may also be formed from another material, such as ceramic.

Claims

1. A heating appliance having a radiator tube which is acted upon internally by heating gases from a gas burner connected at one end, wherein the radiator tube (2) is provided, in a first longitudinal portion (11), with internal shielding (7, 10) limiting the heating of the radiator tube characterised in that the shielding (7, 10) is provided by a portion of tube of multi-walled construction wherein an inner tube (7, 10) is disposed in the longitudinal portion (11), coaxially to and with radial spacing from an outer tube (8), and only the inner tube (7, 10) is acted upon by heating gases from the gas burner (4) there being a continuous gap (9) formed between inner tube (7, 10) and outer tube (8) that opens freely into the outside air at one end.

2. A heating appliance as claimed in Claim 1, characterised in that inner tube (7, 10) and the outer tube (8) change over openly into a common run of tube.

3. A heating appliance as claimed in Claim 1 or 2, characterised in that the inner tube (7, 10) is made thin-walled from stainless steel.

4. A heating appliance as claimed in any preceding Claim, characterised in that the inner tube (10) has a polygonal cross-section.

5. A heating appliance as claimed in any preceding Claim, characterised in that the outer tube (8) continues with the same cross-section in the further radiator tube (2).

6. A heating appliance as claimed in any preceding Claim, characterised in that the longitudinal portion (11) occupies about a quarter of the total length of the radiator tube (2).

7. A heating appliance as claimed in any preceding Claim, characterised in that the radiator tube (2) has a U-shaped longitudinal course with two straight uniform tube portions and one elbow portion.

8. A heating appliance as claimed in any preceding Claim, characterised in that the radiator tube (2) is a thick-walled steel tube.

9. A heating appliance as claimed in any preceding Claim, characterised in that the radiator tube (2) is connected to a blower offtake (6) at the end.

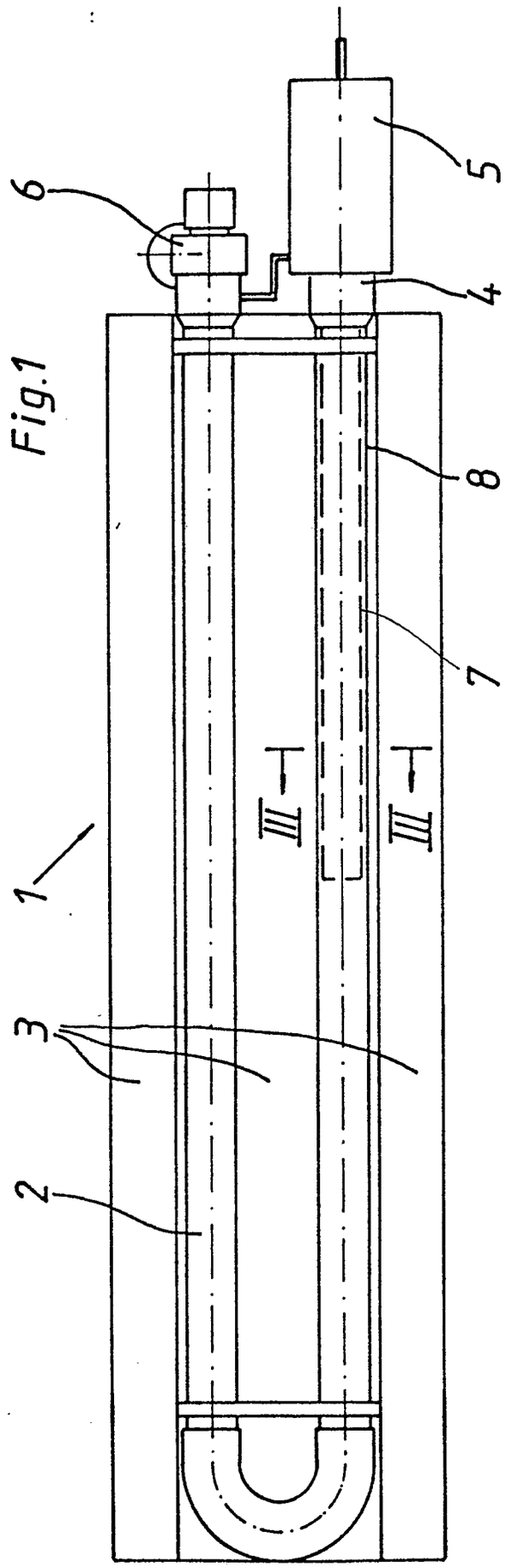

Fig.1

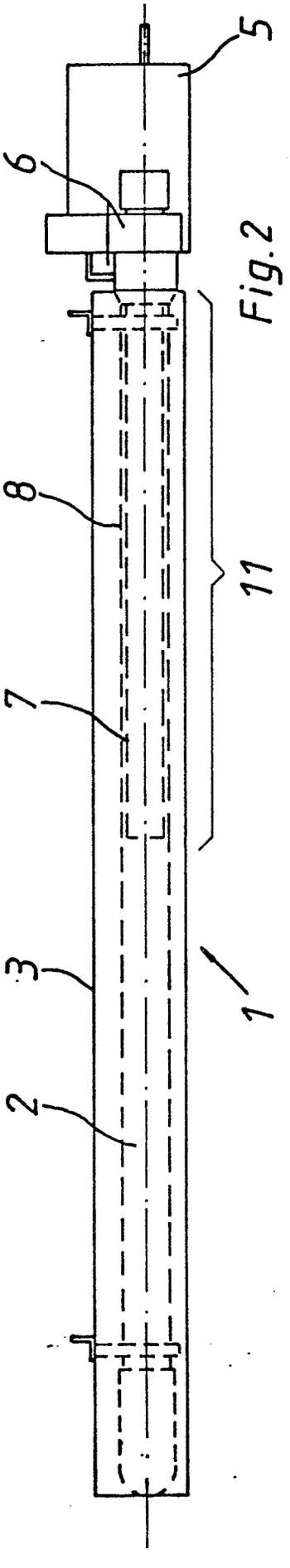

Fig.2

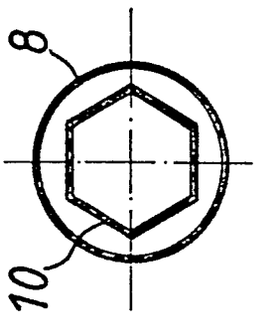

Fig.4

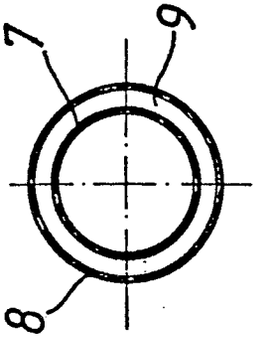

Fig.3

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 87 30 0461

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X,D	US-A-4 529 123 (JOHNSON) * Whole document *	1,2,5, 9	F 24 D 5/08
Y		7	
Y	EP-A-0 164 221 (COLT) * Abstract *	7	
A	EP-A-0 070 360 (PHOENIX BURNERS LTD) * Page 9 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 24 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-04-1987	VAN GESTEL H.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03.82