

**Porous material catalytic combustion burner and flask
equipped with a burner of this kind**

5 The present invention concerns a porous material
catalytic combustion burner having in its lower part a
substantially axial cavity adapted to receive a wick
designed to feed a combustible liquid to the burner and
in its upper part an annular peripheral area supporting a
catalyst and surrounding a central area with no catalyst
10 forming a vaporisation area.

A burner of the above kind is described in patent
FR-B-2 610 390 in the name of the applicant, for example.

15 The combustible liquid fed by the wick enters the
pores of the porous material of the burner. Some of this
liquid reaches the annular peripheral area supporting the
catalyst and there undergoes catalytic combustion which
maintains this peripheral area at a high temperature.

Another part of this liquid passes through the
central area of the burner where it is vaporised.

20 Regularly topping up the combustible liquid in the
flask equipped with a burner of the above kind is
recommended but experience shows that many users forget
to turn off the burner and allow it to function until all
of the combustible liquid is consumed.

25 When there is no more combustible liquid in the
flask the wick dries out and the upper end of the wick,
trapped in the upper part of the cavity of the burner in
contact with the hot walls of that cavity, tends to burn
in the absence of oxygen and to carbonise, which produces
30 free particles of carbon which block the pores of the
burner. The same applies to the last usable amounts of
combustible liquid transported by the wick at a
decreasing flowrate, which no longer pass through the
walls of the burner and incomplete combustion of which
35 also releases amorphous carbon particles. The burner

therefore loses efficiency, becomes unusable and must be changed.

FR-B-2 483 782 in the name of the applicant discloses a burner in the form of an annular catalytic disk made up of inert materials mixed with a catalyst. 5 The disk has an axial hole through it into which is inserted a skirt that extends as far as a tubular wick and that does not contain any catalyst. The upper part of the tubular wick surrounds the skirt under the annular disk. 10 A second wick is disposed inside the tubular wick and is inserted in the skirt.

A burner of this kind has never been developed beyond the prototype stage, firstly because of its complexity and secondly because the two wicks tend to carbonise rapidly in contact with the hot annular catalytic disk. 15

The aim of the invention is to remedy the drawbacks of the catalytic combustion burner of the aforementioned type and to propose a burner of that type in which there is no risk of the wick carbonising even if a user forgets to turn off the burner and allows it to function until all of the combustible liquid contained in the flask has been consumed. 20

The catalytic combustion burner of the aforementioned type in accordance with the invention is characterised in that it includes in its upper part at least one open passage through which the upper part of the cavity communicates with the atmosphere. 25

The open passage enables a continuous feed of oxygen into the upper part of the cavity. Accordingly, after complete combustion of the combustible liquid the dried out wick in contact with the walls of the burner can, if the latter are too hot, burn with complete combustion of the components of the wick and the final amounts of combustible liquid, producing CO_2 and H_2O in 35

gaseous form. This prevents the production of carbon particles that can block the pores of the burner.

5 The passage also provides an inlet for fresh air that accelerates the cooling of the interior walls of the cavity with the result that combustion of the wick stops more quickly than previously.

10 In contrast to the annular catalytic disk burner in which the coaxial wicks used to carbonise rapidly in contact with the walls of said annular disk despite the presence of the axial hole receiving the central wick, the open channel through which the upper part of the cavity communicates with the atmosphere prevents the phenomenon of carbonisation even if its diameter is small compared to that of the cavity.

15 It is therefore possible to allow the burner to function until all of the combustible liquid contained in the flask equipped with said burner is consumed without risk of damaging said burner.

20 In one advantageous version of the invention said passage is substantially axial and preferably has a diameter between substantially one quarter and substantially one half the diameter of the cavity.

25 Another aspect of the invention concerns a catalytic combustion flask adapted to contain a combustible liquid and the neck of which is adapted to receive a catalytic combustion burner receiving a wick dipping into said liquid.

30 In accordance with the invention, the above flask is characterised in that it is equipped with a burner in accordance with the first aspect of the invention.

Other features and advantages of the present invention will become apparent in the following detailed description.

35 In the accompanying drawings, given by way of non-limiting example only:

- figure 1 is a schematic view in elevation of a flask equipped with one embodiment of a catalytic combustion burner in accordance with the present invention;

5 - figure 2 is a schematic view to a larger scale and in axial section of the burner shown in figure 1;

- figure 3 is a view similar to figure 2 showing one embodiment of a support of the burner from figure 2;

10 - figure 4 is a view similar to figure 2 showing one embodiment of a base adapted to receive the support from figure 3;

- figure 5 is a bottom view of the support from figure 3;

15 - figure 6 is a bottom view of the base from figure 4;

- figure 7 is a view similar to figure 2 showing one embodiment of a tubular extension of the support from figure 3; and

20 - figure 8 is a view similar to figure 2 of another embodiment of the present invention.

Figure 1 shows a catalytic combustion flask 1 adapted to contain a combustible liquid 2 and the upper part of which is adapted to receive catalytic combustion burner 3 receiving a wick 4 dipping into said liquid 2.

25 The flask 1 can have any shape featuring a neck 5 to which the burner 3 is fitted.

30 The combustible liquid 2 is usually alcohol, for example isopropyl alcohol, or any other appropriate liquid fuel compatible with the regulations in force. In particular, the fuel must be such that its vaporisation and its catalytic combustion do not produce unpleasant smells.

The combustible liquid can additionally contain a perfumed material and/or an active material.

35 The wick 4 is any kind of wick known in itself, for

example a cotton wick. The wick can equally well be a mineral material wick, for example a mineral fibre wick.

As shown in detail in figure 2, the catalytic combustion burner 3 is made from a porous material, for example a material based on kaolin.

The lower part 3a of the burner 3 includes a substantially axial cavity 6 adapted to receive a wick 4 designed to feed a combustible liquid 2 to the burner 3. The cavity 6, which is open at the lower extremity 3c of the burner 3, extends axially over a major part of the axial dimension of the burner 3.

The upper portion 3b of the burner 3 includes an annular peripheral area 7 supporting a catalyst, for example a catalyst based on a metal from group VIII of the periodic table of the elements. The annular peripheral area 7 surrounds a central area 40 with no catalyst forming a vaporisation area.

In accordance with the invention, the burner 3 is characterised in that its upper part 3b includes at least one open passage 8 through which the upper part 24 of the cavity 6 communicates with the atmosphere.

In the example represented, the passage 8 is substantially axial, in particular for aesthetic reasons.

The passage could very well extend in a direction other than the axial direction, provided that it is capable of feeding fresh air into the upper part 24 of the cavity 6 without impeding catalytic combustion.

The diameter of the passage 8 is preferably between substantially one quarter and approximately three quarters the diameter of the cavity 6.

Accordingly, for a cavity with an inside diameter of approximately 7 mm the passage preferably has a diameter in the range 2 mm to 3 mm.

In the conventional way, as shown in figure 2, the burner 3 has a substantially axial annular groove 9

extending downwards from the upper surface 10 of the burner 3 and having a diameter greater than that of the cavity 6.

5 Figure 2 shows that the annular groove 9 extends axially a distance greater than the thickness of the wall separating the cavity 6 from the upper surface 10 of the burner.

10 The groove 9 clearly separates the peripheral area 7 that supports the catalyst from the central area 40 of the upper part 3b.

Catalytic combustion of the combustible liquid and catalytic destruction of organic gases in the atmosphere around the burner occur in contact with the peripheral area 7 that supports the catalyst, as symbolised by the
15 arrows 25 in figure 1. During operation of the burner the area 7 is at a temperature of several hundred degrees centigrade.

The temperature is substantially lower in the central area 40 separated from the peripheral area 7 by
20 the annular groove 9. The combustible liquid simply vaporises, accompanied by dispersion of the perfumed material contained in the liquid, as symbolised by the arrows 26 in figure 1.

The burner 3 has a peripheral shoulder 11
25 separating the upper part 3b of relatively larger diameter from the lower part 3a of relatively smaller diameter, as shown schematically in figure 2. The shoulder 11 is received by a complementary shoulder 12 of a support 13 surrounding at least the lower part 3a of
30 the burner 3.

The burner 3 can be retained to the support 13 by a bracket (not shown) the ends of which engage in notches 27 in the wall forming the shoulder 12 of the support 13.

35 The burner 3 can be retained to its support 13 by any other means, for example by crimping the

substantially cylindrical lower part 13a of the support 13 around the lower part 3a of the burner 3.

In the example represented in figure 3 the support 13 has an axial length substantially equal to the axial
5 length of the lower part 3a of the burner 3.

The lower part of the support 13 has a plurality of lugs 14 directed substantially radially inwards to grip and retain the wick 4 inside the cavity 6 of the burner 3 fitted to the support 13.

10 The support 13 can be inserted directly into the neck 5 of the flask 1.

As shown schematically in figure 4, the support 13 is usually introduced into the central hole 15 of a base 16 adapted to be fixed to the neck 5 of the flask 1. The
15 base 16 has a lower skirt 17, for example, adapted to be crimped around an annular enlargement 18 of said neck 5.

Figures 4 and 6 show that the base 16 represented includes at least one hole 19 through which the interior of the flask 1 communicates with the atmosphere. In this
20 example the hole 19 is in a peripheral wall 20 above the neck 5 and communicating directly with the interior of the flask 1.

The support 13 advantageously extends downwards beyond the lower extremity 3c of the burner 3.

25 In the example represented in figure 7 the support 13 is extended downwardly beyond the lower extremity 3c of the burner 3 by a tubular extension 20 adapted to fit over the lower part of the support 13.

In this example the tubular extension 20 has at
30 least one section with a constriction 21 to grip the wick 4 and to limit capillary feeding of combustible liquid to the burner 3 by the wick. Similarly, the support 13 includes at least one hole 22 through which the inside of the flask 1 communicates with the atmosphere.

35 The elongate support 13, or the support fitted with

its tubular extension 20, primarily encourages the user of the burner 3 to position the support 13 and the burner 3 perfectly on the base 16 along the axis 23 common to the neck 5, the base 16, the extension 20, the support 13 and the burner 3. This avoids the common fault of a burner 3 being lit when it is not in the correct position on the base 16, as a result of which the flame produced by combustion of the combustible liquid at the surface of the burner can extend down the wick as far as the interior of the flask 1 in which there is an explosive mixture of air and combustible liquid vapour.

The heavier assembly formed by the burner 3, the support 13, the tubular extension 20 and the wick 4 tends to locate of its own accord on the base 16. Otherwise, if it is not introduced into the central hole 15 of the base 16, this assembly tends to hang completely outside the flask in an abnormal position that encourages the user to replace it into the normal axial position.

Tests carried out by the applicant on the improved burner described hereinabove and a flask fitted with a burner of this kind placed on a support 13 fitted with an extension 20 and engaged on a base 16 with a hole 19 through it have verified that the corresponding improvements produce the expected results.

The passage 8 in the upper part 3b of the burner 3 is effective in preventing incomplete combustion of the combustible liquid and of the wick when the combustible liquid contained in the flask has been completely consumed. This prevents production of carbon particles which can block and damage the burner 3. The passage 8 also facilitates cooling of the upper part 3b of the burner 3 so that consumption of the perfumed liquid is not increased.

The passage 8 also enables use in the combustible liquid 2 of perfumed materials chosen from a more varied

range than those which can be used with a conventional burner whose pores they must pass through.

It is therefore possible to use perfumed materials that strike a lighter olfactory note, suggestive of nature or otherwise, for example of plums, or particularly of citrus fruits, which can vaporise directly on passing through the passage 8 without passing through the pores of the burner, which are at a temperature in the order of 200°C, in which they would be destroyed.

Similarly, materials striking a heavier note can be used, for example insecticides, which can vaporise directly through the passage 8 although they would entail the risk of blocking the burner if there were no passage 8.

In the embodiment represented in figure 8 the burner 30 has an axial cavity 6 extending from its lower extremity 30c to the vicinity of its central upper wall 10 surrounded by the annular groove 9.

In this example the peripheral area 7 of the upper part 30b of the burner 30 supporting the catalyst extends axially above the wall 10.

Under the peripheral area 7 the lower part 30a of the burner 30 comprises in succession, in the axially downwards direction, a substantially cylindrical first wall 31 of relatively small diameter that is extended by a flared second wall 32 forming a flange the lower peripheral surface of which forms the shoulder 11 received in the complementary shoulder 12 of the support 13.

The peripheral wall 31 and the peripheral wall 32 also constitute surfaces on which the combustible liquid vaporises, in addition to the central area 40.

The upper part 24 of the cavity 6 communicates with the atmosphere via a plurality of passages 33, two such

passages in this example, which open to the outside at the base of the shoulder 34 connecting the wall 10 to the wall 31, as shown in figure 8.

5 The burner 30 can be fitted to the neck 5 of the flask 1 using supports and bases of the type described hereinabove or some other type.

10 Of course, the present invention is not limited to the embodiments just described and many changes and modifications can be made to the latter that do not depart from the scope of the invention. The various component parts described hereinabove can in particular be combined with each other in any way.

It is to be noted that the periphery of the upper part 3b situated below the catalytic area 7 is also at a
15 temperature substantially lower than that of said catalytic area 7, so that the combustible liquid simply vaporises therefrom.

CLAIMS

1. A catalytic combustion flask (1) adapted to contain a combustible liquid (2) and the neck (5) of which is adapted to receive a catalytic combustion burner (3, 30) receiving a wick (4) dipping in said liquid (2), the said burner (3, 30) is resting on a base (16) fixed to the neck (5) of said flask (1), characterised in that the said base (16) includes at least one hole (19) through which the interior of the flask (1) communicates with the atmosphere.

2. A flask according to claim 1, the burner (3, 30) having a peripheral shoulder (11) separating its upper part (3b, 30b) of relatively larger diameter and its lower part (3a, 30a) of relatively smaller diameter, the shoulder (11) being received by a complementary shoulder (12) of a support (13) around at least the lower part (3a, 30a) of the burner (3, 30), characterised in that the support (13) extends downwardly beyond the lower extremity (3c, 30c) of the burner (3, 30).

3. A flask according to claim 2 characterised in that the support (13) is extended downwardly beyond the lower extremity (3c, 30c) of the burner (3, 30) by a tubular extension (20).

4. A flask according to claim 3 characterised in that the tubular extension (20) has at least one section featuring a constriction (21) to grip the wick (4) and to limit capillary feeding of combustible liquid (2) to the burner (3, 30) by the wick (4).



5. A flask according to any one of the claims 2 to 4 characterised in that the support (13) includes at least one hole (22) through which the interior of the flask (1) communicates with the atmosphere.

