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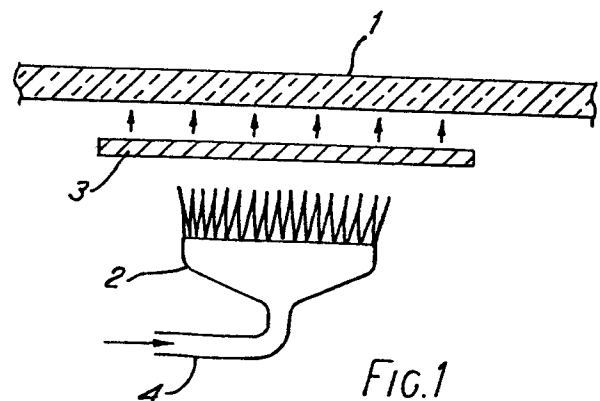
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54 **Cooking apparatus.**

57 Cooking apparatus includes an upper plate (1) for supporting cooking utensils, a gas burner (2) mounted beneath the plate (1) and an intermediate member (3) located between the plate (1) and the gas burner (2), so that flames from the burner (2) heat the intermediate member (3). The plate (1) is formed from a material predominantly transmissive of infra-red radiation of a predetermined range of wavelengths and the intermediate member (3) is formed from a material predominantly emissive, when heated, of infra-rad radiation of wavelengths within the range, so that infra-red radiation emitted by the intermediate member (3) is directly transmitted through the plate (1).



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COOKING APPARATUS

This invention relates to cooking apparatus and in particular, though not exclusively, to a cooking hob having a smooth, glass ceramic surface as a cook-top.

Cooking hobs of this type are advantageous in that the
5 smooth, glass ceramic surface enables the hob to be easily cleaned following, for example, spillage from cooking utensils placed thereon.

Known glass ceramic cooking hobs generally incorporate conventional electrical resistance heating elements, each
10 forming a hotplate area on the cook-top. Alternatively, the cooking hob may be provided with a number of tungsten-halogen tubular lamps forming each hotplate area, as shown in UK Patent Application No. 2132060A, which has been found to achieve a more rapid thermal response than the cooking hobs incorporating
15 conventional heating elements.

In view of the considerable advantages of electric glass ceramic cooking hobs, it is considered desirable to produce a gas-fuelled cooking hob, which is also capable of having a smooth glass ceramic cooktop.

20 Examples of such gas-fuelled cooking hobs are described in UK Patent Nos. 1,349,024 and 1,324,376, wherein a plate is located between a gas burner and the glass ceramic cooktop, so

that the plate is heated directly by the flames from the gas burner and the cooktop is heated indirectly by thermal conduction from the plate, thereby alleviating the risk of damage to the glass ceramic due to the intense heat of the
5 flames.

However, these gas-fuelled cooking hobs rely on thermal conduction to heat the hotplate areas of the cooktop, and to transfer the heat to cooking utensils placed on these areas, which tends to produce an unacceptably slow thermal response.

10 It is therefore an object of the present invention to provide an improved gas-fuelled cooking apparatus, which may be provided with a smooth, glass ceramic cooktop, having a faster thermal response than known cooking hobs of this type.

According to the present invention, there is provided
15 cooking apparatus including an upper plate for supporting a cooking utensil, a gas burner assembly mounted beneath said plate, and an intermediate member located between said burner assembly and the underside of said plate, characterised in that said plate is formed from a material predominantly transmissive
20 of infra-red radiation of a predetermined range of wavelengths, and said intermediate member is formed from a material predominantly emissive of infra-red radiation of wavelengths within said range, when heated by said gas burner assembly, for transmission through said plate.

25 The upper plate is preferably formed from an infra red transmissive glass ceramic material, such as CORNING Black Cooktop 9632, whilst the intermediate member may be formed from a thin foil, a wire mesh, a wafer or a coating sprayed on a substrate of a suitable material with different emissivity
30 characteristics to that of the coating, and preferably the intermediate member has a surface area commensurate with a desired hotplate area of the upper plate.

The cooking hob preferably comprises four respective intermediate members, each associated with a separate hotplate
35 area and each having a gas burner assembly mounted therebeneath.

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

Figure 1 shows schematically a sectional view of one
5 embodiment of the invention,

Figure 2 shows a transmittance characteristic curve for CORNING Black Cooktop 9632, a preferred glass ceramic material for the upper plate of the cooking hob, and

Figure 3 shows a schematic perspective view of a cooking
10 hob, in accordance with one example of the invention.

In Figure 1, a cooking hob includes an upper plate 1 for supporting cooking utensils (not shown), such as saucepans, and a gas burner 2 mounted beneath the plate 1, so that, when lit, flames from the gas burner 2 are directed upwardly towards the
15 plate 1.

An intermediate member 3 is located between the plate 1 and the gas burner 2 so that the flames from the burner heat the intermediate member 3.

The outlet of the gas burner 2 may consist of a substantial
20 number of small holes, which produce a mass of small flames to heat the intermediate member 3, which may achieve more efficient heating than a single larger flame.

A fully or partially pre-mixed air/gas mixture is introduced for ignition into the burner 2 via gas inlet 4 and a
25 suitable ducting arrangement (not shown) is provided to exhaust combustion products from within the cooking hob.

To achieve a rapid thermal response infra-red radiation generated by the intermediate member 3 is directly transmitted through the plate 1 to a cooking utensil supported thereon,
30 rather than by using thermal conduction. To this end, the upper plate 1 is formed from a material predominantly transmissive of infra-red radiation of a predetermined range of wavelengths and the intermediate member 3 is formed from a material, which, when heated, predominantly emits infra-red radiation of a wavelength
35 within the range, so that the emitted infra-red radiation can be transmitted directly through the plate 1.

A specific example of matching of the emittance characteristics of the material of the intermediate member 3 and the transmittance characteristics of the material for the upper plate 1 is shown by Figure 2.

5 Figure 2 shows a transmittance characteristic curve for CORNING Black Cooktop 9632, a glass ceramic material, which, as can be seen from Figure 2, predominantly transmits visible and infra-red radiation within a wavelength range of approximately $0.6\mu\text{m}$ to $2.9\mu\text{m}$.

10 To achieve the matching, a material can be used for the intermediate member, which, when heated to approx $1200-1400^{\circ}\text{C}$ emits infra-red radiation at wavelengths within this range and may typically have a threshold wavelength of approximately $3\mu\text{m}$, above which it is substantially non-emissive. In this way the
15 majority of the infra-red radiation emitted by the intermediate member 3, when heated to the required temperature by the gas burner 2, is directly transmitted through the upper plate to the cooking utensil supported thereon, thereby achieving a more rapid thermal response than that achieved by a cooking hob,
20 which relies on thermal conduction to heat the cooking utensil.

The intermediate member 3 may be made into any desirable shape or configuration, such as a thin foil, a wafer or a wire mesh, or in the form of a coating on a substrate of a different suitable material having different emittance characteristics to
25 that of the coating. It also preferably has a surface area commensurate with that of a hotplate area on the upper plate 1.

Such an arrangement is shown in Figure 3, wherein four intermediate members 5,6,7,8 are mounted between four gas burners 9,10,11,12 and a continuous upper plate 13, the surface
30 area of each intermediate member 5,6,7,8 being commensurate with that of each of four hotplate areas 14,15,16,17 formed on the plate 13.

If the material of the intermediate member 3 is formed into a wire grid, the member 3 can be electrically heated, in
35 addition, or as an alternative, to being heated by the gas burner 2, by passing an electric current through it.

The intermediate member 3 may be made from any suitable material, as long as the transmittance characteristics of the selected material of the plate 1 are sufficiently matched to the emittance characteristics of the material selected for the
5 member 3. Suitable materials for this intermediate member may include a refractory or ceramic material, such as zirconia or molybdenum disilicide, or a metal, such as tungsten, or an alloy used for electrical heating elements, such as KANTHAL 'DSD', 'A' or 'A₁'.

10 However, the alloys have been found to be particularly suitable as materials for the intermediate member 3, because, unlike some other metals such as tungsten, the alloys do not deteriorate rapidly at high temperatures.

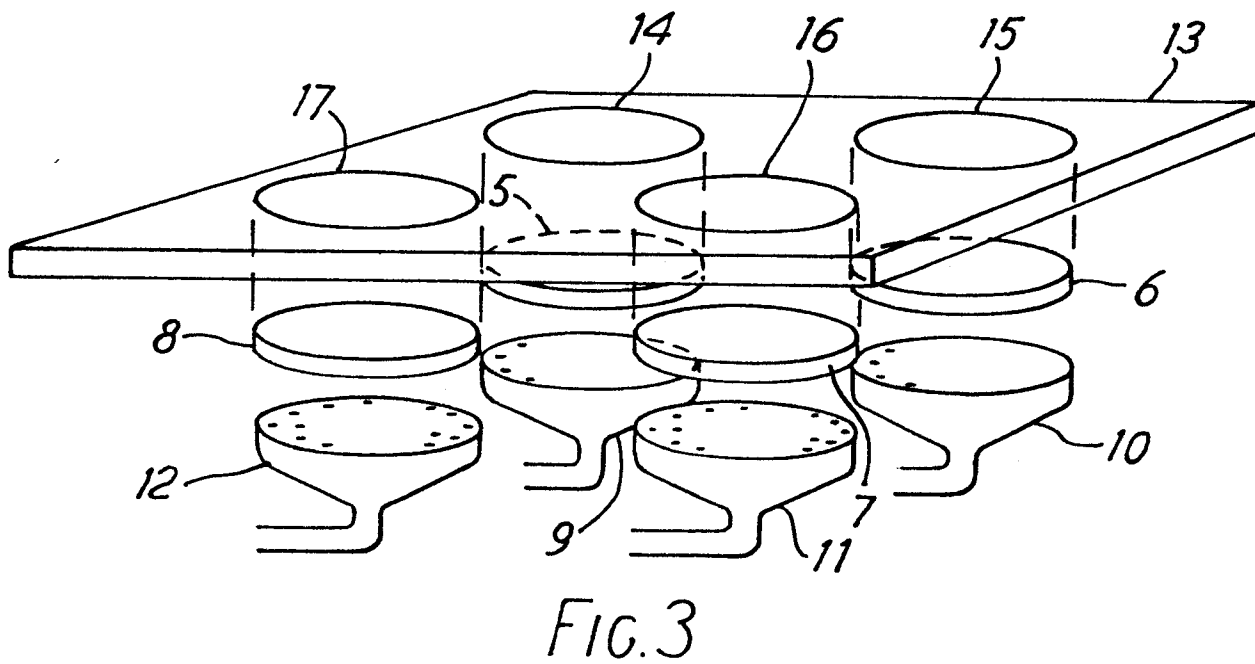
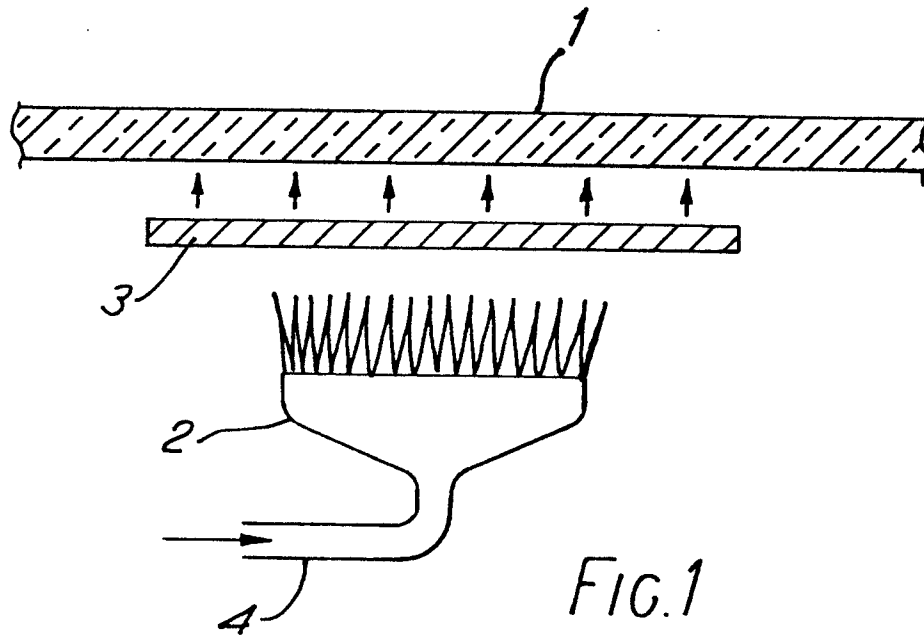
The intermediate member 3 and the gas burner 2 may be
15 mounted beneath the plate 1 by any suitable supporting arrangement, with the air/gas inlet 4 and the ducting arrangement for the exhaustion of combustion products being arranged accordingly.

The material of the plate 1 is preferably tinted to act as
20 a filter of a certain amount of visible radiation, which would otherwise have been transmissable through the plate 1.

The present invention therefore provides an efficient, gas-fuelled, glass ceramic cooking hob incorporating an intermediate member of a material, which, in the preferred
25 embodiment, only requires heating to a temperature of 1200-1400^oC to emit infra-red radiation of wavelengths directly transmissable through the upper plate, in comparison with a temperature commensurate with the maximum combustion temperature of domestic gas in air, i.e. about 1860^oC, which
30 would be necessary without matching of the transmittance and emittance characteristics of the respective materials of the upper plate and the intermediate member.

CLAIMS

1. Cooking apparatus including an upper plate (1) for supporting a cooking utensil, a gas burner assembly (2) mounted beneath said plate (1), and an intermediate member (3) located between said burner assembly (2) and the underside of said plate
5 (1), characterised in that said plate (1) is formed from a material predominantly transmissive of infra-red radiation of a predetermined range of wavelengths, and said intermediate member (2) is formed from a material predominantly emissive of
10 infra-red radiation of wavelengths within said range, when heated by said gas burner assembly (2), for transmission through said plate (1).
2. Cooking apparatus as claimed in claim 1 wherein said plate (1) is formed from an infra-red-transmissive glass ceramic material.
- 15 3. Cooking apparatus as claimed in claim 1 or 2 wherein the material of said plate (1) includes means for filtering visible radiation emitted by said member (2), when heated.
4. Cooking apparatus as claimed in claim 1, 2 or 3 wherein said intermediate member (2) is of the form of a thin-foil, a
20 wire mesh or a wafer.
5. Cooking apparatus as claimed in claim 1, 2, or 3 wherein said intermediate member (2) comprises a coating sprayed on a substrate, said substrate being formed from a material with different emissivity characteristics to those of said coating.
- 25 6. Cooking apparatus as claimed in any preceding claim wherein said intermediate member (3) has a surface area commensurate with a predetermined hotplate area of said plate (1).



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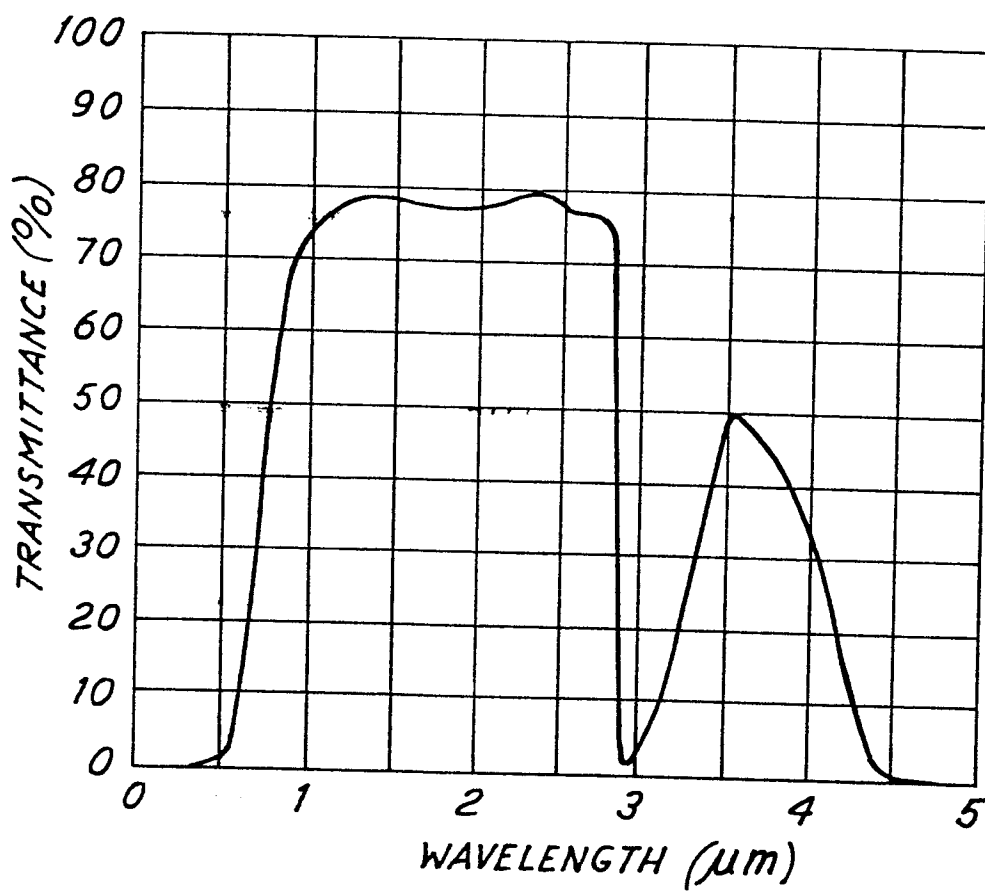


FIG. 2



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)
A	FR-A-2 087 931 (COLUMBIA GAS SYSTEM) * Page 2, lines 3-8; page 3, lines 8-11; figures *	1,2,4	F 24 C 3/06
A	--- DE-A-2 233 369 (CRAMER) * Page 6, claim 1; figures *	1,4	
A	--- CH-A- 460 287 (KANEKICHI HAYASHI) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			F 24 C H 05 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-01-1987	Examiner VANHEUSDEN J.
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			