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(54) Cooking oven having at least one radiant element.

(57) An oven comprises at least one radiant element (1) mounted substantially parallel to an upright wall (3) thereof, a reflective sheet (2) spaced from the wall (3) and having a rear surface capable of substantially inhibiting radiant heat transfer, so as to reflect radiant energy from the element (1) away from the wall (3). The oven also includes an oven liner (6) having an air outlet (10) situated adjacent the top thereof, so as to allow circulating air heated by the element (1) to re-enter the oven cavity (5) from a space (7) formed between the wall (3) and the oven liner (6), thus substantially increasing the air flow over the element (1).

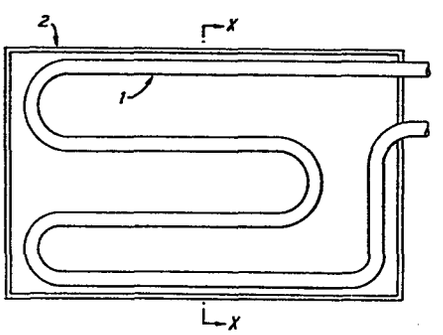

FIG.1

EP 0 076 031 A2

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TITLE
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: 1 :

IMPROVEMENTS IN OR RELATING TO OVENS.

This invention relates to improvements in ovens and is more particularly concerned with reducing heat losses in ovens, or using more of the heat generated for cooking.

According to the invention there is provided an oven having at least one radiant element mounted substantially parallel to an upright wall thereof, characterised in that the oven contains reflective means, associated with the element, said reflective means being arranged to reflect radiant energy from the element away from the oven wall, and the oven further including lining means, associated with the oven wall, having an air outlet situated adjacent the top thereof to allow circulating air heated by the element to re-enter the oven from a space formed between the oven wall and the lining means.

Preferably, the reflective means comprises a radiant - reflective sheet mounted in between the oven wall and the element, but the oven wall may instead be provided with a reflective coating or foil. The foil is, preferably, of aluminium and may be glued to the oven wall.

The lining means preferably comprises an oven liner mounted between the element and the interior of the oven and modified so as to increase substantially the flow of circulating air over the element.

It is appreciated that in some circumstances the circulating air in an oven carries soiling agents, such as grease from food and deposits them on the walls of the oven. Where soiling agents are transported in circulating oven air in

the vicinity of the oven wall the reflective means is, preferably, a radiant reflective sheet with a rear surface capable of inhibiting radiant heat transfer. The sheet is spaced from the oven wall, and the airgap between the sheet and the wall supresses conductive and convective heat flow to the wall, which means that energy may be saved by the radiant reflective sheet even when the front surface of the sheet becomes soiled. It has been found that savings in energy of up to 15% can be made by employing a radiant reflective sheet in this manner, for a centre oven temperature (C.O.T.) of 200°C median.

It may be preferable in circumstances where soiling agents are not transported in oven air that the reflective means comprises the said reflective coating or foil to avoid the expense of providing a separate radiant reflective sheet. It has been found that where a radiant-reflective sheet and a modified oven liner are provided heat losses from the element are reduced with the consequence that the temperature of the element is increased, as well as there being a substantial increase in the flow of circulating air over the element.

An embodiment of an oven in accordance with the present invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings in which:-

Figure 1 shows a front view of a radiant element and a radiant-reflective sheet which comprise part of the embodiment;
Figure 2 shows a sectional side view of the element and sheet taken on the line X-X of Figure 1 mounted in relation to an oven wall;

Figure 3 shows a sectional side view of part of a prior art oven which includes a conventional oven liner, and

Figure 4 shows a side view of the embodiment of the invention incorporating the reflective sheet and a modified oven liner.

Figures 1 and 2 show a radiant element 1 of an oven which is mounted in a vertical plane in a manner known per se. Radiant reflective means in the form of a metal sheet 2 is

located in a vertical plane behind the element 1, and in between the element and a wall 3 of the oven. As shown in Figure 1, the sheet 2 extends upwardly, downwardly and laterally just beyond the upward, downward, and lateral extent of the element which is disposed in front of the oven wall 3. This is to enable a radiant-reflective surface 2a of sheet 2 to receive substantially all the radiant energy from the element which is directed towards the oven wall 3. A rear surface 2b of the sheet 2 exhibits low thermal emissivity, and thus inhibits radiant heat transfer. The sheet 2 is supported on the oven wall 3 at its upper and lower extremities and this may be by any suitable means, for example by a bayonet fixing.

A narrow air gap 4 is defined by the sheet 2 and the oven wall 3 and this gap supresses conductive and convective heat flow to the wall. This, in conjunction with the low emissivity of surface 2b, means that the sheet is still capable of reducing heat losses even if the radiant-reflective surface 2a should become soiled with deposits emanating from cooking food which is uncovered.

Figure 3 shows a prior art oven including an oven cavity 5' and an oven liner 6' of conventional form, which can be compared with a modified oven liner 6 shown in Figure 4. Figure 3 shows that a hot air pocket develops in a space 7' at the top of the oven in between the oven wall 3' and the oven liner 6'. The modified oven liner 6 in Figure 4 is primarily for use in conjunction with the reflective sheet 2. The oven liner 6 is shaped to increase the airflow over the element 1 as compared to the airflow over the element 1'a shown in the prior art in Figure 3, to thereby improve the efficiency of heat transfer. Firstly, as can be seen from Figures 3 and 4 the modified oven liner 6 is approximately 20 mm shorter at the bottom 6a than the oven liner 6' in Figure 3 in order to increase the area into which air from the oven cavity can flow. Secondly, the prior art shows a right-angled flow deflector 8' situated above air outlet 9' and in the embodiment

shown in Figure 4 this deflector has been omitted, to permit a proportion of air flowing in between the oven wall and the liner to flow over the uppermost bar 1a of element 1. Thirdly, the modified oven liner 6 has, in addition to air outlet 9, an extra air outlet 10 situated towards the top, to allow circulating air, heated by the element, to re-enter the oven cavity 5 from a space 7. Thus the pocket of hot air formed in space 7' in Figure 3 is eliminated, and the modified oven liner 6, used in conjunction with a radiant reflective sheet 2, improves the efficiency of heat transfer from a radiant element which is located in a vertical plane.

Naturally, an oven may comprise more than one heating element and may be provided with reflective means associated with one or more of the elements. Oven liners which have been modified as described may also be asociated with one or more of the elements.

Alternative materials to aluminium may be used, such as aluminised steel or stainless steel, and the reflective sheet may have a particular finish, such as being anodised.

What we claim is:

1. An oven having at least one radiant element (1) mounted substantially parallel to an upright wall (3) thereof, characterised in that the oven contains reflective means, associated with the element (1), said reflective means being arranged to reflect radiant energy from the element away from the oven wall (3), and the oven further including lining means (6), associated with the oven wall (3), having an air outlet (10) situated adjacent the top thereof to allow circulating air heated by the element (1) to re-enter the oven from a space (7) formed between the oven wall (3) and the lining means (6).

2. An oven according to claim 1 wherein said reflective means (2) comprises a radiant-reflective sheet (2) mounted in a space provided between the oven wall (3) and the element (1).

3. An oven according to claim 2 wherein said reflective sheet (2) is spaced from the oven wall (3).

4. An oven according to either of claims 2 or 3 wherein said reflective sheet (2) includes a rear surface (2b) capable of substantially inhibiting radiant heat transfer.

5. An oven according to claim 1 wherein said reflective means (2) comprises a reflective coating or foil secured to said oven wall (3).

6. An oven according to any preceding claim wherein the lining means (6) has at least one further air outlet (9).

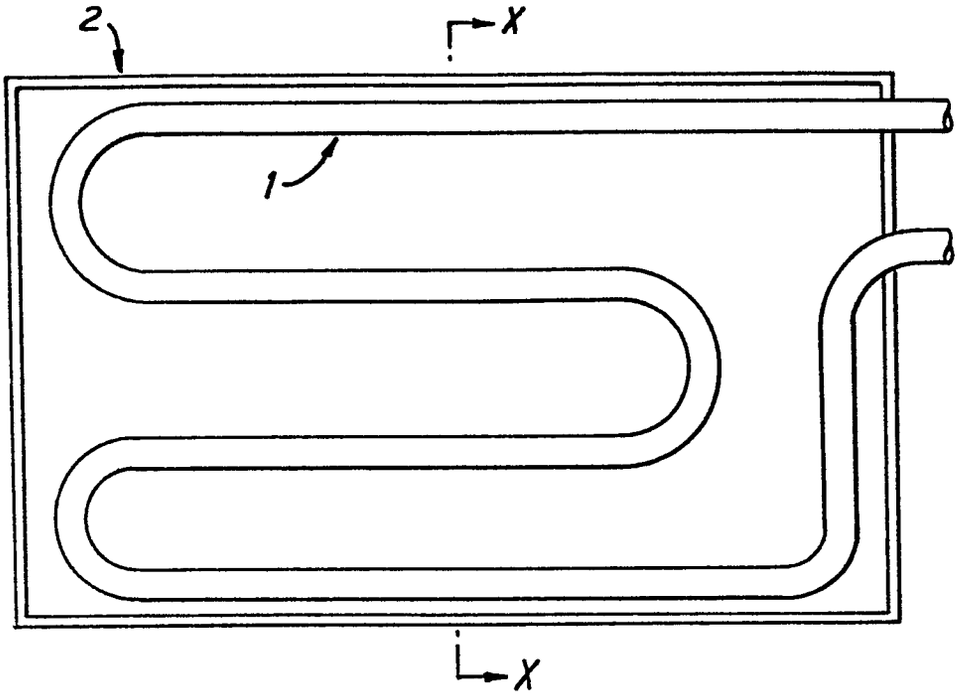

FIG. 1

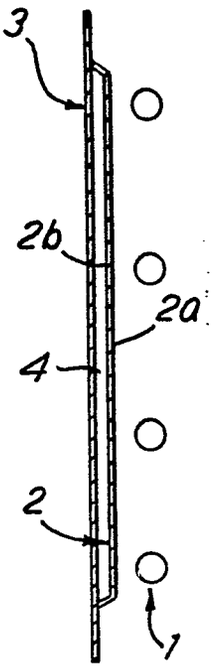

FIG. 2

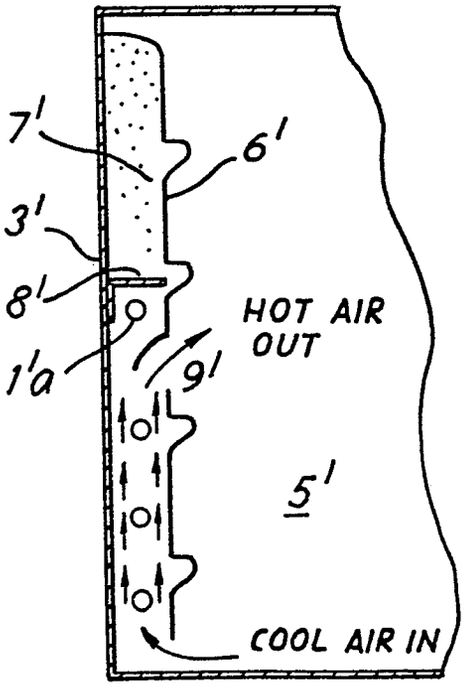

FIG. 3

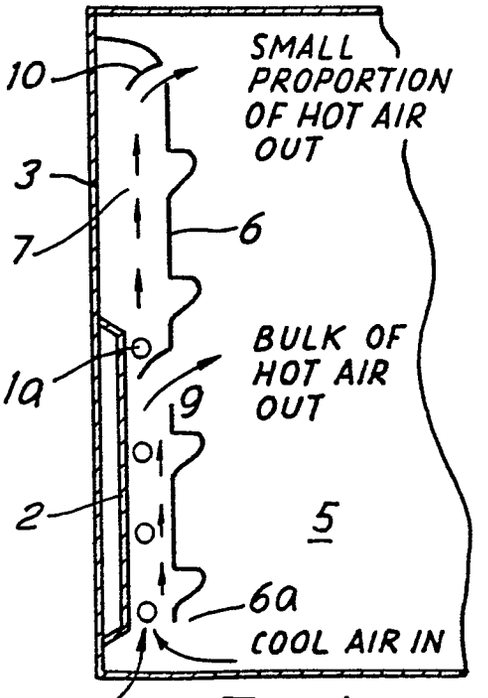

FIG. 4