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(54) Rotary bakers' oven

(57) A baker's oven has an oven compartment with a vertical drive shaft (16) supporting two pairs of carriers (18). The compartment is heated by electrical heating elements (27, 28, 30) each shaped to form an elongate U, with parallel arms extending across the compartment. The elements are arranged, by their respective spacing to the drive shaft (16), and by their spacing in each series of elements (27, 28, 30) so that if the carriers (18) are held at rest for some time in a first position and then rotated through 180° and held at rest for the same time in a second position, no part of the carriers (18) will be directly over, or directly under, an arm of a heating element (27, 28, 30) in both positions, to thereby avoid the likelihood of "hot spots", or overbaking in the bakery products supported by the carriers (18).

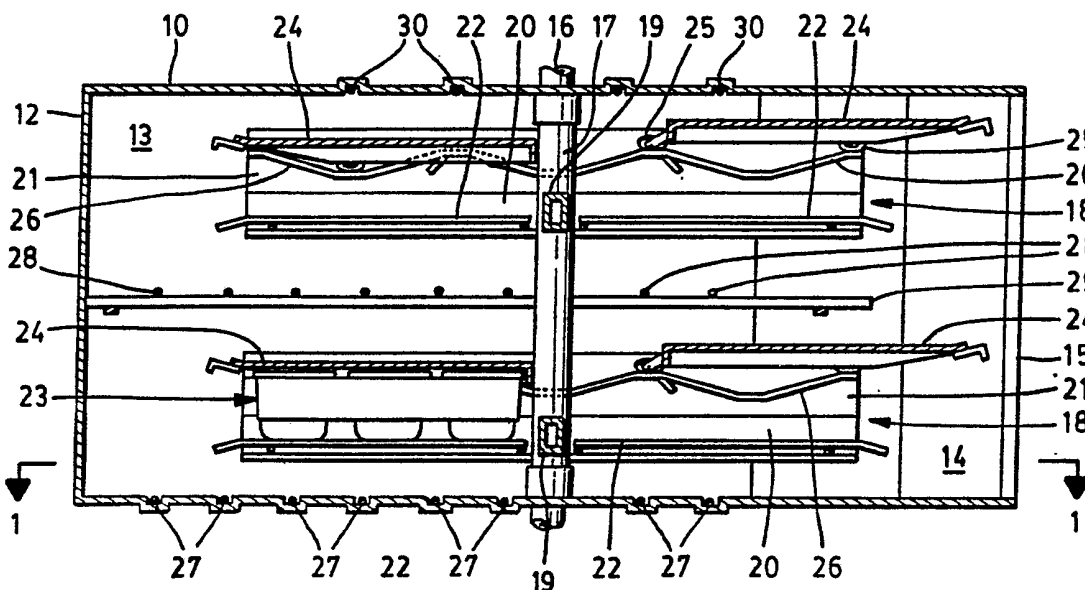


Fig. 2.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

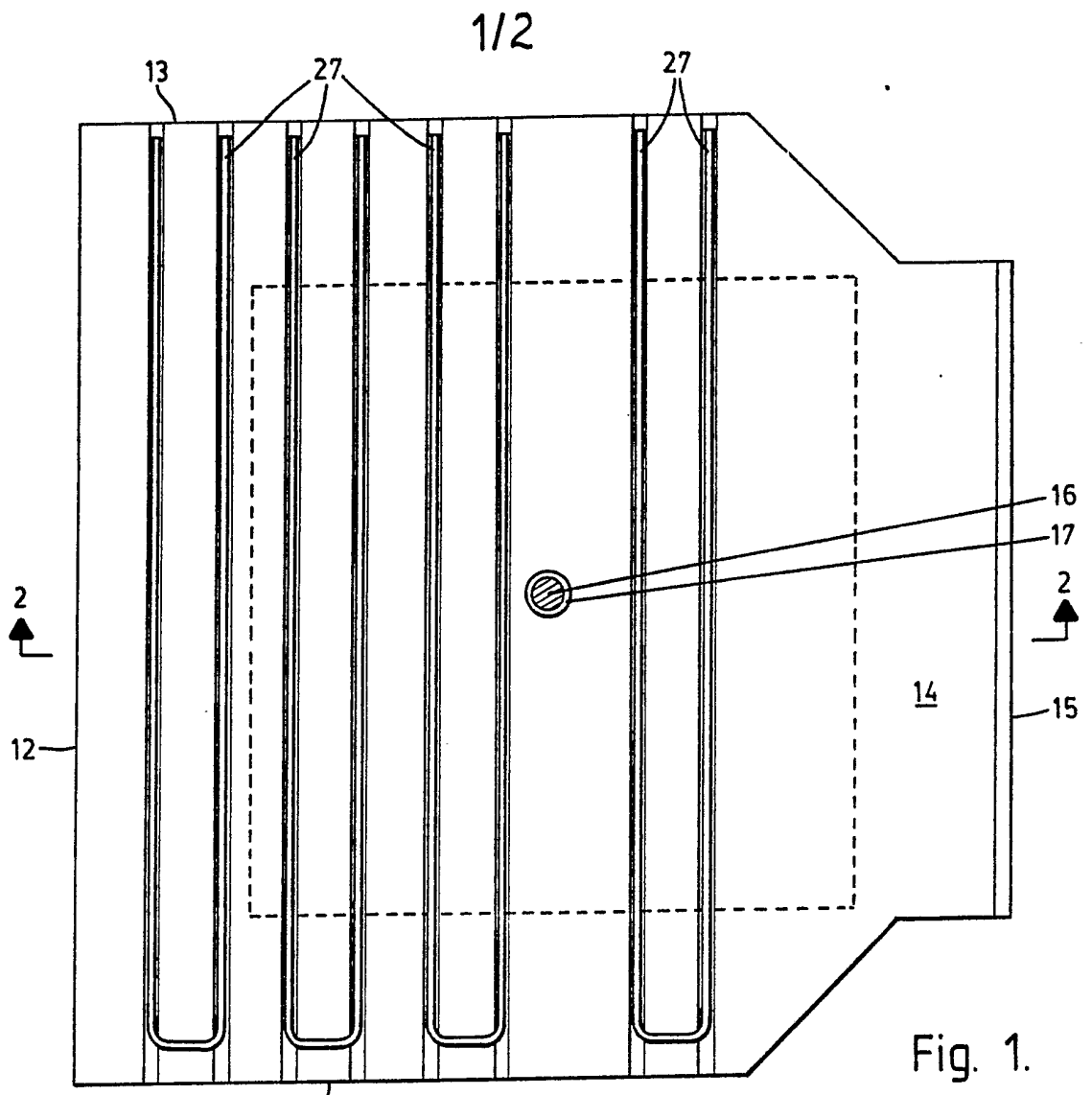


Fig. 1.

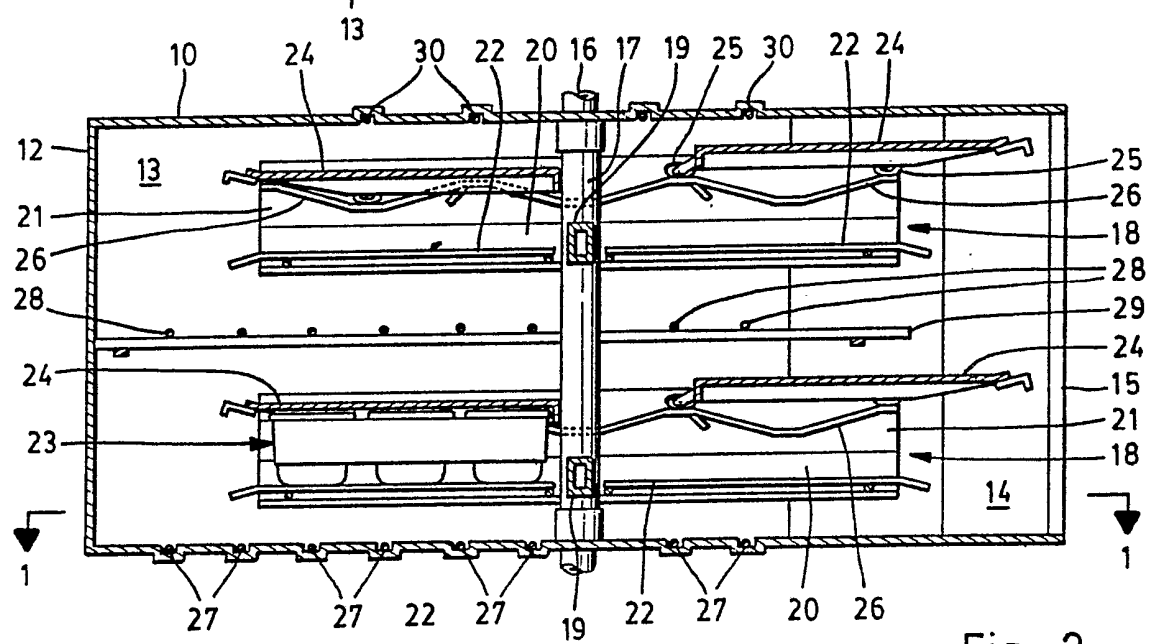


Fig. 2.

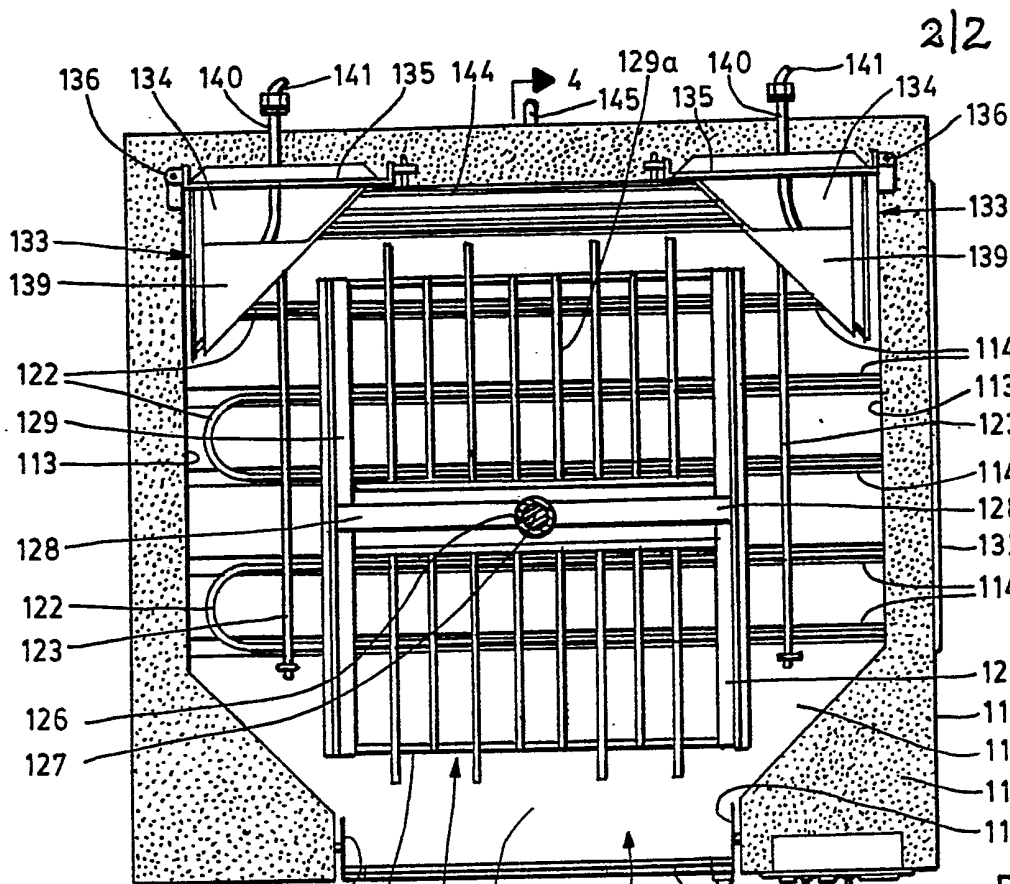


Fig. 3.

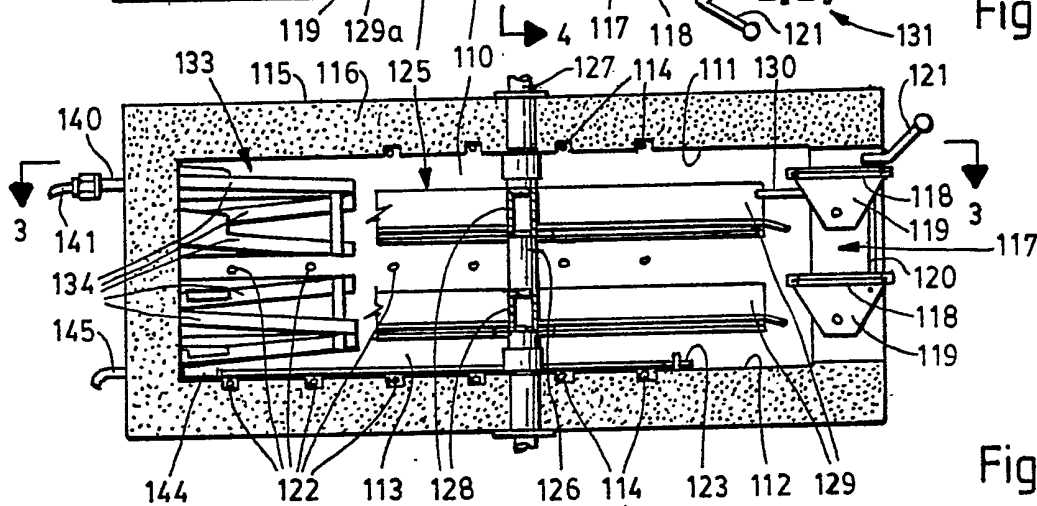


Fig. 4

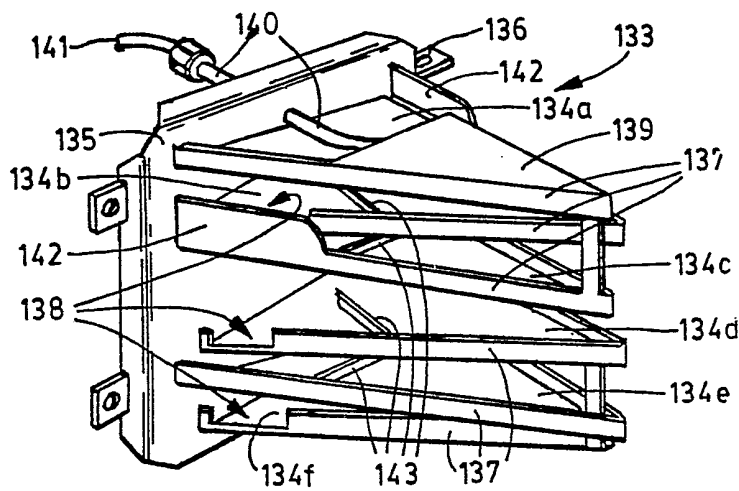


Fig. 5

TITLE: ELECTRICALLY HEATED ROTARY BAKERS' OVEN

DESCRIPTION

THIS INVENTION relates to electrically heated rotary bakers' ovens.

A well-known and widely used baker's oven has a number of superimposed oven compartments with individual oven doors at the front. A vertical drive shaft driven by an electric motor passes through all of the compartments. In each compartment, a sleeve is mounted on, and frictionally driven by, the shaft. Fixed on each sleeve are two carrier frames, one spaced above the other, each frame carrying two grid supports, to opposite sides of the sleeve. Each support is capable of receiving through the opened oven door of the compartment, and when the carrier frames and sleeve have been brought temporarily to rest, two adjacent assemblies, each of three bread baking tins. Four such assemblies, or twelve of the baking tins, may thus be loaded on to the two carrier frames, and after the carrier frames have been permitted to turn through 180°, a further four assemblies of the baking tins may be loaded similarly.

Bakery goods other than those in bread baking tins may, of course, be loaded into the oven in this way. When the baking has been completed, the baked articles may be easily and quickly unloaded.

The oven compartment is heated by electric heating elements of rod type, each shaped to form an elongated U, the parallel arms of which extend across the oven. One series of elements is at the bottom of the compartment, another at the top, the parallel arms of each element being housed in channels formed in the bottom and top plates of the oven compartment. A third set of heating elements is supported between the two carriers.

Although ovens of this type have been found to be very effective and generally satisfactory, a problem can exist when, as sometimes happens, there are

undue delays during the unloading or loading of bakery products on the carriers at rest, when "hot spots" may cause over-baking.

The present invention has been devised to
5 overcome or substantially reduce this problem by a novel arrangement of the heating elements of the oven as defined in the appended claims.

It is a further object to provide an improved means for the quick and efficient introduction of steam,
10 despite any degree of hardness of water used.

Exemplary embodiments of the invention are shown in the accompanying drawings, in which:

Fig 1 is a diagrammatic representation of the floor plan of a compartment of a baker's oven according
15 to the invention, being a sectional view taken along line 1-1 in Fig 2;:

Fig 2, which is a sectional view of the oven compartment taken along line 2-2 in Fig 1;

Fig 3 is a sectional side view of an oven,
20 fitted with the steam generating assembly, taken on line 3-3 on Fig 4;

Fig 4 is a partly broken away sectional view taken on line 4-4 in Fig 3; and

Fig 5 is a perspective view of one of the
25 steam generating assemblies.

The oven compartment illustrated has, formed from stainless steel sheet, a top 10, floor 11, back 12 and sides 13, which, near to the front, are convergent to a loading and unloading doorway 14 which may be
30 closed by a glass hinged door indicated at 15.

A vertical motor-driven drive shaft 16 passes more or less centrally through the compartment within which it is enclosed by a sleeve 17 normally rotated frictionally by the drive shaft but capable of being
35 held stationary by a first arm of a bell-crank (not shown) at one side of the doorway 14 and brought to

operative position when the door 15 is opened to disengage the other arm of the bell-crank, the first arm, when in operative position, intercepting and interrupting the rotation of one or two carriers 18
5 mounted on the sleeve 17, one above the other. Each carrier includes a pair of box-section arms 19 radiating from the sleeve 17 and at their outer ends fixed centrally to a pair of parallel angle members 20 to the upright flanges of which parallel side plates 21 are
10 secured, the horizontal flanges of the angle members 20 supporting, to opposite sides of the sleeve 17, a pair of grid supports 22 for assemblies 23 of bread baking tins. Above each support 22 is a sheet metal lid 24 with wheels 25 travelling on tracks 26 on the side
15 plates and so ramped that when a lid is advanced, it simultaneously rises and when retracted, it lowers onto the tops of the bread baking tins on the support 21.

The oven compartment is heated by three series of electric heating elements. One series of heating
20 elements at the compartment floor comprises four elongated tube elements, each formed with a central U-bend, its parallel sides being housed in channels formed transversely across the floor 11, the U-bend part being bent upwardly to bridge the part of the floor between
25 the two channels. The elements 27 are all similar, the centre of the parallel arms of each being spaced by, say 90mm. However, the elements are not spaced evenly apart. The front one of the elements is located in front of the shaft 16 by a distance of, say, 120mm from
30 the shaft centre to the centre of the near arm of the element. The second element from the front of the oven has its front arm spaced from the centre of the shaft by, say, 25mm. The spacing between the second element and the third element is, say, 110mm, which is greater
35 than that between the third and fourth elements which is 90mm.

The middle series of heating elements 28 is carried by support bars 29 so that the elements 28 are midway between the two carrier frames 18, and the arrangement of the heating elements 28 is similar to that of the heating elements 27.

The heating elements 30 of the compartment top consist of two similar elements of elongated U-shape, the parallel arms of which are more widely spaced at, say, 140mm, than those of the elements 26 and 27. The elements 30 are housed in inverted channels formed transversely of the compartment roof, one element 30 being located in front of, the other behind, the shaft 16. The front one of these two elements is spaced by, say, 75mm from the shaft centre, the second element is spaced by, say, 145mm behind the shaft centre.

This arrangement of the heating elements is such that if the carriers 18 should be held at rest for some time and then, after being rotated through 180°, again held at rest, as will occur when the carriers are being loaded and unloaded with the bread baking tin assemblies, no part of the carrier or the tins carrier thereon will be directly over, or directly under, a heating element when the carrier is in both positions. Consequently, there will be no likelihood of "hot spots" and over-baking occurring.

Referring now to the oven of Figs 3-5, the oven illustrated includes an oven chamber 110 consisting of a top 111, bottom 112 and side walls 113, all of which are preferably of sheet stainless steel, the top and bottom being formed with transverse channels 114, the ends of which are closed by the side walls 113. The oven chamber 110 is housed within an outer casing 115, insulating material 116 being interposed between the two. A loading and unloading doorway 117, lined with sheet stainless steel, leads through the outer casing and into the oven chamber, and may be closed by a pair

of doors 118, one above the other. Each of these doors may be a panel of plate glass fixed between channelled metal ends fixed to brackets 119 which are pivoted to the sides of the doorway 117, the brackets at one side
5 of the doorway being connected by links 120 so that, by means of a handle 121 on the upper door, both the doors may be swung down to closed positions, as shown in Fig 3, or up to horizontal open positions within the doorway, as shown in Fig 4.

10 The oven is heated by bottom, central and top electric heating elements 122, each being of rod type formed with a middle U-bend. The top and bottom elements are except at their U-bends, housed in the channels 114 formed in the oven top 111 and bottom 112,
15 the U-bent part of each being raised and carried around from one channel to the next. The heating elements are releasably held in place by retaining rods 123. The central heating elements are supported by horizontal rods (not shown in the drawings) fixed in the oven.

20 The oven can receive four baking trays (not shown) loaded with bakery products, or eight assemblies of bread baking tins (not shown), inserted through the doorway 117 onto a turntable 125. This turntable is of two-deck type and it includes a central sleeve 126 which
25 is rotatable on a vertical drive shaft 127 passing centrally through the oven and driven by any suitable drive means from a motor (not shown). The turntable ordinarily rotates with the shaft, by reason of friction between the two, but it may be brought to rest without
30 interrupting the drive to the shaft. Two pairs of opposed arms 128, one above the other, radiate from the sleeve 126 and are fixed perpendicularly at their outer ends to the middles of angle supports 129. These supports may carry baking trays to both sides of the
35 central sleeve 126, or (as shown), grids 129a to support bread baking tin assemblies. When the oven doors 117

are opened, a finger 130 fixed to one of the door pivot brackets 119 is brought into position to intercept the approaching angle support 129 of the turntable (as shown in Fig 4) which therefore is brought to rest in a position for the easy loading or unloading of baking trays or bread baking tins at one side of the central sleeve 126. If the doors are briefly closed and then re-opened, the turntable will turn through 180° before being brought to rest again for the loading or unloading of trays or tins at the opposite side of the central sleeve. The oven controls indicated at 131 are located at one side of the doorway 117 and electrical connections of the heating elements 122 are outside the oven chamber and the insulation 116, and are all accessible by way of an inspection door 132 at one side of the oven.

A feature of the invention resides in the steaming devices indicated generally at 133. Two such devices, oppositely arranged but otherwise similar are located in the inside corners of the oven. Each consists of a series of heating plates 134 welded to and extending perpendicularly from a back plate 135, whereby it is hinged to the back of the oven so that each assembly can be swung through an opening in the wall of the inner chamber to become located in a back corner of the oven chamber 10, and clear of the turntable 125.

The heating plates 134 are triangular, and in a vertically spaced and staggered arrangement. The top plate 134a slopes at a small angle from one side to the other, which is inset from the corresponding side of the second plate 134b, which in turn is sloped in opposite direction, its lower edge being inset from the corresponding side of the third plate 134c, and so on. Each of the plates has raised edges 137 along its free sides and, near to the lower of these edges, the raised edge has a cut-away overflow opening 138. The top plate

134a is partly covered, from its apex, by a triangular top plate 139. Water can be fed onto the top plate 134a through a water inlet pipe 140 which may be connected by a flexible hose 141 to any suitable source of supply and, after spreading across most if not all of the plate, will flow through the cut-away opening 138 to fall onto the second plate 134b and from this second plate it will flow through the overflow opening not shown in the drawing of this second plate onto the third plate 134c and so on.

To prevent escape of water flowing from the top plate 134a, the second plate 134b has a splash plate 142, and a similar splash plate 142 is provided on the third plate 134c to ensure there is no loss of water flowing from the second plate 134b. Similar splash plates may be provided on the other plates if desired, but will not ordinarily be required. To ensure that water cascading onto each of the plates below the top one follows a circuitous path before leaving the plate, baffles 143 are fixed on the plates.

When each steaming assembly is swung into place in the oven, it is brought directly over part of the rearmost bottom heating element 122; and the third plate 134c and fourth plate 134b are so spaced that they become located over and under part of the rearmost of the middle heating elements.

Consequently, the steaming devices are quickly heated within the oven to a high temperature and when water is admitted through their inlets 138, it is rapidly converted to steam while spreading over the heating plates one after the other, so that the oven chamber rapidly fills with live steam. Any deposition of mineral from hard water will not materially affect the operation of the steam generators, at least for a long time, after which the device may be easily removed for maintenance or replacement. Any water which flows

from the lowermost heating plates 134f of the devices is received into a transverse gutter 144 from which there leads a drain pipe 145.

Bakers' ovens according to the invention will
5 be found to be very effective in achieving the objects for which they have been devised. Various modifications may, of course, be made within the scope and ambit of the invention.

CLAIMS

1. An electrically-heated rotary bakers' oven having at least one oven compartment of the type having at least one carrier on a vertical drive shaft, an oven door at the front of the compartment, and heated by at least one series of electric elements of the rod type, each element shaped to form an elongate U, the parallel arms of which extend transversely across the oven, wherein:

10 in the or each series of elements, the elements are unevenly spaced apart so that if the carrier is held at rest in a first position, and then rotated through 180° and held at rest at a second position, no part of the carrier will be directly over, or directly under, an arm of a heating element in both positions.

2. An oven according to Claim 1 wherein a first series of elements has four elements at the compartment floor, with a first element between the oven door and the drive shaft and second, third and fourth elements rearwardly of the drive shaft.

3. An oven according to Claim 2 wherein:
the parallel arms of each element are spaced a distance A apart;

25 the front element is located in front of the drive shaft a distance greater than A between the drive shaft and the rear arm of the first element; and

the second element is located rearwardly of the drive shaft a distance less than A between the drive shaft and the front arm of the second element.

4. An oven according to Claim 3 wherein:
the spacing between the adjacent arms of the second and third elements is greater than the distance A, which is the distance between the adjacent arms of the third and fourth elements.

5. An oven according to Claim 3 wherein:

35

a second series of elements has two elements at the compartment top, the first element between the oven door and the drive shaft and the second element rearwardly of the drive shaft, the distance between the parallel arms of each element are spaced a distance greater than the distance A apart; and

the parallel arms are not directly above the parallel arms of the elements in the first series.

6. An oven according to any one of Claims 3-5 wherein:

the compartment has two pairs of vertically-spaced carriers on the drive shaft; and

a third series of elements is supported midway between the two pairs of carriers, the arrangement being similar to the arrangement of the elements in the first series.

7. An oven according to Claim 6 wherein:

the elements of the third series are supported on support bars extending longitudinally of the compartment.

8. An oven according to any one of Claims 2 to 7 wherein:

the parallel arms of the elements of the first series are supported in channels transversely of the compartment floor.

9. An oven according to any one of Claims 1 to 8 and further including:

steam generating means comprising:

an assembly of heating plates, one above the other, located within, and heating by, the oven, and

inlet pipe means for introducing water onto a top heating plate to cascade down to the lower plate or plates in sequence and, by heat transfer from the heated plates, to be converted to steam within the oven.

10. An oven according to Claim 9 wherein:

the heating plates are fixed to and extend from a back plate hinged to a side of an opening in a wall of the oven so that when the back plate is moved to close the opening, the heating plates are located within
5 the oven.

11. An oven according to Claim 9 or Claim 10 wherein:

the heating plates incline from one side to the other, alternately in opposite directions, have side
10 walls with outlet openings at their lower sides and are in staggered arrangement, so that water leaving the outlet from the lower side of one will be received at the higher side of the heating plate next below.

12. An oven according to any one of Claims 9 to 11
15 wherein:

the heating plates are substantially of triangular shape in plan view.

13. An electrically-heated rotary baker's oven substantially as hereinbefore described with reference
20 to Figs 1 and 2 of the drawings.

14. An electrically-heated rotary baker's oven substantially as hereinbefore described with reference to Figs 1 and 2, and fitted with the steam generating means of Figs 3 to 5, of the accompanying drawings.