

INTELLECTUAL PROPERTY OFFICE OF SINGAPORE
PATENT AGENTS QUALIFYING EXAMINATION 2013

PAPER B: AMENDMENT OF A PATENT SPECIFICATION

2 October 2013, Wednesday

1330 – 1730 hrs

Maximum Time: 4 Hours (includes reading time)

Maximum Marks: 100



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INSTRUCTIONS TO CANDIDATES

1. This Paper consists of 32 pages, including this cover page.
2. Write your answers in English. Answers in any other language will not be marked. Answers in illegible handwriting will not be taken into consideration.
3. Two copies of the question paper are provided, one is for your reading and the other is for your use (optional) when answering the question(s) in the Answer Booklet(s).
4. Only your answers and/or drawings to the question(s) typed/written or glued in the Answer Booklet(s) provided by the Examination Secretariat will be considered. You are to write on one side of each sheet in the Answer Booklet (s).
5. Information provided in the question(s) may be obtained from actual situations or modified therefrom for the purpose of this examination. You should accept the facts given in the Paper. Assume also that the prior art given is exhaustive.
6. For the purpose of this Paper you do not need to propose any amendments to the description of the Patent Application.

To be continued

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7. The documents provided in the question are:

- a. Document A: Letter from Client (includes questions) (2 pages);
- b. Document B: Singapore Patent Application No. 2013000013-0 (6 pages of description plus claims and 4 pages of drawings);
- c. Document C: Written Opinion (2 pages)
- d. Document D1: US 1,036,148 (3 pages)
- e. Document D2: US 3,414,708 (9 pages) ; and
- f. Document D3: US 3,301,172 (4 pages)

End

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Document A – Letter from Client (includes questions) (1/2)

You receive the following letter from your client:

5 Dear Patent Agent

SINGAPORE PATENT APPLICATION NO. 2013000013-0

Many thanks for forwarding the Written Opinion.

10

I do not understand the Written Opinion. Please let me know what I should do with this document. I also see that the examiner disregarded certain claims. Does this mean I cannot get protection for these claims?

15 Looking at the drawings of the cited documents you provided, you can tell that my invention looks very different. I do not see these cooking devices in the market. Unlike these other types of cooking devices, my barbecue device does not cause flaming of the barbecued food. In fact, my competitors are copying my design exactly for this advantage. Also, the barbecue device is very durable due to my fan design and because my fan is made of a nickel-chromium based
20 alloy with molybdenum which I had told you about. Please ensure this material is protected – this is a new alloy. Furthermore, my fan is supported on a pin for easy and free rotation, which is different from the cited documents.

I am just about to board a plane for my annual vacation. I will leave this application in your good
25 hands.

Best regards

BBQ Ben

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Document A – Letter from Client (includes questions) (2/2)

QUESTION 1 – Prepare a response to the Written Opinion, including an analysis of the cited documents.

5

QUESTION 2 – Prepare amendments to the claims. You are required to amend the present claims to overcome the cited documents, correct any errors in the claims and/or add new claims.

10 QUESTION 3 – Prepare a letter of advice to BBQ Ben. Your letter should discuss your response and provide him with alternative courses of action that may provide varying levels of protection.

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Document B – Singapore Patent Application No. 2013000013-0 (1/10)

PORTABLE BARBECUE DEVICE

Background

5 [0001] The present invention relates to a portable barbecue device, particularly to a portable, exterior heat source powered barbecue device with a multi-blade fan.

 [0002] Barbecuing food is a popular way for cooking food, which can be easily carried out indoors or outdoors. The barbecuing process imparts a unique flavour to the food which is
10 not found in conventional cooking. However, existing barbecue apparatuses are often expensive, bulky and yet present many problems.

 [0003] For example, barbecuing often results in uneven cooking where food, especially meat products, is burnt on the outside and uncooked on the inside. This is due to a
15 phenomenon known as flaming. Flaming is the uncontrolled sparking of flames or fire due to the burning of fat and grease which drip from the food being barbecued onto the heat source. Although a metal sheet can be interposed between the food and the heat source, the interposed sheet also prevents efficient heat transfer from the heat source to the food, thereby increasing cooking time.

20 [0004] It is therefore an object of this invention to provide a portable barbecue device which addresses the above and other problems.

Summary

25 [0005] In a first aspect of the invention, there is provided a barbecue device comprising:
(a) a pan having a bottom wall and side walls for defining an open space within the pan, the bottom wall having a centre opening adapted to fit over an external heat source; and (b) a rotatable ventilator adapted to be removably mounted over the centre opening, wherein the rotatable ventilator overlays above the centre opening and is rotatable in a generally horizontal
30 plane.

 [0006] Preferably, the side walls are adapted to support a grill plate overlaying the open top of the pan.

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[0007] Preferably, the device includes a support attachment for attaching the rotatable ventilator to the bottom wall of the pan. More preferably, the support attachment includes a heat resistant band spanning transversely across the centre opening, the heat resistant band secured to the bottom wall and is adapted to support the fan support in a generally vertical direction. Still more preferably, the heat resistant band may be made of the same material as the pan.

[0008] In a second aspect of the invention, there is provided a barbecue device comprising: (a) a pan having a bottom wall and side walls for defining an open space within the pan, the bottom wall having a centre opening adapted to fit over an external heat source; and (b) a ridge located on the bottom wall and circumferentially surrounding the centre opening, the ridge defining a trough with the side walls, which is adapted to retain water at the bottom of the pan.

[0009] Preferably, the side walls are adapted to support a grill plate overlaying the open top of the pan.

[0010] The portable barbecue device of the present invention is suitable for use as an indoor barbecue. The barbecue device does not require an internal heat source and does not require any electrical or power supply. The risk of flaming is virtually eliminated by interposition of an element between an external heat source and the food to be cooked. This element intercepts and deflects the grease which drips from the food being barbecued to a water reservoir. Further, the barbecue device allows hot air rising from the heat source to mix with cooler air drawn into the pan by the rotation of the fan, thereby further promoting even cooking of the food.

Brief Description of the Drawings

[0011] FIG. 1 is a perspective view of a portable barbecue device;

[0012] FIG. 2 is an exploded view of the device of FIG. 1 with a partial cut away of the pan.

[0013] FIG. 3 is a cross sectional view taken along the line 3--3 in FIG. 1 showing water in the drip pan.

[0014] FIG. 4 is a cross sectional view taken along the line 3--3 in FIG. 1.

[0015] FIG. 5 is a perspective view of the fan support attachment shown in FIG. 2.

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Detailed Description

[0016] FIG. 1 illustrates a portable barbecue device 10 in an assembled form which is ready for use. FIG. 2 is an exploded view of the barbecue device 10 of FIG. 1 with a partial cut away of the pan. The portable barbecue device 10 comprises a pan 12 and a rotatable ventilator 14. For the purposes of the present invention, the term “rotatable ventilator” is meant to refer to any structure that rotates and allows the ventilation of air in the device 10. The advantage of providing the ventilation will be described in this application. Such a “rotatable ventilator” may include any fan-like structure. In an embodiment of the present invention, the “rotatable ventilator” is a multi-blade fan as shown in the Figures. The barbecue device 10 may further include a removable grill plate 16 overlaying the open top of the pan 12 for supporting food items to be cooked. The grill 16 may be formed of crossbars made of metal or steel.

[0017] The pan 12 includes a bottom wall 20 (see FIG. 2) and a plurality of side walls 22, 24, 26, 28 which may be attached at right angles to the bottom wall 20 to define an open space within the pan 12. The bottom wall 20 of the pan 12 has a centre opening 30 suitably dimensioned to fit over an external heat source such as, but not limited to, an electric stove element, a gas stove, burning charcoal or wood. The pan 12 may be made of a durable and heat resistant material, preferably metal.

[0018] A fan support attachment (see FIGs. 2 and 5) such as a heat resistant band 32 may be disposed transversely across the centre opening 30 in the bottom of the pan 12. Opposite ends of the heat resistant band 32 are fixedly attached to the bottom wall 20 of the pan 12. The heat resistant band 32 may be made of metal, preferably of the same material as the pan 12.

[0019] A fan support 38 (see FIGs. 2 and 3) is installed in a generally vertical or upright orientation. The fan support 38 has a lower end 42 fixedly attached to the heat resistant band 32, and an upper end 40 adapted to receive a multi-blade fan 14 to allow rotation about the fan support 38. Particularly, the upper end 40 of the fan support 38 includes a pin which is adapted to engage the apex of a cone shaped hub of the fan 14 (see FIG. 4). As the area of contact between the pin and the hub is minimal, the fan 14 can rotate freely. The fan 14 may also

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include further suitable components which are adapted to strengthen the fan 14 and prevent deformation of the blades 68.

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[0020] The fan 14 may further include a lip 74 adjacent the outer periphery of the blades 68 for collecting grease from the blades and deflecting the grease to a reservoir 50 to prevent flaming. Further details of the lip and its advantages are described below.

10

[0021] Upon mounting the multi-blade fan 14 on the fan support 38 (see FIG. 3), the multi-blade fan 14 overlays the centre opening 30 of the bottom wall 20 and is rotatable in a generally horizontal plane. When a grill plate 16 is supported on the pan 12 in the assembled form, the multi-blade fan 14 is interposed between the grill plate 16 and the bottom of the pan 12. After an external heat source 31 is activated, the external heat source heats the air above it and generates rising convection currents 62. The hot convection currents 62 pass through the centre opening 30 of the bottom of the pan 12, and strike the lower surface of the fan blades 68, thereby causing the fan 14 to rotate in a clockwise direction as illustrated by arrows 86. To operate the fan 14 continuously, a steady stream of convection currents is required. As the heated air 62 rises to rotate the fan 14, cooler air is drawn into a first air gap 64 between the bottom of the fan 14 and the top of a trough which is located between a ridge 48 surrounding the centre opening 30 and side walls 22, 24, 26, 28 of the pan 12. The fan rotation forces a stream of air 70 up and away from the fan 14, carrying smoke and gas generated by the cooking food with it. The mixed air smoke stream 70 is then drawn into an overhead exhaust fan (not shown). This mixing of hot air rising from the heat source with cooler air drawn into the pan 12 by the rotation of the fan 14 permit even cooking of food placed proximately above the multi-blade fan 14. The multi-blade fan 14 does not require electricity or manual manipulation to rotate. The multi-blade fan 14 is actuable solely by rising convection currents generated by an external heat source to rapidly rotate. In addition, the fan 14, being disposed between the heat source and food items, also attenuates the direct effect of the heat upon the food and therefore reduces overcooking of food placed over the barbecue device 10.

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[0022] The fan blades 68 may be similarly shaped and have same angular orientation to the horizontal plane of rotation of the fan 14 and in the same circumferential direction. The

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number of fan blades 68 may range between 5 to 30, and more preferably in the range of 10 to 20.

5

[0023] The pan 12 further includes a ridge 48 located on the bottom of the pan 12. As illustrated in FIG. 3, the ridge 48 comprises a wall projection arranged circumferentially around the centre opening 30 of the bottom wall 20 to define a trough between the ridge 48 and side walls 22, 24, 26, 28 of the pan 12. The trough, in turn, defines a reservoir 50 that is preferably suitably filled with water. When the fan 14 rotates by action of rising convection currents 62, a centrifugal force is generated which allows the fan blades 68 to intercept grease which drips off the cooking food items, compel the grease towards the lip 74 adjacent the outer periphery of the fan blades 68, and subsequently deflect the grease into the water reservoir 50. Further, since the fan 14 is suitably dimensioned to overlay at least most of the centre opening 30, grease and fats are prevented from falling into the external heat source 31 and causing flaming. In addition, the fan 14 can also disperse and atomise the grease which falls on it due to the heated condition of the fan blades 68 and speed of the rotating fan blades 68. This will result in very minute grease droplets which are dispersed by the air currents created by the rotating fan 14 and are carried upwards by the air stream rising up from the fan 14.

20

[0024] The amount of water 50 in the trough should be filled to a level just below the multi-blade fan 14, preferably to the brim of the ridge 48. The water 50 acts to collect and cool grease which drips from the cooking food. Additionally, the water 50 produces steam 56 which upon rising can guide smoke out of the pan 12 and assists cooking of the food on the grill 16. Thus, the food can be cooked in an unenclosed environment, i.e. without requiring a cover, and yet retaining moisture. This way, the unique barbecue characteristics can be retained in the cooking food.

25

[0025] While the invention has been illustrated and described above, it is not limited to the details shown. Other embodiments will be apparent to those skilled in the art from consideration of the specification and practice of the invention. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to limit the disclosed embodiments of the invention. The embodiments and features described above should be considered exemplary, with the invention being defined by the appended claims.

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Claims

1. A barbecue device comprising:
 - 5 (a) a pan having a bottom wall and side walls for defining an open space within the pan, the bottom wall having a centre opening adapted to fit over an external heat source; and
 - (b) a rotatable ventilator adapted to be removably mounted over the centre opening, wherein the rotatable ventilator overlays above the centre opening and is
10 rotatable in a generally horizontal plane.
2. The device of claim 1, wherein the side walls are adapted to support a grill plate overlaying the open top of the pan.
3. The device of claim 1, further comprising a support attachment for attaching the
15 rotatable ventilator to the bottom wall of the pan.
4. The device of claim of any preceding claim, wherein the support attachment includes a heat resistant band spanning transversely across the centre opening, the heat resistant band secured to the bottom wall and is adapted to support the support attachment in a generally
20 vertical direction.
5. The device of any preceding claim, wherein the heat resistant band may be made of the same material as the pan.
- 25 6. A barbecue device comprising:
 - (a) a pan having a bottom wall and side walls for defining an open space within the pan, the bottom wall having a centre opening adapted to fit over an external heat source; and
 - (b) a ridge located on the bottom wall and circumferentially surrounding the centre
30 opening.
7. The device of claim 6, wherein the side walls are adapted to support a grill plate overlaying the open top of the pan.

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Document B – Singapore Patent Application No. 2013000013-0 (7/10)

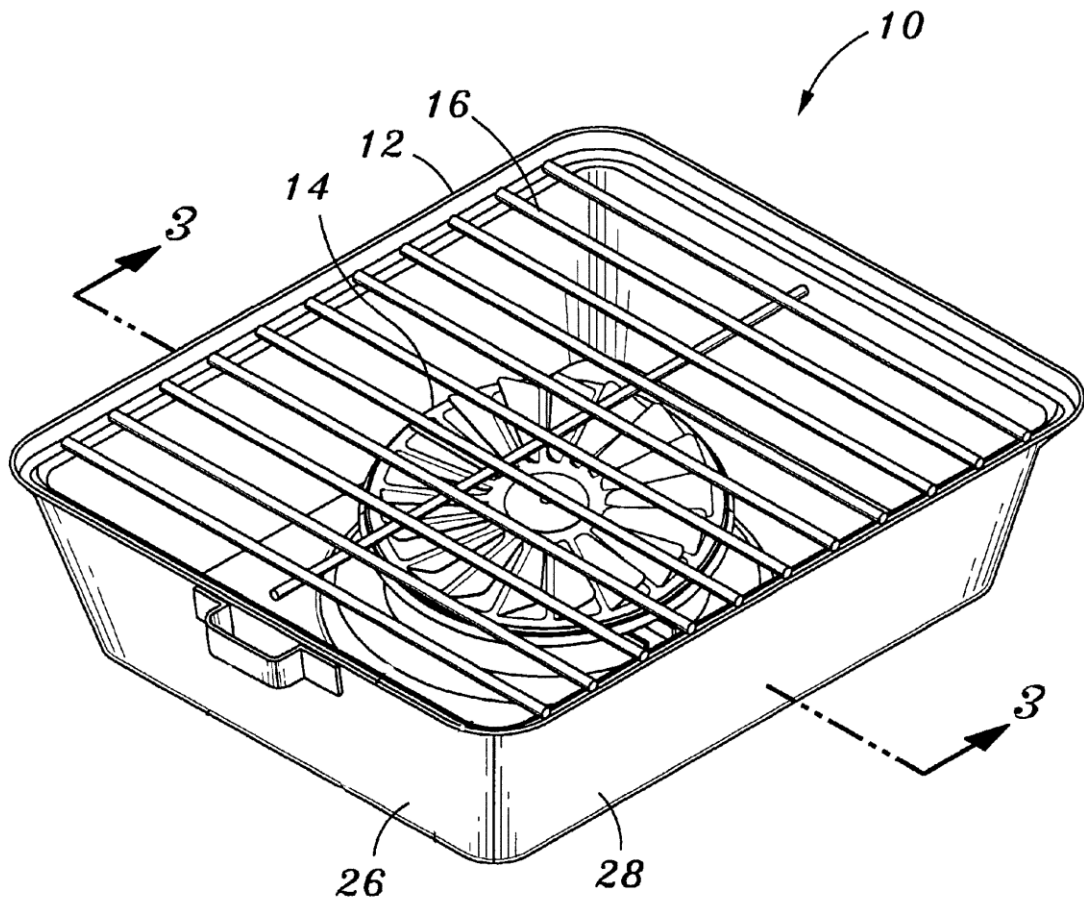


FIG. 1

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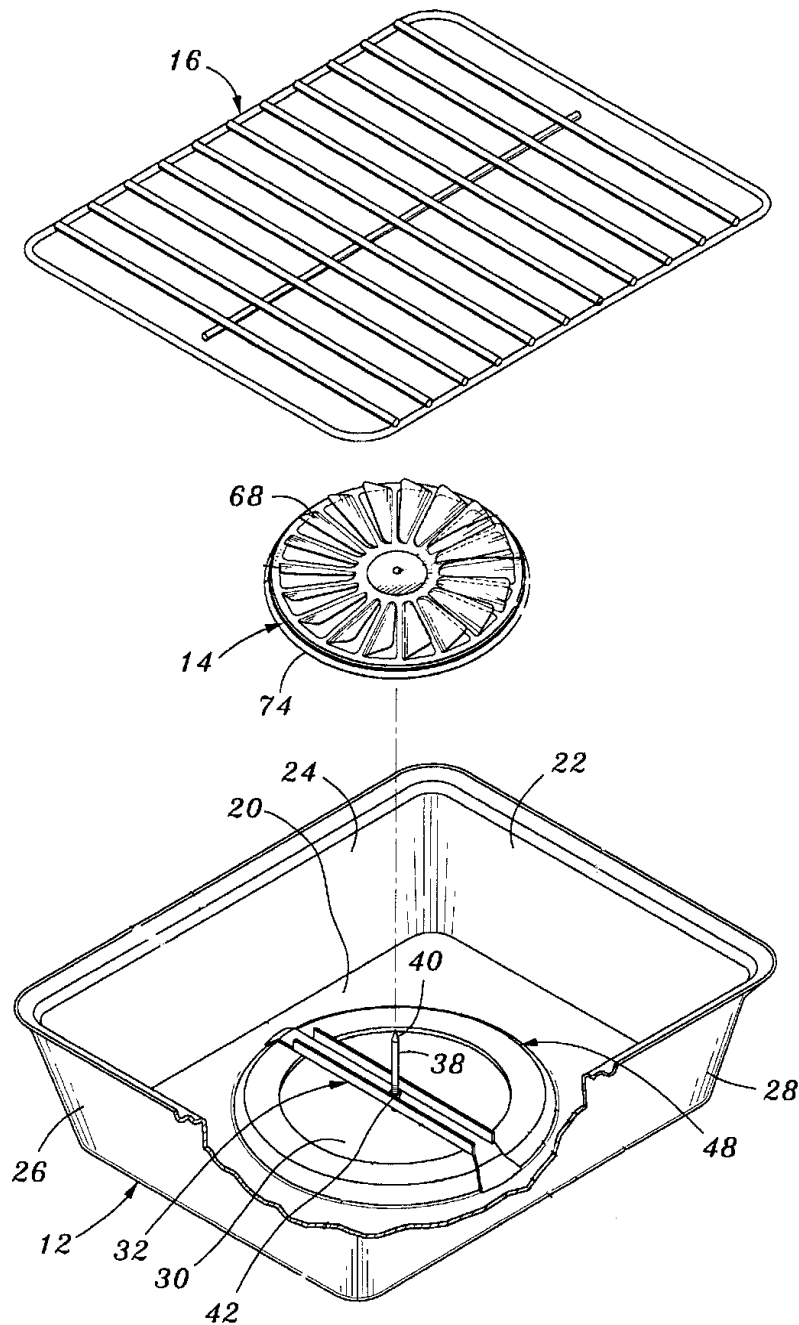


FIG. 2

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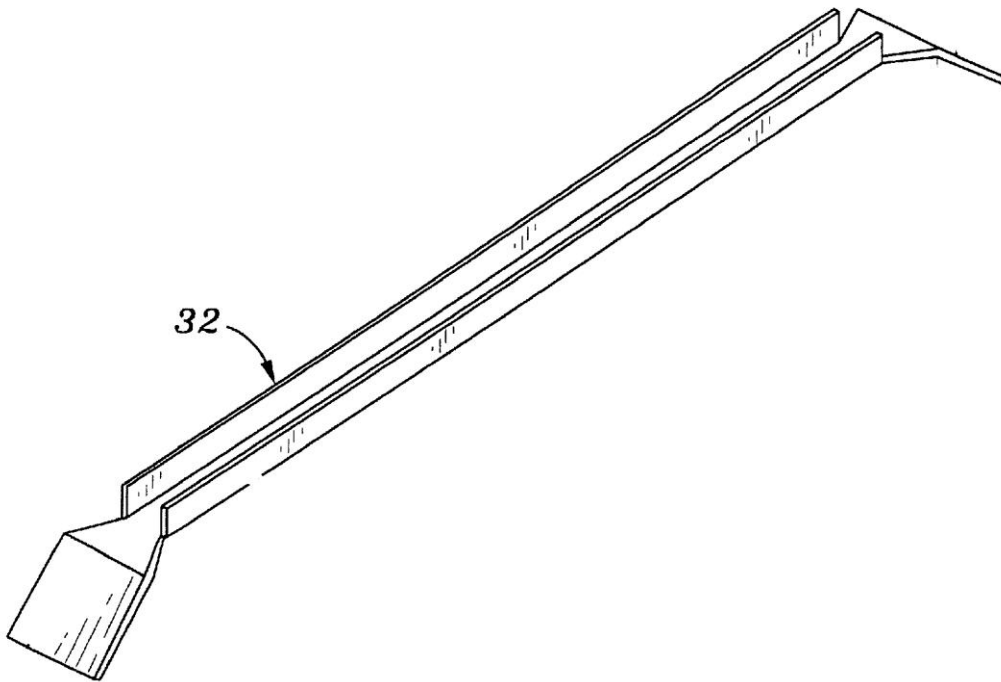


FIG. 5

[copyright notice: source of drawings is US 5,967,135]

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Document C – Written Opinion (1/2)

Lack of unity of invention

There are multiple inventions in this application, as follows:

5 First invention: Claims 1 to 5. It is considered that a barbecue device having a rotatable ventilator comprises a first distinguishing feature.

Second invention: Claims 6 to 7. It is considered that a barbecue device having a trough comprises a second distinguishing feature.

Consequently, this Opinion has been established in respect of Claims 1 to 5 only.

10

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement:

15	Novelty (N)	Claims		YES
		Claims	1-5	NO
	Inventive step (IS)	Claims		YES
		Claims	1-5	NO
20	Industrial applicability (IA)	Claims	1-5	YES
		Claims		NO

2. Citations and explanations

Reference is made to the following citations:

25	D1	US 1,036,148
	D2	US 3,414,708
	D3	US 3,301,172

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Document C – Written Opinion (2/2)

Novelty

5 **Claim 1:**

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses a broiler c in the shape of a pan, and comprises a body portion c^2 , the bottom of which is provided with a large central opening d , over which is secured a spider work frame or support e provided centrally with a standard f , on which is rotatable mounted a disk or plate g , provided with a plurality of apertures h , below which are downwardly and laterally directed wings or blades i .

10 Accordingly, Claim 1 is not novel.

Claim 2:

D1 discloses the body c^2 of the broiler provided with a top or covering j made in the form of a grid and also made detachable.

15 Accordingly, Claim 2 is not novel.

Claims 3 and 4:

D1 discloses a spider work frame or support e provided centrally with a standard f , on which is rotatable mounted a disk or plate g ,

20 Accordingly, Claims 3 and 4 are not novel.

Inventive Step

25 **Claim 5:**

D1 does not disclose the material of spider work frame or support e , however it would have been obvious to a person skilled in the art to use a same material for the heat resistant band and the pan.

Accordingly, Claim 5 is not inventive.

30

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Document D1 – US 1,036,148 (1/3)

US Patent No. 1,036,148

BROILER ATTACHMENT FOR RANGES AND OTHER HEATERS

5 Filed January 12, 1912

Patented August 20, 1912

This invention relates to broiler attachments for ranges, stoves and other heaters and the object thereof is to provide an improved device of this class which may be used in connection with the
10 ordinary range, stove or other heater, and by means of which all kinds of meats, fish, fowl and the like may be quickly, easily and thoroughly broiled, and by means of which bread may be similarly toasted; and with this and other objects in view the invention consists of a device of the class specified, constructed as hereinafter described and claimed.

15 The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which--

Figure 1 is a central transverse section of my improved broiler and showing the method of its
20 use. Fig. 2 a plan view of one part of the broiler and Fig. 3 a section on the line 3—3 of Fig. 2.

In the drawing forming part of this specification, I have shown at **a** the top of the gas range of other heater provided with a burner **b**, and I have also shown at **c** the preferred form of my improved broiler. The broiler **c**, in the form shown, is made substantially in the shape of a pan or
25 similar article, and comprised a body portion **c**², the bottom of which provided with a large central opening **d**, over which is secured a support provided centrally with a standard **f**, on which is rotatably mounted a disk or plate **g**, provided with a plurality of apertures **h**, below which are downwardly and laterally directed wings or blades **i**, all of which extend in the same direction, and all of which are, in the form of construction shown, of the same shape as the
30 aperture **h**, and of the same transverse dimensions, said wings or blades being stamped from the metal of the disk or plate **g** in the operation of forming said apertures. The body **c**² of the broiler is also provided with a top or covering **j** made in the form of a grid and also made detachable, and on which the meat or other material to be broiled or toasted is placed, and on

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Document D1 – US 1,036,148 (2/3)

which said meat or other article may be turned in the usual manner in the operation of broiling or
toasting the same.

5

It will be understood that the broiler may be removed from or placed on the heater whenever
desired, and when in a position for using, the rotatable disk or plate **g** is directly over the burner,
or in the line of the upwardly moving currents or hot gases produced by the burner or heater,
and these upwardly moving currents of hot gases strike the wings of blades **i** of the disk or plate
10 **g** and rapidly rotate the same, and the heat or hot gases pass through said disk or plate and
around the separate parts of the grid **g**, and over the bottom surface of the meat or other article
to be broiled, or bread to be toasted, and this prevents the unequal broiling of the meat, or other
article, and the unequal toasting of the bread, the upwardly moving heat products or gas, being
thoroughly distributed as will be readily understood.

15

My invention is not limited to any particular form of the broiler or broiler attachments, the
essential feature thereof being the rotatable distributor **g** placed between the bottom of the
broiler and the top thereof.

20

[Note: This document has been modified for the purpose of the examination.]

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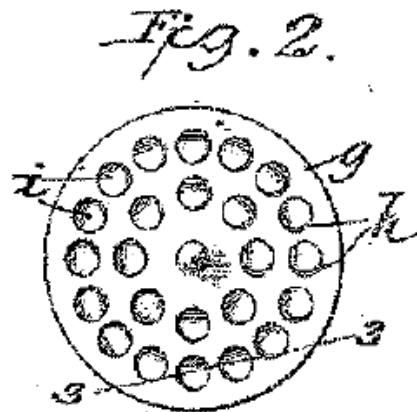
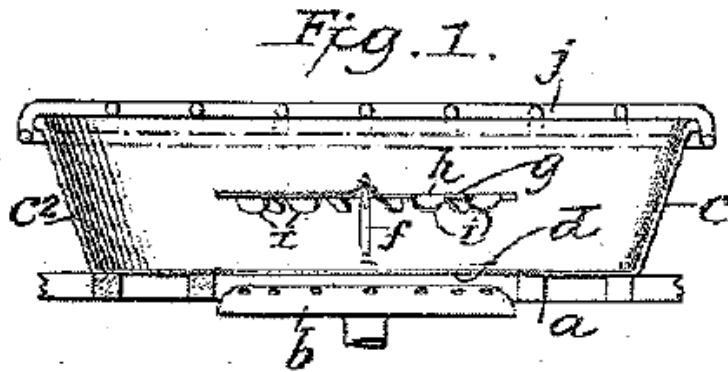
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Document D1 – US 1,036,148 (3/3)

1,036,148.

Patented Aug. 20, 1912.



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Document D2 – US 3,414,708 (1/9)

US Patent No. 3,414,708

FORCED CONVECTION OVEN

5 Filed October 22, 1965

Patented December 3, 1968

The present invention relates to improvements in forced convection ovens.

- 10 It has previously been proposed to put a fan or blower in an oven to accelerate the baking process. However, where the fan is placed at the top or bottom of the oven, the baking pan forms a partial barrier to the air flow within the oven which results in uneven heating of the food being baked. In some cases, as where the air goes up along the side walls of the oven and down in the middle, a crust will be formed at the top of the food, such as a cake, whereas the
15 bottom will be undercooked. In other cases, where the air stream goes up in the middle of the oven and down along the side walls, the bottom of the cake will be overcooked, and the top will be undercooked.

- The direction of the air stream is determined by the location of the fan, and by the type, either
20 radial delivery or axial delivery.

- In addition, the air stream in the middle of the oven is likely to have a more concentrated heating effect which will cause localized overheating at the area of impingement at the concentrated air stream on the bottom of the pan, in the case of an upwardly directed air stream, or on the top of
25 the food in the pan, in the case of a downwardly directed air stream.

- An object of my invention is to provide a more uniform distribution of the air currents in the oven in order that both the top and the bottom of the baking pan will be subjected to the same amount of heat transfer, and in order that localized overheating will be minimized.

30

According to my invention, the fan is an axial delivery fan, and I provide a ring-shaped baffle above the fan, and spaced above the opening in the baffle, I provide a second baffle in the form

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of an imperforate disk. The heating element is located at about the same elevation of the fan and surrounds the same, but it is spaced radially from the fan and from the baffle assembly by a substantial distance.

According to this arrangement, the air stream is directed upwardly through a hole in the lower baffle, and the upper baffle serves to direct the air stream radially outward toward the walls of the oven. This arrangement has been found to be very effective in overcoming the difficulties encountered in the prior art arrangements, as discussed above.

Another object of my invention is to provide a forced convection oven in which the fan is protected from over-heating even though the oven is operated at relatively high temperatures, as in the case of cooking frozen foods.

A still further object of my invention is to provide an improved forced convection oven in which the fan is located beneath the baking pan where the ambient temperature is lower, and in which means are provided to protect the fan blades from food drippings.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

FIG. 1 is a front elevation of an oven embodying my invention with a portion of the oven door broken away;

FIG. 2 is a side view of FIG. 1, partially in section;

FIG. 3 is a plan view of the baffle assembly;

FIG. 4 is an elevation of FIG. 3, partially in section;

FIG. 5 is a diagram illustrating the operation; and

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Document D2 – US 3,414,708 (3/9)

FIG. 6 is an enlarged detail showing the mounting of the baffle support structure and guard; and

5 FIG. 7 shows a modification.

The oven shown in FIGS. 1 and 2 comprises an outer sheet steel casing 10 and an inner casing 11 with insulation material 12 confined within the double wall construction. The insulated double wall construction provide a top wall 13, a bottom wall 14, two side walls 15, and a back wall 16.

10 A broil unit 17 is located at the top of the oven, and a bake unit 18 is located at the bottom of the oven, by means of suitable supports 19. These broil and bake units 18 and 17 are shown as usual rod type electric heating elements although open resistance wires may be used if preferred. The oven thus described is the usual bake and broil combination oven, and one feature of my invention is that the oven is capable of normal baking and broiling use when it is
15 not desired to use the convection fan.

An insulated door 20 is hingedly mounted at the front of the oven in the usual manner.

A compartment 21 is located below the oven for accommodating the usual terminal block, electric cables, and switch mechanisms, not shown. Also located within the compartment 21 is a
20 fan motor 22 having a shaft 23 which extends upwardly through the bottom wall 14. An axial delivery fan 24 is mounted on the shaft 23 at its upper end. The axial delivery fan is surrounded by the bake unit 18 which is of rectangular outline. Above the fan 24 is located a double baffle assembly 25, shown in FIGS. 3 and 4. This assembly comprises a lower ringshaped baffle 26,
25 an upper disk-shaped baffle 27 together with a wire supporting structure 28 for the lower baffle 26. Sheet metal spacers 29 mount the upper baffle 27 on the lower baffle 26. The lower ends of the legs 30 of the supporting structure 28 are secured to the inner casing 11 of the bottom wall 14 in any suitable manner, as by being welded to the interior of a flanged nut 31 which extends through the inner casing and is welded to the outer surface thereof. This avoids damage to the
30 inner surface which may be coated with porcelain enamel.

The fan 24 is rotated in a direction to blow air upwardly and radially outwardly through the throat 32 between the lower and upper baffles 26 and 27.

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A sleeve 33 extends through the bottom wall 14 and surrounds the fan shaft 23. This provides a passageway of considerable cross section, and the rotation of the fan causes air to be drawn through the sleeve 33 upwardly into the oven. This provides considerable circulation of air through the compartment 21 which cools the fan motor 22.

A small motor cooling fan 34 is secured to a lower extension of the shaft 23 to assure that the air stream passing through the sleeve 33 will pass over the surfaces of the fan motor.

There is sufficient leakage in the sheet metal construction of the switch compartment 21 and also around the oven door to permit the desired circulation of air; additional vents in the switch compartment may be provided if desired.

It will be noted that the sleeve 33 extends upwardly almost into abutting relationship with the undersurface of the inner casing 11, but does not need to be welded thereto. The inner casing 11 is provided with a flanged opening 35, the diameter of which may approximate the diameter of the sleeve 33, or be somewhat smaller as shown.

The sleeve 33 is secured at its lower end to a motor mounting plate 36 which in turn is welded to the under-surface of the outer casing 10, and the body of the motor is secured to the motor mounting plate 36 by suitable bracket means which do not obstruct the flow of air through the sleeve 33.

Air currents substantially as shown in FIG. 2 are observed during the operation of the device. The arrow 40 designates an intake air stream, the arrow 41 an output air stream, arrow 42 a wall-adjacent ascending air stream, and the arrow 43 a centrally descending air stream. The customary position for a baking pan is shown by the dotted line 44, that is, interposed in the centrally radiated descending air stream 43.

It has also been observed that the wall adjacent ascending air stream 42 sweeps across the oven door as indicated by the arrow 42a in FIG. 1. In other words, the wall adjacent ascending air streams move spirally in the direction of fan rotation.

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Preferably, the broil unit 17 is energized at partial heat, and it has been found that this provides more uniform baking of the top of a cake; when not energized, the middle top portion of the cake may be undercooked even though the top is crusted over at the outer top portions.

The exact reason for the improved results is not fully understood. However, it is believed that the arrangement sets up two different air stream paths as diagrammatically indicated in FIG. 5. The primary air stream path A comprises the intake air stream 40 and at least a portion of the output air stream 41. The throat 32 imparts a high velocity to the output air stream 41 and causes it to induce a secondary air stream B, FIG. 5. The secondary air stream comprises the ascending and descending air streams 42 and 43. At the point C where the air stream paths A and B are tangent to each other, heat exchange takes place, probably through commingling.

Thus, the kinetic energy applied to the secondary air stream B is applied throughout a large ring-shaped area C surrounding the baffle assembly 25, making for a what might be termed a diffuse source of energy as compared, for instance, with the blades of a fan or a blower. Thus, the descending central air stream is also of a diffuse character which permits it to follow all the contours of the baking pan and to bathe the same with an air stream which is less concentrated than, for instance, the output air stream of an axial delivery fan or the input air stream of a radial delivery fan. In other words, that which is avoided according to the present invention, is the creation of a central air stream having what might be termed "axial" characteristics, namely the high velocity, relatively small cross section of the axial delivery or axial intake air streams above mentioned.

[Note: This document has been modified for the purpose of the examination.]

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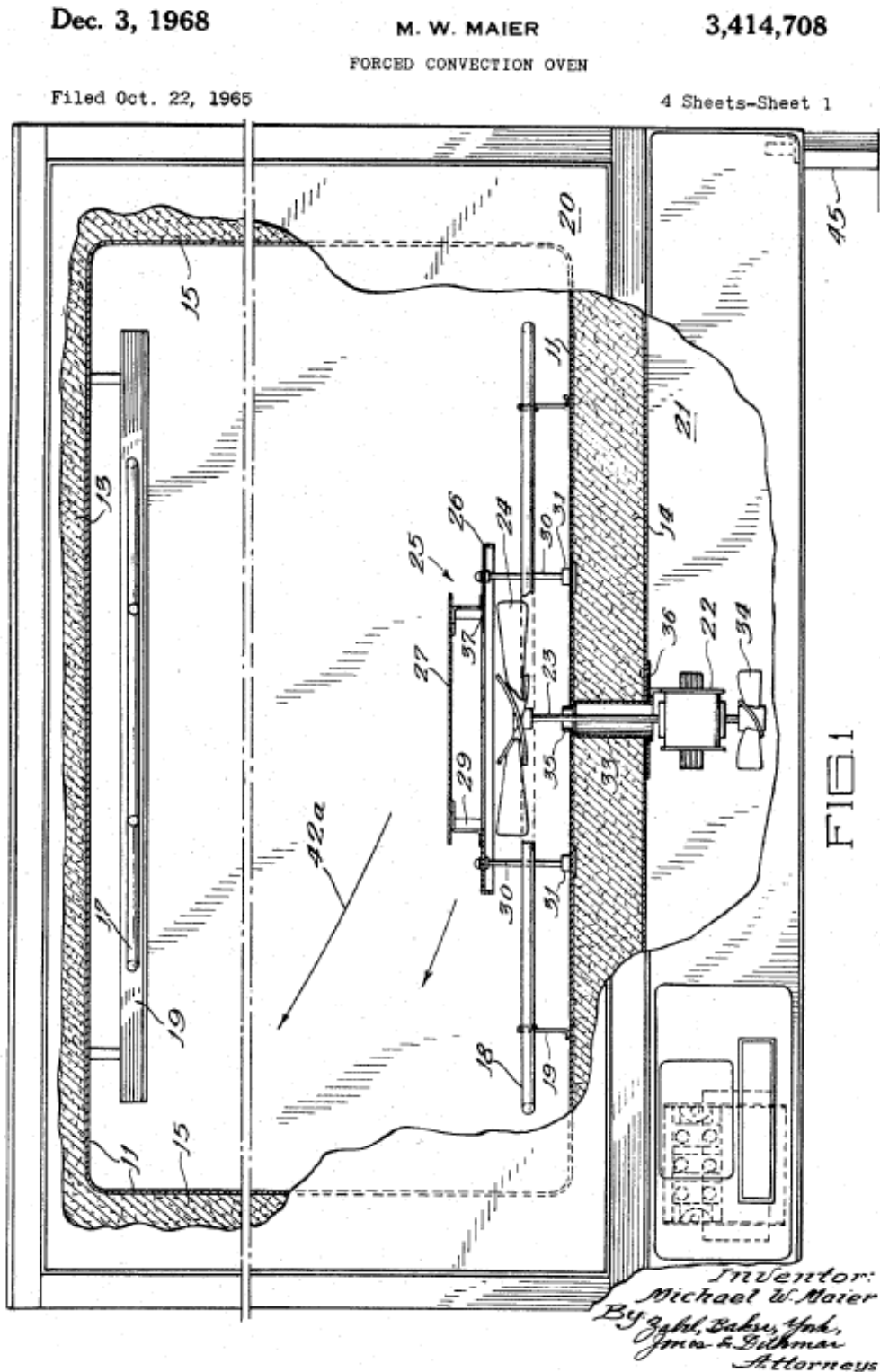


FIG. 1

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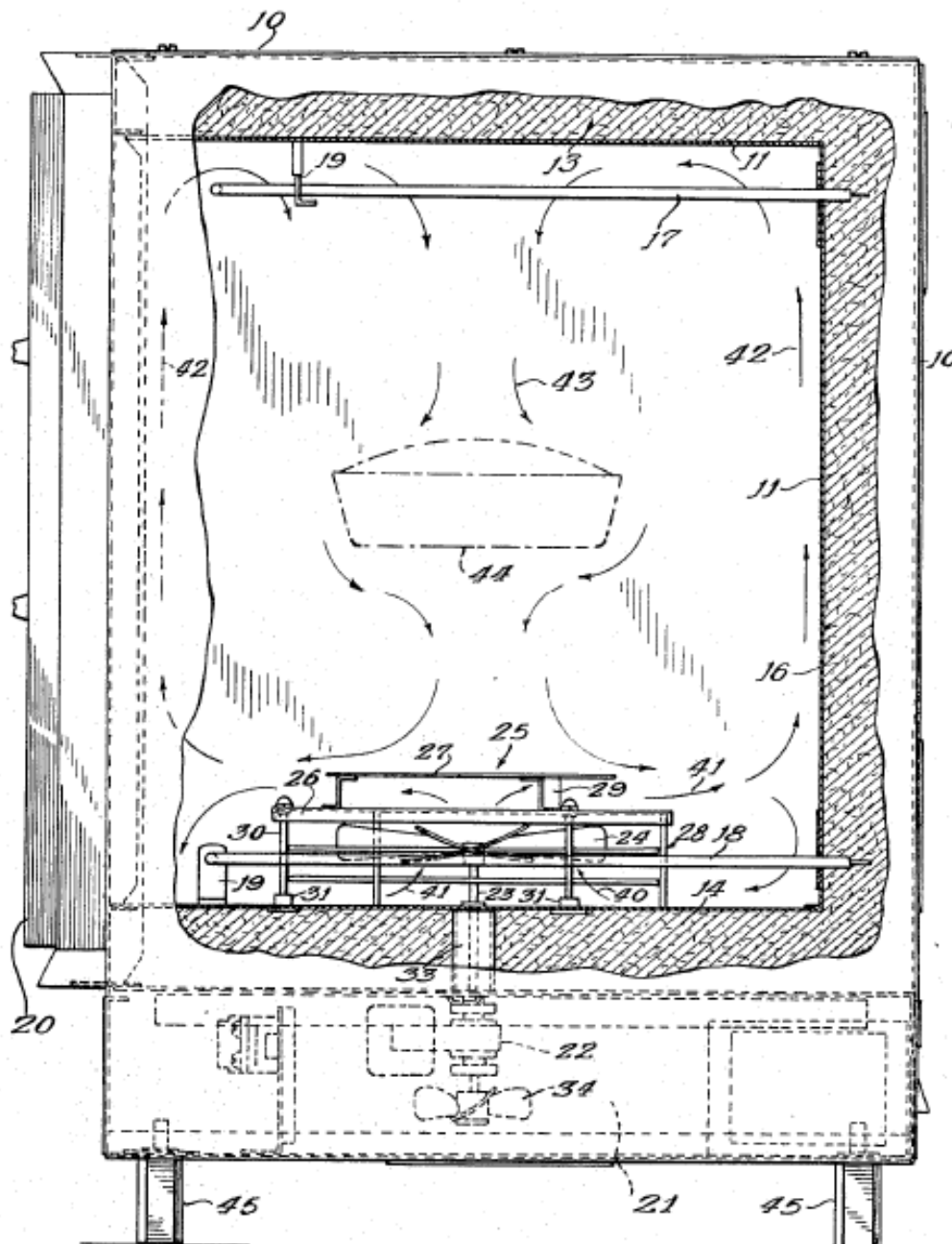
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FIG. 3

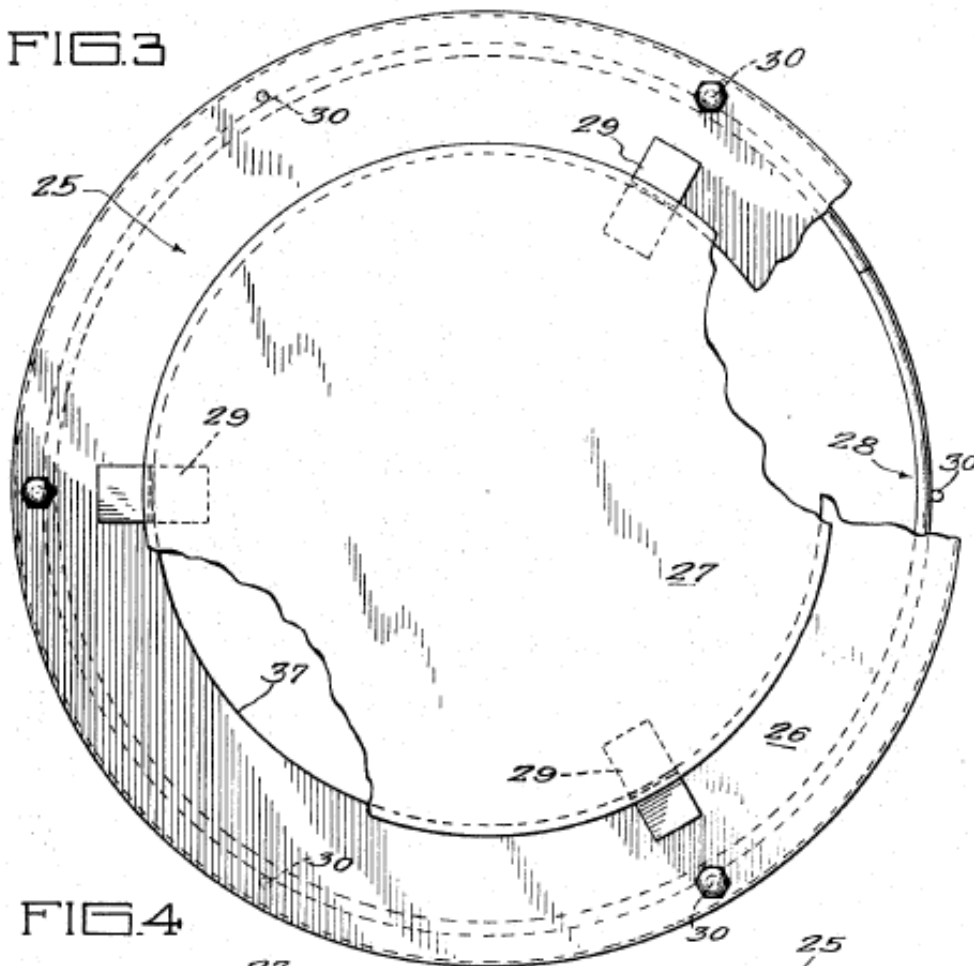
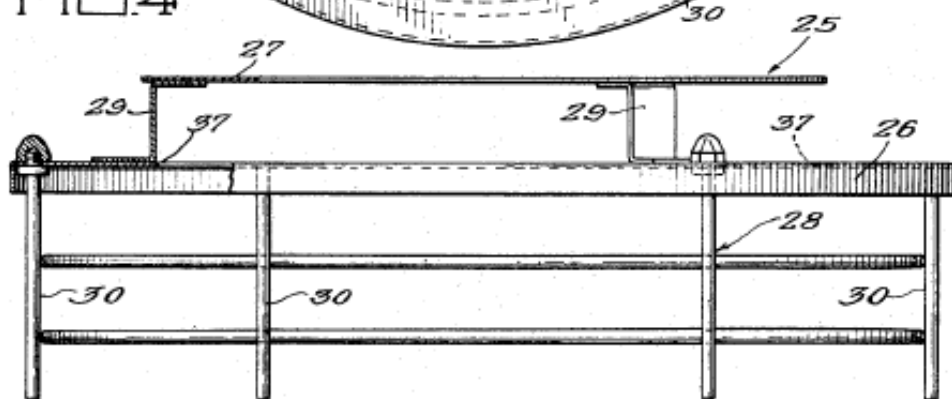


FIG. 4



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FIG. 5

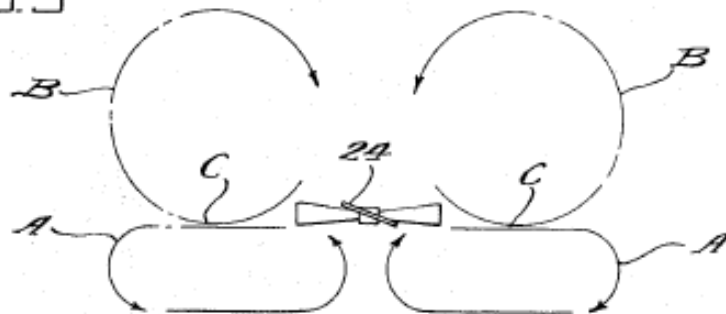
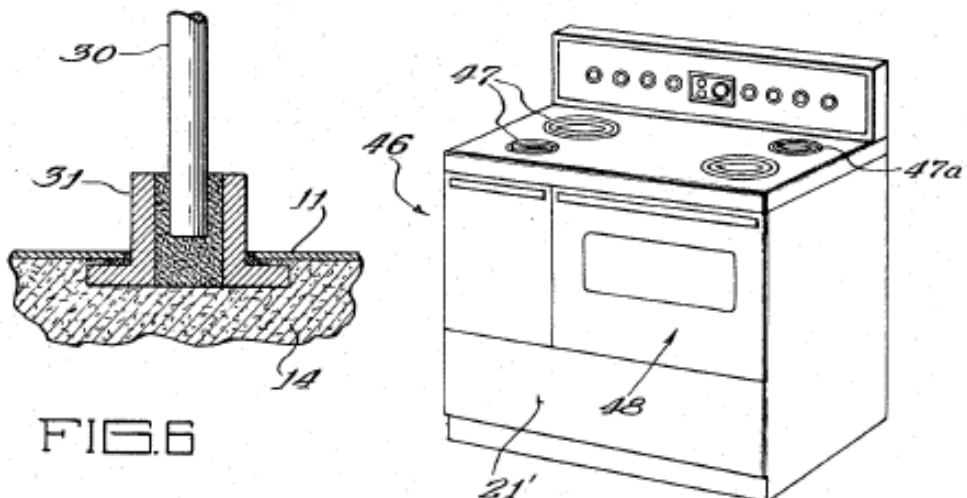


FIG. 7



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Document D3 – US 3,301,172 (1/4)

US Patent No. 3,301,172

COOKING GRILL

5 Filed October 9, 1964

Patented January 31, 1967

This invention relates to grill type apparatus for cooking foods and more particularly to a grill in which food is cooked by the heat of hot convection gases.

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The principal object of the invention is to provide a cooking appliance for use with a gas burner or the like which cooks food rapidly and evenly with substantially no smoke and surprisingly little odor. A further object is to provide a cooking grill which may be used either indoors or outdoors for cooking a wide variety of food efficiently while maintaining a high moisture content so that

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A preferred form of the cooking grill is illustrated in the accompanying drawing, wherein--

FIG. 1 is a cross-sectional view taken in a vertical, axial plane of the cooking grill, and

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FIG. 2 is a plan view of the grill with the cover removed.

The grill apparatus is exceedingly simple. It consists essentially of three principal parts, a base 1, a wire grid 2 supported upon and spaced above the base, and a cover 3 supported upon the grid. The base has a central opening 4 defined by an upstanding circular flange 5. It also has a peripheral flange 6 which, with flange 5, provides a receptacle for liquid drippings from food on the grid. The grid 2 is fabricated from spaced wires and includes three legs 7 arranged to stand upon the base 1 at the peripheral flange 6. The grid also has three radially extending wires 8 with upturned ends 9 intended to support the cover 3. Preferably, grid 2 is provided with a central opening 10 of approximately the same size as opening 4 in the base, for the unimpeded passage of hot gases upwardly through the grid as hereinafter more fully described.

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The cover, like the base, of the cooking grill may be made of a suitable metal, such as aluminium. It is deeply domed to provide a space 11 between it and the grid 2. A relatively heavy plate 12 of iron, having a diameter somewhat greater than that of openings 4 and 10 in the base and grid, respectively, is arranged inside of the cover at the axis of the grill. Conveniently, plate 12 is fastened to the cover by means of the nut 13 which also fastens handle 14 to the cover. The diameter of cover 3 is approximately the same as the diameter of the base 1 and rests upon the grid at the upturned ends 9 of radial wires 8.

The cooking grill may be used for cooking meat and vegetables and for baking bread, potatoes and other foods. The raw food is placed upon the grid as indicated at 15, above the receptacle portion 16 of base 1. The apparatus is placed over a suitable burner, such as burner 17, illustrated by way of example, of a gas stove. The hot gases from the burner rise and enter the grill through opening 4. At least the major part of the convected current passes upwardly through opening 10 in grid 2, impinges upon plate 12 and mushrooms outwardly in all directions, being confined by cover 3, and passes over the food before escaping through the gap 18 between the edge of flange 6 of the base and the periphery of cover 3. A small part of the hot gases may spread radially from the main stream and pass along under the grid and food from opening 4 to the escape gap 18. The food, being heated in this manner, cooks and, in doing so, may release fats or juices which drip down into the receptacle 16. These dripping may be used for basting, if desired, although normally the food cooked in this grill retains a satisfactory proportion of its moisture so that the product is moist and palatable. The drippings may be used for making gravy, for example, or may be discarded. The important consideration is that no part of the fat dripping from meat is burned. Thus, smoke, odor and other possible undesirable products of such combustion are avoided.

It has been found that the presence of plate 12 tends to hasten and stabilize the cooking process.

The height of flange 5 is not critical. If desired, to avoid the effect of ambient cross air currents, this flange may approach grid 2, but should not extend above it. To allow for the desired even circulation of hot gases through the cooking grill, the vertical dimension of gap 18 should be not less than about one-half of the distance between the bottom portion of base 1 and grid 2.

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Because the rising currents of the gases at the axis of the grill spreads to flow radially throughout the 360 degrees of the circular device and then passes downwardly over the food,
5 all the food is cooked evenly and with desirable control. It will be understood that sources of heat other than the gas burner shown for purposes of illustration may be used. It is essential only that a current of sufficiently hot gases be supplied.

10 The cooking zone being confined to a relatively small volume and the heat being readily controllable, the temperature of the food can be brought to cooking level rapidly without causing burning in any degree so that cooking can be accomplished rapidly with little loss of moisture.

[Note: This document has been modified for the purpose of the examination.]

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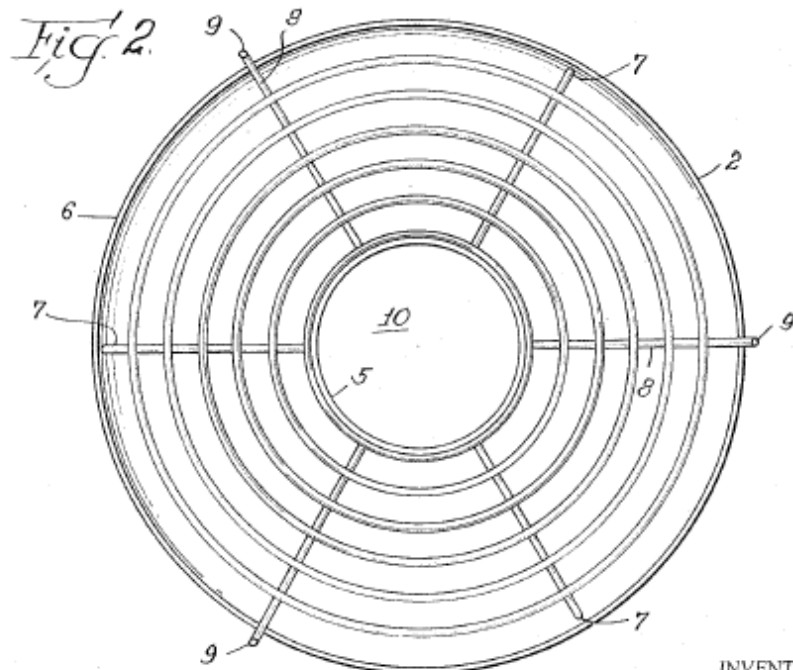
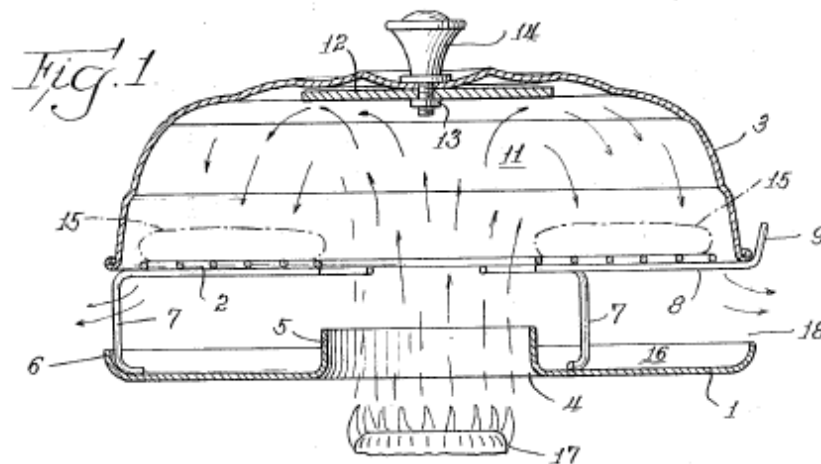
Jan. 31, 1967

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3,301,172

COOKING GRILL

Filed Oct. 9, 1964



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