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DOMESTIC APPLIANCE

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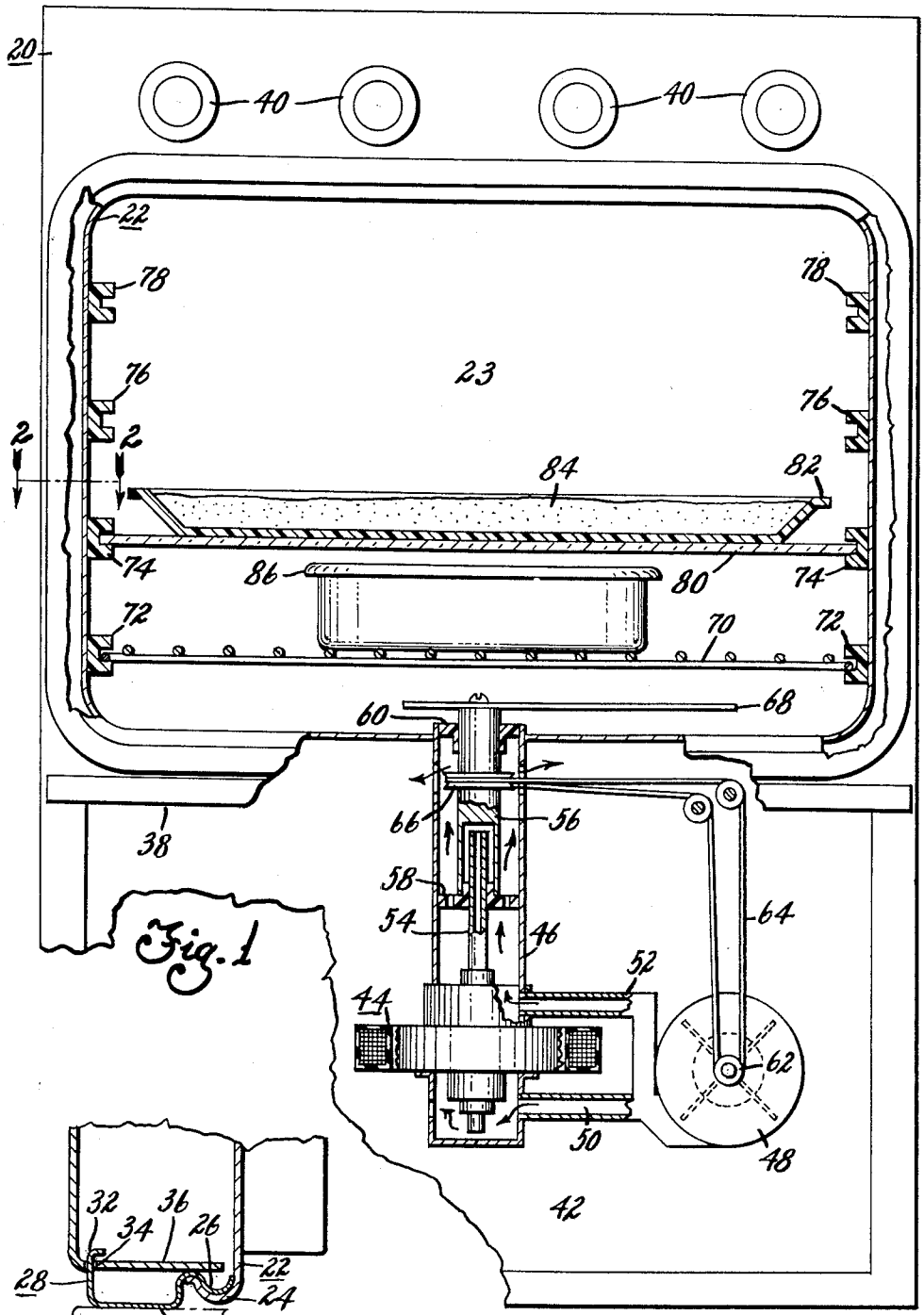

Fig. 1

Fig. 2

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DOMESTIC APPLIANCE

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This invention relates to a domestic appliance and more particularly to domestic electric ovens in which the electromagnetic high frequency waves of the order of 915 or 2500 megacycles are used to rapidly cook foods.

Such ovens have the capability of cooking foods in a minute or two, but a number of difficulties have been encountered in addition to teaching this new method of cooking. One of the difficulties has been that parts of a food load such as a roast or a cake are well-done or overdone, while other parts are underdone. Allegedly, this is due to the presence of hot spots and cold spots within the oven. Attempts have been made to combat this difficulty with stirrers, rotating antennas and various forms of wave guides. While these procedures provide means for reducing the difficulties, they have not eliminated them.

It is an object of this invention to obtain even and uniform cooking and baking in an electronic oven, particularly in the region wherein roasts and cakes are normally baked.

It is another object of this invention to provide a more even voltage gradient throughout the region of the food to be cooked or baked.

It is another object of this invention to provide a simple means within an electronic oven which will shift and alter the wave pattern and eliminate hot and cold spots.

It is another object of this invention to provide a simple, inexpensive improved metal spring gasket readily applied to and retained upon the door jamb for grounding the door to the door jamb for preventing arcing and also for preventing the escape of radio frequency waves.

These and other objects are attained in the form of the invention shown in the drawing in which the microwave cooking device is provided with an electron discharge device of the magnetron type located beneath the oven provided with a rotating antenna driven by the blower motor. Above the rotating antenna is a horizontal bar-type metal shelf provided with relatively widely spaced bars, which is supported upon guideways of electrical insulating material mounted upon the sidewalls of the oven. This shelf may support materials to be heated, cooked, baked or roasted. Spaced above the bar shelf is a second horizontal shelf of regular plate glass which may be supported on similar guideways of electrical insulating material fastened to the side walls of the oven. This sheet of plate glass may also be used to support material to be heated, cooked, baked or roasted. The plate glass is not transparent to the radio frequency energy but has an appreciable loss and a dielectric constant above 7. It acts to diffuse and change the wave pattern within the oven to reduce the hot spots and cold spots.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a front view, partly in section and partly diagrammatic, showing a microwave oven embodying one form of my invention; and

Figure 2 is a horizontal fragmentary sectional view taken along the line 2—2 of Figure 1.

Referring now to the drawing, there is shown a microwave oven **20** provided with a metal enclosure **22** enclosing the oven compartment **23**. The metal enclosure **22** has an outwardly curled flange **24** which holds the curled inner edge **26** of a thin spring metal gasket **28**. The curled inner edge of the gasket is held firmly beneath the outwardly curled flange **24**. The gasket **28** is provided with an outwardly bulged portion **30** connecting with the inner curled portion **26** and having rearwardly extending tongues **32** extending through slots **34** in the door-jamb **36**. The door **38** closes against the outwardly bulged portion **30** which yields to the high spots so that a substantially tight contact is made throughout with the inner face of the door. On the front wall of the oven above the oven compartment **24** are the various controls **40**.

Beneath the oven compartment there is provided a compartment **42** for the electron discharge device **44** of 915 megs. This device is of the magnetron type and includes a coaxial transmission line **46** and a double outlet blower **48** having an outlet **50** discharging below the electron discharge device **44**, and an upper discharge outlet **52** discharging into the transmission line **46** above the discharge device **44**. The transmission line **46** includes an inner conductor **54** extending up into the hollow bottom of the rotating conductor **56**. The rotating conductor **56** is rotatably mounted upon the lower and upper insulating bearings **58** and **60** provided within the transmission line **46**. The blower **48** is provided with a small pulley **62** which, through the belt **64** and the selectively located pulley **66**, rotates the conductor portion **56**. The conductor portion **56** and the coaxial transmission line **46** extend through an aperture in the bottom wall of the metal enclosure **22**. Within the oven compartment the conductor portion **56** is provided with a rotating antenna **68** having arms of a quarter and a half wave length.

Spaced above the antenna **68** is a horizontal shelf **70** made of parallel steel bars fastened to a perimeter bar. This shelf **70** is slidably supported in the guides **72** fixed to the side walls of the metal enclosure **22**. These guides **72** are of low loss electrical insulating material and of such dimension and location so as to prevent arcing between the metal shelf **70** and the metal enclosure **22**. The side walls of the enclosure **22** are provided with similar guides **74**, **76** and **78** spaced at different heights above the guides **72** within the oven. The bar shelf **70** is a matching device to electromagnetically match, radiate, distribute and make uniform the electromagnetic waves. However, I find that there are hot spots and cold spots within the oven. According to my invention, spaced above the bar-type shelf **70** is a shelf **80** of regular ¼" plate soda lime glass which has a higher loss and different properties than quartz and high quartz glass which are practically transparent to radio frequency waves. It has a composition containing less than 75% of SiO_2. This has a dielectric constant between 7 and 7½. It has a relatively high loss factor (which varies with the frequency in mega-

cycles) as high as .059. The average composition may be as follows:

	Percent
SiO_2	71.6
Na_2O	13.2
CaO	11.7
MgO	2.5
Na_2SO_4	0.6
NaCl	0.1
Fe_2O_3	0.1
Al_2O_3	0.2
	100.0

I find that this plate glass shelf gets only slightly warm from the wave energy it absorbs. It, however, does appear, if properly located, to minimize the hot and cold spots and apparently provides a more even voltage gradient and more uniform wave distribution. It also seems to prevent cancellation in same areas. For example, a hot spot pattern in a food load can be shifted by the introduction of this material. Perhaps it performs as an impedance matching medium to limit intense microwave field concentration. The glass shelf **80** may be used to support a reinforced polyester pan **82** containing the material **84** for baking a cake. The shelf **70** may also support a receptacle **86** containing material to be heated, baked or roasted. The plate glass shelf **80** appears to have an effect upon the wave pattern both above and below. The plate glass **80** may be placed also vertically or at various angles and positions to obtain the uniformity and distribution desired.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A microwave cooking device including a metal enclosure, means for radiating radio frequency energy into the interior of said enclosure, a metal shelf having openings therein within said enclosure, electrical insulating means between the adjacent portions of said shelf and said enclosure, and a sheet of glass having an SiO_2 content of less than ¾ and a relatively high loss factor extending between the walls of said enclosure for changing the wave pattern of the radio frequency energy within said enclosure.

2. A microwave cooking device including a metal enclosure, means for radiating radio frequency energy into the interior of said enclosure, and a sheet of soda lime glass having an SiO_2 content of less than ¾ and a relatively high loss factor extending between the walls of said enclosure with the central portions of the sheet spaced away from the walls for changing the wave pattern of the radio frequency energy within said enclosure.

3. A microwave cooking device including a metal enclosure, means for radiating radio frequency energy into the interior of said enclosure, and a sheet of soda lime glass having an SiO_2 content of less than ¾ and a relatively high loss factor extending between the walls of said enclosure for changing the wave pattern of the radio frequency energy within said enclosure, said sheet of glass extending horizontally for supporting material to be cooked.

4. A microwave cooking device including a metal enclosure, means for radiating radio frequency energy into the interior of said enclosure, a metal shelf having openings therein within said enclosure, electrical insulating means between the adjacent portions of said shelf and said enclosure, and a sheet of glass having an SiO_2 content of less than ¾ and a relatively high loss factor extending between the walls of said enclosure for changing the wave pattern of the radio frequency energy within said enclosure, said radiating means being located at the bottom of said enclosure, said shelf and glass being located in spaced horizontal planes located one above the other.

5. A microwave cooking device including a metal enclosure, means for radiating radio frequency energy into the interior of said enclosure, a metal shelf having openings therein within said enclosure, and a sheet of soda lime glass having SiO_2 content of less than ¾ and a relatively high loss factor extending between the walls of said enclosure for changing the wave pattern of the radio frequency energy within said enclosure.

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