1. Microwave cooking appliance comprising a cooking cavity, microwave source being electro-magnetically coupled to an antenna mounted inside the cooking cavity on a conductive wall of the cooking cavity, characterised in that the part of the wall on which the antenna is mounted, comprises a dome shaped microwave reflector for reflecting microwave energy towards the center of the cavity.

2. Microwave cooking appliance according to claim 1, characterised in that the microwave reflector is essentially symmetric around the antenna.

3. Microwave cooking appliance according to claim 1 or 2, characterised in that the microwave reflector comprises a truncated cone protruding outward the cooking cavity.

4. Microwave cooking appliance according to claim 3, characterised in that the cone is truncated by a planar wall.

5. Microwave cooking appliance according to one of the claims 1 to 4, characterised in that a sloping section of the dome comprises a transition section forming part of a wave guide for transmitting microwave energy from the microwave source to the antenna, said waveguide being mounted at the outside of the cooking cavity.

6. Microwave cooking appliance according to claim 5 and 4, characterised in that the transition section is rectangular.

7. Microwave cooking appliance according to claim 3, characterised in that the angle of the cone with respect to the plane of the wall, in which it is mounted, has a value between 25 to 40 degrees.

8. Microwave cooking appliance according to one of the previous claims, characterised in that the antenna is rotatable and is provided with turbine blades, in that the microwave cooking appliance comprises a blower for generating an airflow, and in that the cooking appliance comprises conducting means for conducting the airflow via cooling elements of the microwave source, and via the turbine blades for causing the antenna to rotate.

9. Microwave cooking appliance according to claim 8, characterised in that the conducting means are also arranged for conducting the airflow via the cavity for expelling cooking vapours from the cooking cavity.

10. Microwave cooking appliance according to one of the claims 5 or 6 and to one of the claims 8 or 9, characterised in that the conducting means are arranged for introducing the airflow into the waveguide in the vicinity of the microwave source and for extracting the airflow out of the waveguide in the vicinity of the antenna.

"Microwave cooking appliance"

The invention is related to a <preamble claim 1>.

Such a microwave cooking appliance is known from document 1. In a conventional oven, food is heated by placing it in a heated cavity of the oven.

Microwave cooking appliances, e.g. microwave ovens, function in a different manner. The cooking cavity is not directly heated. Instead, electromagnetic radiation is caused to enter the food to be heated. The molecules of water and other substances present in the food to be heated absorb this radiation and transform it into heat. For this purpose the wavelength of the radiation has to be very short.

The required microwave radiation is generated by a microwave source, e.g. a so-called magnetron. Such a magnetron is a high technology device having relatively large dimensions so that it cannot be placed in the oven cavity. It could, in principle, be placed in the direct vicinity of one of the walls of the oven cavity, directly radiating into the oven cavity, but this would result in an appliance of cumbersome size and shape. The magnetron is therefore usually located in a separate compartment of the cooking appliance.

A problem associated with microwave ovens is that the spatial distribution of the microwave energy in the oven cavity tends to be non-uniform. As a result, "hot spots" and "cold spots" are produced at different locations in the oven cavity. This can lead to unsatisfactory cooking results because some portions of the food may be completely cooked while others are barely warmed. This problem becomes more severe with foods of low thermal conductivity.

One explanation for this non-uniform distribution of the microwave energy is that, due to reflections and superpositions of waves within the oven cavity, standing wave patterns are set up. Consequently, microwave energy varies greatly with position within the oven cavity.

These patterns are moreover dependent upon the reflectivity, type, shape and quantity of the food which is placed in the oven cavity.

In order to obtain a uniform cooking of the food, it is therefore desirable to alter the relative locations of the above-mentioned wave patterns and the food as a function of time.

In the cooking appliance known from document 1, this problem is solved by using a rotating antenna. Although - due to the rotation of the antenna - the field is varied as function of time, a relatively high percentage of the microwave energy does not directly reach the food to be heated, the single or multiple reflections on the side walls causing losses in the reflected waves, which results in a decreased efficiency of the heating process.

The object of the invention is to provide a microwave cooking appliance according to document I, having an improved efficiency. Therefore, the microwave cooking appliance is characterised in that <characterising part claim 1>.

The shape of the dome described above provides the following advantages as compared with the oven disclosed in document I: the dome uniformly reflects that portion of the microwave energy which is not directly radiated from the antenna towards the food to be heated. This portion of the microwave energy, which also exists for directional antennas (which ought to predominantly radiate directly towards the food to be heated), is hence efficiently concentrated towards a centre region of the oven cavity. The dome also returns the microwaves reflected by the food to be heated back towards an area in the centre of the oven cavity and thus back again towards the food to be heated. The resulting microwave field is thus not dependent upon the side walls of the oven cavity 14 for the distribution of microwave energy. It may therefore be said that the dome concentrates the microwave energy on the food to be heated by keeping the radiation away from the side walls of the oven cavity. Due to the concentration of the microwave energy towards the centre of the oven cavity, a very efficient heating of the food, in particular when it is heavy and bulky, is obtained. Such food in particular requires a higher concentration of microwave energy in the centre than in the peripheral regions of the food.

Regarding the geometry of the dome, it should be appreciated that the dome can basically be designed in a manner analogous to an optical reflector. The symmetry of the dome ensures uniform radiation characteristics for the antenna.

An embodiment of the invention is characterised in that <characterising part claim 5>.

It should be noted that the provision of the waveguide directly along the top wall of the oven cavity, the sloping section and the top wall of the dome is particularly advantageous, since, in this way, the manufacture of the oven is considerably simplified. During manufacture the upper portion of the waveguide, which consists of the top wall, the side walls and the end walls, is spot-welded to the top wall of the oven cavity and to the dome by means of flanges provided along the side and end walls. Thus only two punched sheet-metal components are needed to obtain the essential parts of the microwave conveying system of the oven: the first one comprises the top wall of the oven cavity including the dome, and the second one comprises the upper portion of the waveguide mentioned above.

A further embodiment of the invention is characterised in that <characterising part claim 8>.

This embodiment has the advantage that only one blower is needed, in comparison with the cooking appliance according to document 1, in which two blowers are required.

A still further embodiment of the invention is characterised in that <characterising part claim 10>.

It should be noted that the transition section has the additional advantage of reducing the cross-sectional area of the air flow in the waveguide. This results in a considerable increase in the air speed, which ensures a reliable rotation of the antenna 32.

Note to the Examiner

* It is observed that the measures according to claims 8, 9 and 10 can be applied without all measures as claimed in the claims 1 to 4, on which the claims 8, 9 and 10 depend.

* To offer the client the broadest protection possible, it may be desirable to file a separate application having claims directed to the simultaneous use of a single air flow for cooling the microwave source and for driving the rotatable antenna. Independent claims regarding this aspect in the first application would likely result in non-unity objection due to the absence of a general concept.

* It is further observed that in claim 1 not a rotatable antenna is claimed, because the improvement of efficiency is also obtained if a non-rotating antenna is used. The reason for this is that the reduction of reflections of the microwaves at the walls is due to the effect of the dome-shaped reflector.