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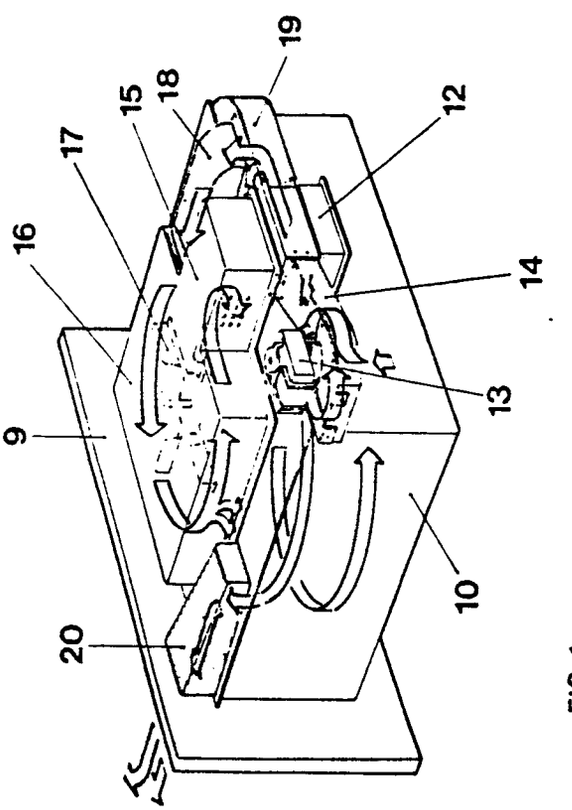
(54) Microwave oven of the installation type.

(57) Microwave oven of the installation module type for domestic use, comprising a cavity for containing foods to be cooked, a door provided with a handle for closing the cavity, a microwave generator and associated agitator connected to the cavity, and an assembly including a fan and associated air conduit means for cooling the microwave generator. The cooking cavity is directly connected to the cooling air inlet conduit and that discharge of the air from the cooking cavity takes place through front openings (21) associated to the handle (27) and provided with sealing means formed in a corresponding part of the door for preventing the escape of microwaves.



FIG·1

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Microwave Oven of the Installation Type

The invention relates to a microwave cooking oven of the installation module type for domestic use adapted to be included in composable kitchen furniture.

Microwave cooking ovens generally present various functional problems requiring specific solutions. The main problems derive from the necessity of cooling the microwave generator components, of preventing the escape of microwaves to the environment of the oven, and of eliminating condensates developing in the oven chamber during the cooking of certain types of foods.

The air used for cooling the microwave generator and associated control components is usually directed into the oven chamber through suitable conduits, part of this air being in some cases deflected towards a rotatable reflector or agitator for causing it to rotate. This air is aspirated from the environment and put into circulation by means of a power-driven fan, and subsequently leaves the oven chamber, together with entrained condensates, through discharge conduits located at the rear of the oven and provided with sealing means preventing the escape of microwaves.

A solution of this kind cannot be applied to microwave ovens of the installation type, because the composable kitchen furniture pieces have a closed continuous rear wall. The employ, however, of a rear-mounted exhaust stack for directing air and cooking vapours upwards would inevitably imply technical difficulties and higher cost and obviously result in a reduction of the available depth in furniture pieces mounted above the oven due to the space requirements of the stack.

Known microwave ovens of the installation type are therefore provided with suitable conduits leading from an opening in the rear wall of the oven chamber to louvres formed at the front above the oven. These conduits extend exteriorly of and above the oven chamber, resulting in a more complicated construction and certain functional disadvantages. These conduits in fact represent an indispensable accessory to be separately mounted as the oven is being installed, and cause a noticable pressure drop in the air flow towards the outlet; in addition, the air outlet louvres impose a considerable limitation on the height of the door and thus also of the oven chamber.

The main object of the invention is thus the provision of a microwave oven of the installation type which is of simplified construction and simple and reliable performance. The invention is thus intended to provide an oven designed to be readily installed in a composable assembly without requiring particular accessories for the circulation of the air entraining cooking vapours and for camouflaging the air outlet, in place of which the respective components are to be incorporated in the oven itself, so that the appearance of the complete oven structure is in harmony with that of the surrounding furniture.

It is further intended to ensure an efficient elimination of condensates from the cooking chamber by the immission of air at an elevated pressure by way of a circuit causing minimum pressure drop and by the employ of a controlled discharge at a suitable location.

These objects of the invention are attained in a microwave oven of the installation type for domestic use, comprising a cavity for containing foods to be cooked, a door provided with a handle for closing the cavity, a microwave generator and associated agitator connected to the cooking cavity, and means including a fan and associated air conduit for cooling the microwave generator, the oven being characterized in that the cooking cavity is directly connected to the cooling air intake conduit and that the discharge of the air from the cavity takes place through front openings associated to the handle and provided with sealing means preventing escape of microwaves disposed in a corresponding part of the door.

The characteristics of the invention will become more clearly evident from the following description, given by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a diagrammatic rear perspective view of an oven according to the invention, and

fig. 2 shows a diagrammatic perspective front view of a detail of the oven of fig. 1.

The microwave oven shown in the drawings generally comprises a cooking cavity or chamber 10 having a front wall 9 closed by a door 11.

Mounted at the exterior of a rear wall of cavity 10 is a microwave generator (magnetron) 12 (fig. 1) and an associated power-driven fan 13 for aspirating ambient air and directing it through a conduit 14 for cooling magnetron 12. The latter is connected, by way of a waveguide 15, to a chamber 16 housing a rotatable microwave reflector or agitator 17. Waveguide 15 and agitator chamber 16 are disposed above cooking cavity 10, chamber 16 communicating with cavity 10 through connecting passages (not shown). According to the invention, cooling air conduit 14 is extended beyond magnetron 12 and branches into a first branch 18 opening tangentially into chamber 16 of agitator 17, and a second branch 19 opening directly into cooking cavity 10.

Cavity 10 communicates through passages 30 (fig. 2) with a discharge conduit 20 disposed thereabove at a suitable position and formed with outlet openings 21 in front face 9 of the oven.

Discharge conduit 20 is preferably mounted at a lateral position with respect to cooking cavity 10 - (fig.1) at a location diametrally opposite the opening of conduit branch 19.

This arrangement is not, however, strictly unalterable, as it depends on the geometry of cavity 10 and on the relative positions of the functional components of the oven, that is to say, it is to be defined in manner to ensure the most efficient circulation of the air within cavity 10 as indicated by arrows in the drawings so as to evacuate therefrom the vapours formed during the cooking of foods.

The direct discharge of the air at the front face of the oven should be suitably controlled so as to prevent the simultaneous escape of microwaves.

To this purpose the invention provides for door 11 to be suitably modified. As shown in fig. 2, door 11 is usually composed of a metal frame 22 having a suitable shaped boundary for forming a microwave trap 23, a perforate panel permitting inspection of the interior of the oven, and inner and outer window panes 24 and 25 secured to the frame. Door 11 is additionally provided with a handle 27.

The modification of door 11 with respect to the described conventional construction comprises an upwards directed extension 28 of frame 22. Extension 28 extends in front of outlet 21 of discharge conduit 20 and is provided with openings dimensioned and positioned so as to prevent microwaves from passing therethrough. In particular, the dimensions of the openings have to be smaller than one-fourth of the wavelength of the microwave radiation.

This solution permits the provision also in the upper part of the oven of a microwave trap for a suitable wavelength for preventing any microwaves from escaping through the food charging opening of cavity 10. This problem is solved in the traditional manner along the lateral and lower boundaries of the oven, where there are no openings for the discharge of air, so that the required microwave trap may be formed by the door frame and the borders of the door opening of the cooking cavity.

The oven according to the invention thus attains the stated objects. Above all it constitutes a complete and compact unit capable of being preassembled and subsequently in stalled in a piece of kitchen furniture without requiring the addition of accessory elements such as conduits for the circulation and discharge of air.

On the other hand, the removal of vapours from the cooking cavity is ensured in a particularly efficient manner, because the major part of the air is directly directed into the cavity at an elevated pressure thanks to the reduction of the length of the connecting conduits and the corresponding pressure losses. The air is finally discharged at the front, thus eliminating the excessive space requirements in a piece of furniture in the case of a rear-mounted exhaust stack.

Also eliminated is any possibility of an escape of microwaves, thanks to the particular construction of the door and associated sealing means, and that without any reduction of the usable volume of the cooking cavity.

There is finally attained the technical and economical advantage of employing only a single motor in association with the fan, thereby reducing the number of electric connections and the possibility of malfunctions.

Claims

1. A microwave oven of the installation type for domestic use, comprising a cavity for containing foods to be cooked, a door provided with a handle for closing said cavity, a microwave generator and associated agitator connected to said cavity, and an assembly including a fan and associated air conduit means for cooling said microwave generator, characterized in that said cooking cavity (10) is directly connected to the inlet conduit (14, 19) of the cooling air, and that the discharge of the air from said cavity (10) takes place through front openings (21) associated to said handle (27) and provided with sealing means (28) formed in a corresponding part of said door (11) for preventing the escape of microwaves.

2. A microwave oven according to claim 1, characterized in that after passing said microwave generator (12) said cooling air conduit (14) branches into a first branch (18) opening tangentially into a chamber (16) containing said microwave agitator (17), and a second branch (19) opening directly into said cooking cavity (10).

3. Microwave oven according to claim 1, characterized in that said front openings (21) for the discharge of air are formed at the upper forward boundary (9) of said cokking cavity and connected to said cavity (10) by way of a discharge conduit - (20) and passages (30) formed in a corresponding zone of the top wall of said cavity (10).

4. A microwave oven according to claim 1, characterized in that said sealing means for preventing the escape of microwaves through said front openings (21) for the discharge of air from said cooking cavity (10) are formed in an upwards projecting extension (29) of a metal frame (22) of said door (11) of the oven adjacent said openings - (21).

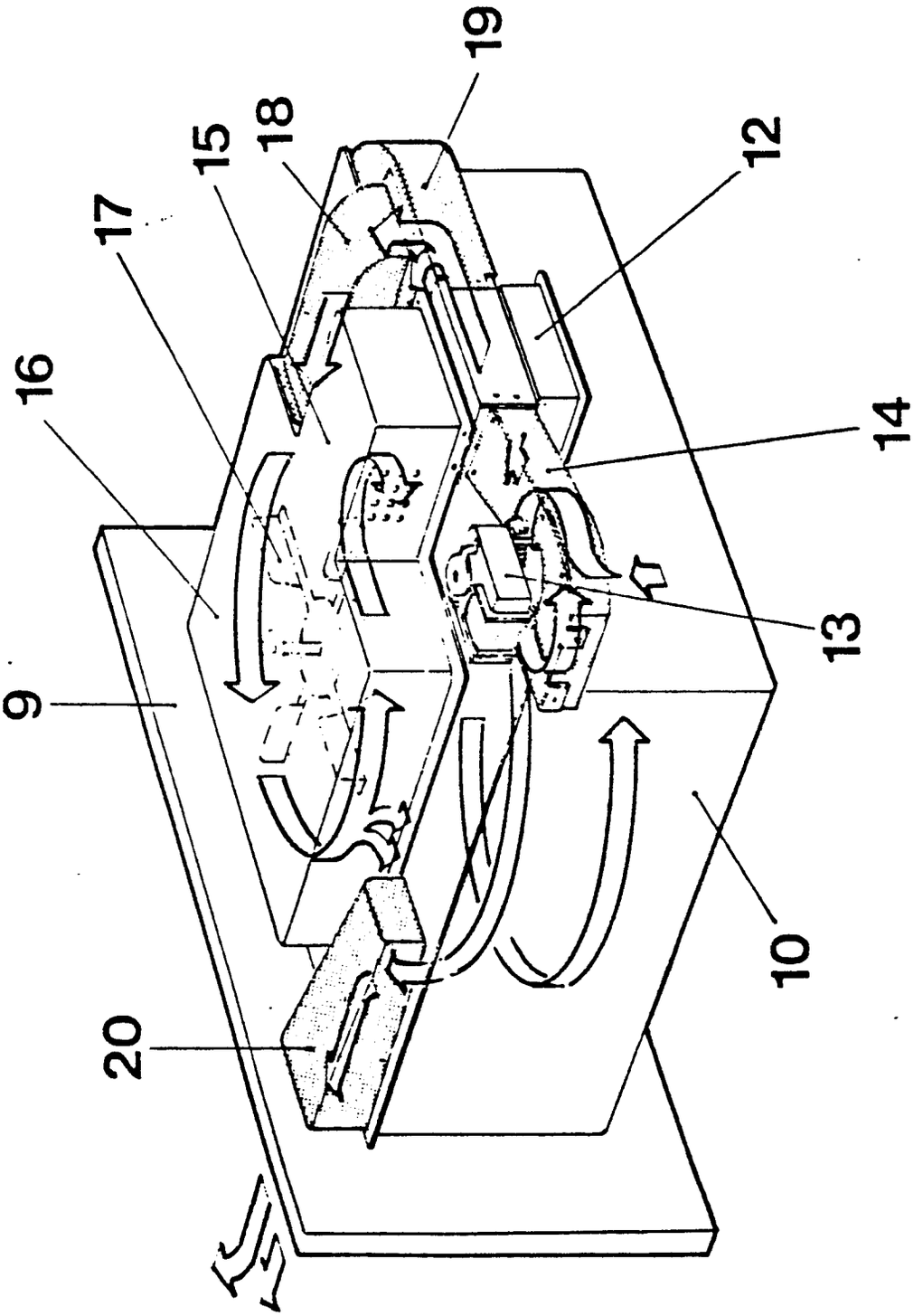

FIG-1

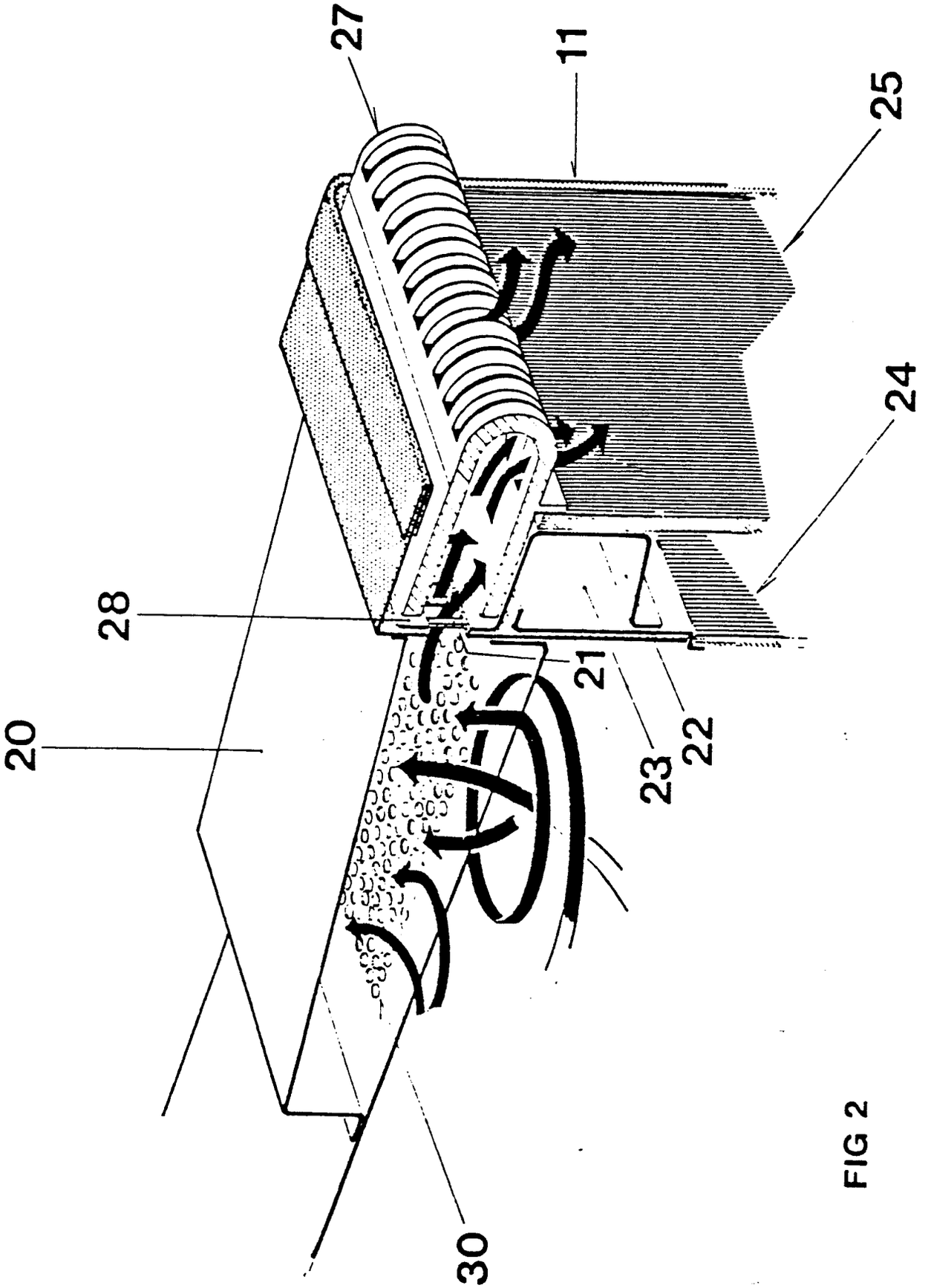

FIG 2

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EUROPEAN SEARCH REPORT

Application number

EP 86 11 5825

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-1 160 884 (MICROTHERM LTD) * Page 1, line 54 - page 2, line 19; figures 1,2 *	1-3	H 05 B 6/80 H 05 B 6/76
A	US-A-3 783 219 (TATEDA) * Column 5, line 54 - column 6, line 7; figure 3 *	1,2,4	
A	US-A-4 369 347 (SHIN) * Column 2, lines 28-58; figure 1 *	1-3	
A	EP-A-0 003 764 (BOSCH-SIEMENS)		
A	US-A-4 184 945 (MORGAN)		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	US-A-3 679 855 (BINZER)		H 05 B 6/00
A	US-A-3 681 557 (SUZUKI et al.)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11-03-1987	RAUSCH R.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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