

[54] **FOOD-TREATMENT APPARATUS WITH
TELESCOPING SEAL FOR AIR-
CIRCULATING BLOWER**

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[56] **References Cited**

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[57] **ABSTRACT**

A food-treatment apparatus, e.g. an oven, has a muffle defining a closed chamber in which food is heated and a fan in this chamber for circulating air therein during food treatment and pyrolytic self-cleaning thereafter. This fan is powered by a motor outside the muffle and extends through an opening in the muffle wall. A pair of nested telescoping angle-profile or flanged rings, one attached to the inside face of that wall and the other to its outside face carrying the motor are separated by an insulating ring, e.g. of asbestos, and surround the fan in the opening to form a thermally yielding seal and motor support.

9 Claims, 2 Drawing Figures

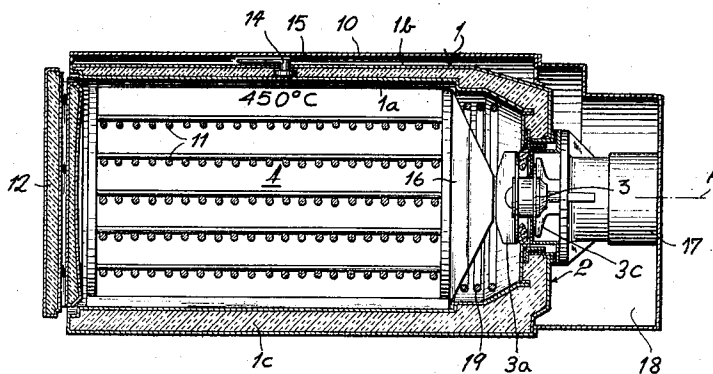


FIG. 1

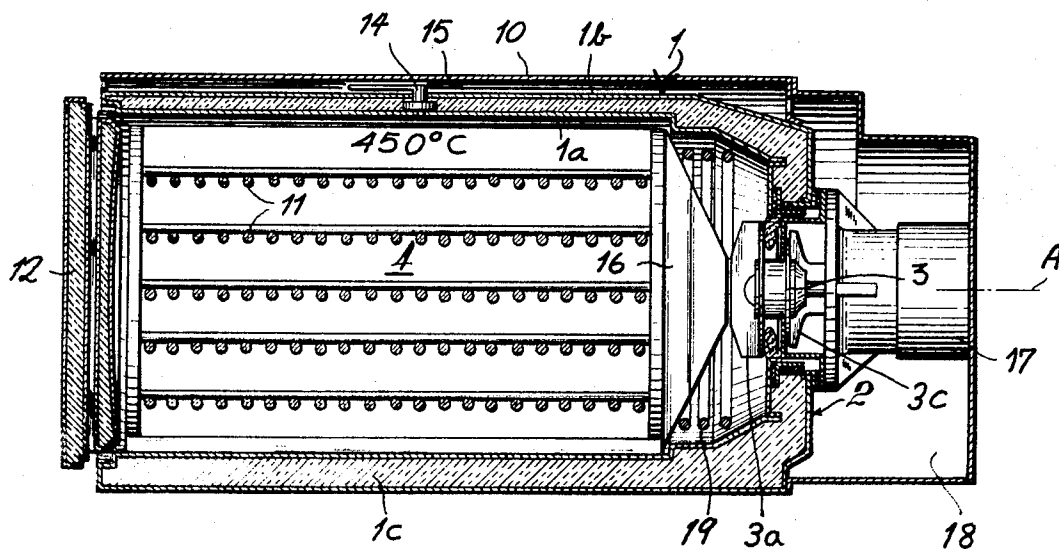
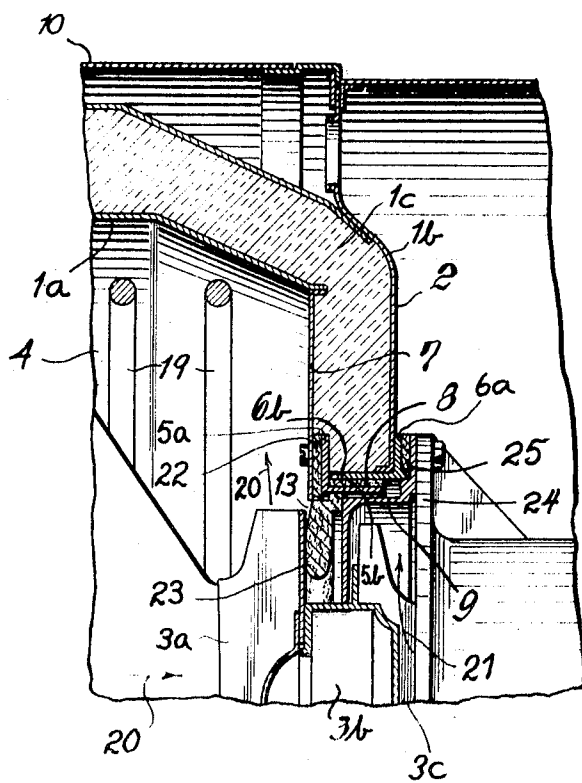


FIG. 2



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FOOD-TREATMENT APPARATUS WITH TELESCOPING SEAL FOR AIR-CIRCULATING BLOWER

1. CROSS-REFERENCE TO COPENDING APPLICATIONS.

This application discloses an improvement in the systems described and claimed in the commonly assigned copending applications, serial numbers 778,123, now U.S. Pat. No. 3,550,576, and 778,269 filed Nov. 22, 1968 and Ser. Nos. 40,127 and 40,128 filed May 25, 1970.

2. FIELD OF THE INVENTION

The present invention relates to a food-treatment apparatus. More specifically this invention concerns an oven used for the thermal treatment, e.g. baking, broiling, or comestibles and provided with so-called self-cleaning means.

3. BACKGROUND OF THE INVENTION

Such a self-cleaning apparatus is often provided with a fan inside its treatment chamber which is operated to circulate gases therein during cooking or cleaning for even heat distribution. During self-cleaning, when temperatures of about 500° C. are necessary for the pyrolytic decomposition and/or combustion of food residue, it is necessary to protect the fan motor. This has been done in the past through the simple expedient of mounting the motor outside the treatment chamber, with the fan extending through a wall of the chamber as described in the above-mentioned applications for example.

Such methods have not proven wholly effective, especially during the self-cleaning operation. Enough heat often passes through the opening through which the blower extends to damage the motor, even though elaborate methods of sealing this opening have been used.

It has been found that an important reason for heat leaks at this point is the expansion of the muffle walls during heating. A seal which is excellent when the apparatus is at room temperature opens when it is heated. At the same time, the various structure constituting the seal arrangement often serve to conduct heat out of the chamber and to the motor.

4. OBJECTS OF THE INVENTION

It is, therefore, an object of the present invention to provide an improved food-treatment apparatus of the general character described.

Another object is to provide a seal having particular adaptability to a food-treatment apparatus of the type described and claimed in the above-mentioned applications.

5. SUMMARY OF THE INVENTION

The above objects are obtained according to the present invention by an apparatus having a housing defining a closable heatable chamber with one wall formed with an opening through which blower means or circulating air in the chamber passes. Mounting means is provided which includes a first axially directed ring fixed to an inside face of the wall and extending outwardly in the opening and a second axially directed ring telescopically received in the first ring and fixed to an outside face of the wall. The second ring extends inwardly in the opening and the blower means extends through the rings so that, when the wall expands on heating, they move axially relative to each other. An important feature of the invention provides that the motor and fan assembly is mounted solely upon the annular outwardly extending flange of the outer flanged ring and that this mounting means is formed with a housing sleeve which is telescopically received within, but is spaced circumferentially from the inner ring.

According to another feature of the present invention an annular compressible seal of insulating material, e.g. asbestos, is provided between the two rings, and the ring attached to the inner face is nested within the other ring. In this manner a tight seal is maintained both during axial shifting and during the inevitable radial expansion of the inner ring.

In accordance with yet another feature of this invention on the motor for the fan of the blower means is secured to an annular flange which is bolted to the flange of the outer ring, with interposition of a thermally insulating washer. The sleeve and outer ring form a channel coaxially receiving the rearwardly extending end of the inner ring and forming a labyrinth therewith, the labyrinth compartment between the inner and outer rings being filled with the asbestos layer. Another asbestos ring held between the parts of the fan assembly, hugs the inner wall of the inner ring ahead of the housing sleeve.

The housing defining the chamber is, according to yet another feature, formed by a thick body of insulating material such as Fiberglas sandwiched between two metal sheets. The rings are angle rings each attached to one of the sheets. In such a structure the expansion of the inner sheet relative to the outer sheet during heating is extreme so that the seal of the present invention finds particular application.

6. DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become apparent from the following description, reference being made to the accompanying drawing, in which:

FIG. 1 is a vertical longitudinal section through an apparatus according to the present invention; and

FIG. 2 is a detail of FIG. 1 in enlarged scale.

7. SPECIFIC DESCRIPTION

As shown in FIG. 1 an oven has a housing 10 of sheet metal in which is provided a muffle 1 having a cooking chamber 4 in which food to be cooked can be held on racks 11. The muffle 1 has one end closed by a door 12 and another end 2 formed with an opening 13. A catalytic afterburner 14 is provided in its top wall opening into a space 15 between the housing 10 and the muffle 1. A hood 16 is provided at the back of the cooking chamber 4 with its wide mouth open towards the door and its narrow mouth opening toward a fan 3 which extends through the opening 13 and is connected to an electric drive motor 17 received in a chamber 18 in back of the muffle 1 in the housing 10.

The muffle 1 is formed with thick walls comprising a metallic inner skin 1a and an metallic outer skin 1b sandwiching a body of 1c of insulating material such as Fiberglas. Such a construction is extremely durable and offers excellent thermal insulating properties so that, on heating of the chamber 4 by the electric element 19 disposed around the hood 16, very little heat is lost. It is possible to heat the chamber 4 up to a around 450° centigrade for self-cleaning of the wall 1a and the racks 11, the noxious vapors being rendered harmless by the catalytic afterburner 14.

The fan 3 is adapted to be operated both during cooking and self-cleaning. To this end it comprises three coaxial portions, a pair of oppositely directed axial-input radial-output fans 3a and 3c separated by a hub 3b. The fan 3a is received in the chamber 4 and, on rotation, pulls gases in axially through the hood 16 and expels them radially outwardly around this hood, as shown by the arrows 20. The fan 3c is in the chamber 18 and serves to circulate air through the motor 17 and expel it outwardly in this chamber as shown by the arrows 21, whence it passes through the space 15 and out of the housing 10. The hub 3b axially spaces the two fans 3a and 3c and passes through the opening 13 in the rear wall 2 of the muffle 1. A discussion of how such a fan arrangement functions is to be found in the commonly assigned patent applications mentioned above.

Bolted to the inner face of wall 2, with interposition of an insulating washer 22, is a ring 5 of L cross section. This angle ring 5 has, thus, an annular portion 5a bolted to and lying in a plane parallel to the inner wall 7 of the muffle end 2, and portion 5b of cylindrical shape extending from the inner periphery of the attached portion 5a outwardly in the opening 13. A similar L-section metallic ring 6 is provided with its flange portion 6a bolted directly to the outer face of the wall 2 and its cylindrical, axially directed portion 6b extending in

the opening 13 inwardly toward the muffle 4. The ring portion 6b lies coaxial with and outside of the portion 5b, with a cylindrical ring 8 of asbestos insulating material compressed between these two portions.

An annular metallic body or sleeve 9 comprising a pair of substantially planar and parallel portions separated by a cylindrical portion is bolted with the motor flange 24, an insulating gasket 25 and the ring portion 6b to the wall 2. This body 9 also prevents heat loss through the opening 13 by controlling air currents therethrough and serves to center the fan 3 while defining with the rings a labyrinth seal. A gland 23, advantageously of asbestos, engages at its outer periphery the ring portion 5b and has its thickened inner edge in engagement with the disk face of the back of the fan 3a.

On heating of the chamber 4 the inner metallic skin 1a of the muffle 1 will expand, compressing slightly the insulating material 1c. At the same time the rings 5 and 6 will move axially toward each other, and any radially outward expansion of the ring portion 5b will be taken up by the compressible ring 8. Thus, an effective seal is maintained at the opening 13 in spite of the inevitable expansion, and subsequent contraction, of the muffle 1, while permitting the fans 3a and 3c to rotate. Even since the rings 5 and 6 and the fan 3 are all coaxial about an axis A orthogonal to the wall 2, the expansion of this wall will not create any difficulties. Even the extreme heat necessary for self cleaning operations present no difficulties with a food-treatment apparatus of this type.

I claim:

1. An apparatus for the heat treatment of a comestible comprising:

a housing defining a closable heatable chamber adapted to receive said comestible, said housing having a wall formed with an opening;

blower means extending through said opening for circulating

ing air in said chamber; and mounting means including a first ring fixed to an inside face of said wall and extending axially outwardly in said opening and a second ring telescopically received in said first ring and fixed to an outside face of said wall, said second ring extending axially inwardly in said opening, said blower means extending through said rings, whereby on thermal expansion of said wall said rings move axially relative to each other.

2. The apparatus defined in claim 1 wherein each of said rings is an angle ring with an annular flange portion attached to the respective face of said wall and a cylindrical portion extending from the inner periphery of the flange portion.

3. The apparatus defined in claim 2 wherein said blower means includes a fan rotatable about an axis, said cylindrical portions being coaxial with said axis.

4. The apparatus defined in claim 3 wherein said wall is substantially flat and perpendicular to said axis.

5. The apparatus defined in claim 2, further comprising a ring of compressible insulating material between said cylindrical portions.

6. The apparatus defined in claim 1 wherein said wall includes an outer metallic skin forming said outer face, an inner metallic skin forming said inner face, and a body of compressible insulating material between said skins.

7. The apparatus defined in claim 2 wherein said second ring attached to said outer face at least partially surrounds said first ring.

8. The apparatus defined in claim 1, further comprising an annular centering body attached to said second ring, said blower means being centered in said body.

9. The apparatus defined in claim 8 wherein said body is a sleeve forming a labyrinth seal with said rings.

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