United States Patent

Gehrmann

[15] **3,670,746**

[45] **June 20, 1972**

[54] **COMBINATION DISHWASHING MACHINE AND OVEN**

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[22] Filed: **Jan. 26, 1971**

[21] Appl. No.: **109,777**

[30] **Foreign Application Priority Data**

Jan. 26, 1970 Austria 7767/70

[52] **U.S. Cl.** ..... **134/107,** 134/115 R, 134/183, 134/200, 219/391, 219/473

[51] **Int. Cl.** **B08b 3/02**

[58] **Field of Search** ..... 134/105, 107, 115 R, 135, 183, 134/200; 219/391, 473

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[57] **ABSTRACT**

A combination dishwashing machine and oven is formed of an open-topped tank with a cover closing its opening, a heating element unit spaced vertically above the opening in the tank, and a vertically displaceable shell positionable between the cover and the heating element unit for laterally defining the oven space. A vertically arranged support column is associated with the tank and includes a lifting mechanism for displacing the shell downwardly into the tank from its position about the oven and for lifting dishwashing baskets upwardly out of the tank. The shell, tank cover and dishwashing baskets are sized so that the shell fits around the cover and baskets for effecting the vertical displacement of the various parts.

18 Claims, 4 Drawing Figures

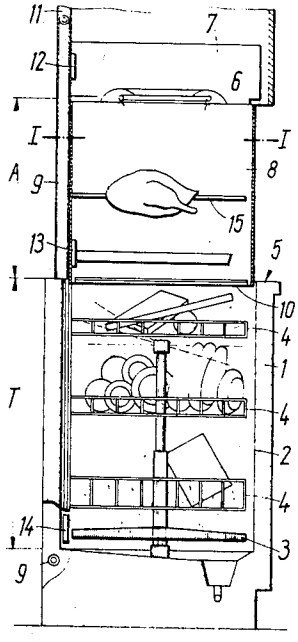


Fig. 1

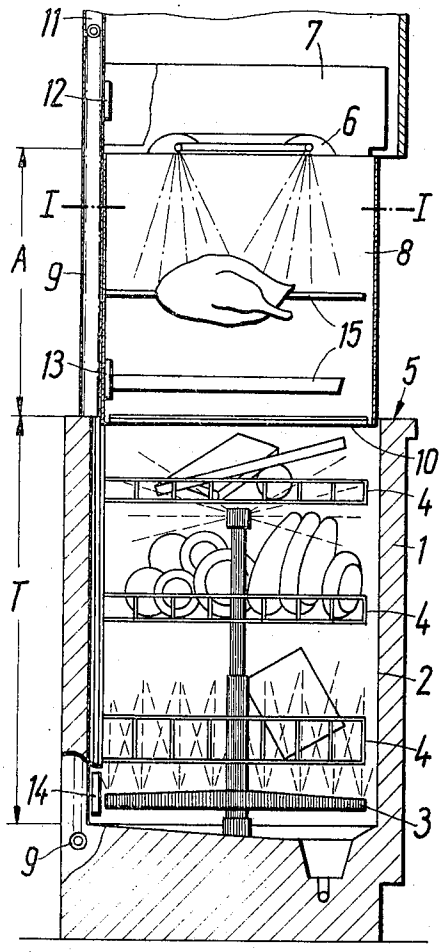


Fig. 2

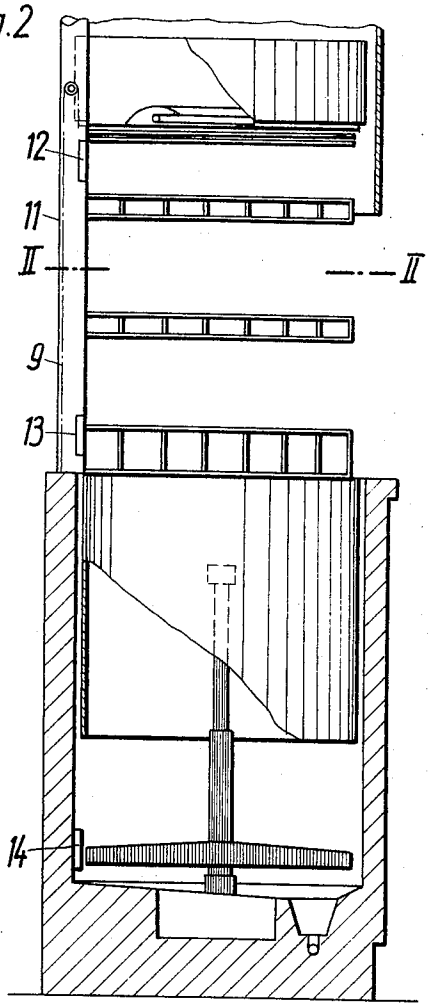


Fig. 3

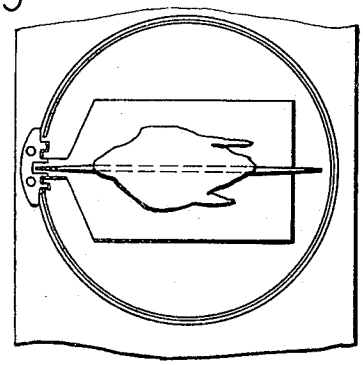
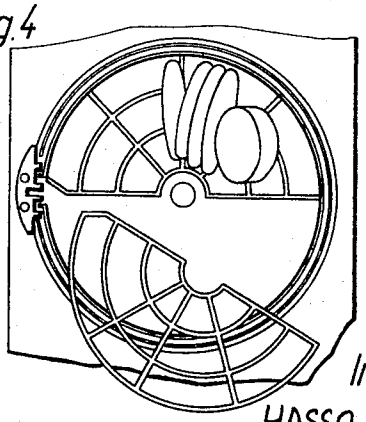


Fig. 4



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COMBINATION DISHWASHING MACHINE AND OVEN

SUMMARY OF THE INVENTION

The present invention is directed to a combined dishwashing machine and oven and, more particularly, it is concerned with a top opening dishwasher having an oven positioned above its top opening and including a shell for the oven which is vertically displaceable into the tank of the dishwashing machine and a cover and baskets for the dishwashing machine which are vertically displaceable into the space normally forming the oven.

Modern kitchens require both an oven and a dishwashing machine, however, in the past these appliances have been installed as completely separate units. Generally speaking, the best location for the installation of the oven is above table level. Unfortunately, the space above table level is often required for other appliances and, as a result, ovens have been installed below dishwashers and frequently below table level.

Conventionally kitchen ovens are used for grilling, roasting, baking and defrosting. When such ovens are used regularly, they must be cleaned frequently and oven manufacturers are presently attempting to provide ovens which are easier to clean or which include means for automatic cleaning.

Accordingly, it is the primary object of the present invention to provide an oven structure in combination with a dishwashing machine so that the oven can be easily cleaned.

Further, another object of the invention, is to provide a combined dishwashing machine and oven arrangement so that the laterally defining surfaces of the oven and the baskets in the dishwashing machine can be displaced vertically relative to one another.

Still another object of the invention is to size the movable parts of the dishwashing machine and the oven so that the structure defining the lateral surfaces of the oven can be displaced into the dishwashing machine without interfering with the cover of the machine or the baskets within its tank.

Therefore, in accordance with the present invention, a combination dishwashing machine and oven are provided by a top-opening vat-like tank in which superposed baskets are arranged for washing dishes. A cover provides a closure for the top opening in the tank and it is located at approximately table height. Spaced upwardly above the cover is a heating element unit formed by a housing containing one or more heating elements. A sleeve-like shell is positioned between the cover and the heating element unit and forms the laterally defining surface for the oven space. The shell has an outside diameter slightly less than the inside diameter of the tank so that it can be lowered from its normal position about the oven space into the tank so that it is positioned about the baskets in the tank. For effecting vertical displacement of the shell and of the baskets in the dishwashing machine, preferably at least one column-shaped vertical support member is provided with mechanical, pneumatic or electrical lifting mechanisms which operate independently of one another so that one lifting mechanism takes care of the shell and the other lifting mechanism takes care of the baskets.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 and FIG. 2 are vertical sectional views of a combined dishwasher and oven, in accordance with the present invention, indicating different operating positions of the dishwasher and oven parts;

FIG. 3 is a view taken along line I—I in FIG. 1; and

FIG. 4 is a view taken along line II—II in FIG. 2.

In FIGS. 1 and 2, a cabinet 1 supported on the floor forms a top-opening, vat-like tank for a dishwashing machine. The lateral periphery of the tank is closed and it contains known spray nozzles and spray arms 3 preferably arranged centrally in the tank. Further, a number of baskets 4 are provided, one above the other, into which the dishes to be cleaned are placed. The opening in the top of the tank is closed by a cover 10 and the upper surface of the tank and the cover are arranged at about table level. Spaced above the upper surface of the tank in general alignment above the cover, is a heating element unit consisting of a heating element 6 positioned within a housing 7.

As indicated in FIG. 1, the heating element 6 is arranged so that it directs heat downwardly toward the cover 10.

As indicated in FIG. 1, the distance or dimension between the upper surface 5 of the cabinet 1 and the heating element 6 is A and a sleeve-like shell 8 extends for the distance A and provides the laterally defining surface of an oven space between the cover 10 and the heating element 6. The shell 8 is made of a transparent material which is insensitive to temperature shock. The height T of the interior of the tank 2 is equal to or greater than the vertical dimension of the shell 8. Further, the transverse contour of the shell 8 corresponds to but is slightly smaller than the corresponding inner contour of the tank. Accordingly, due to the slight difference in the outer diameter of the shell, it can be displaced downwardly passing into the tank from its position laterally defining the oven into the tank so that it passes outwardly about the cover 10 and the baskets 4.

To afford the vertical displaceability of the different parts involved, a hollow column 11 secured to the cabinet 1 provides a vertically extending support spaced laterally of the tank. Within the hollow support column 11 a pair of lifting mechanisms 9 are arranged independent of one another so that the lifting cable of one mechanism 9 is secured to the shell 8 and the lifting cable of the other mechanism is secured to the dishwashing baskets 4 and the cover 10 for displacing the shell and the cover and baskets independently.

As displayed in FIG. 2, the dimension between the cover 10 and the lower surface of the bottom basket 4 is substantially equal to the dimension A between the upper surface of the tank or cabinet and the heating element. As indicated previously, the diameter of the circumferential periphery of the cover is slightly smaller than the inside diameter of the shell 8 so that these two parts can be displaced relative to one another.

Spaced vertically in the column 11 between the upper surface 5 of the cabinet and the heating element unit are recesses for detachably securing cooperating elements 15, such as skewers, supports, baking sheets, drip pans and the like. Both the heating element 6 and its housing 7 which defines the top of the oven space, are secured on the support column 11 and, as indicated in FIG. 2, are vertically displaceable to afford adequate space for the dishwashing baskets for when they are lifted out of the tank 2. Within the support column 11, in addition to the lifting mechanisms 9, at least one longitudinally extending air duct is provided which has at least two openings located above the upper surface 5 of the cabinet 1, one opening 12 is positioned so that it opens into the housing 7 and the other opening 13 is located above the upper edge of the tank 5 so that it opens into the lower portion of the oven space. Further, the air duct within the support column 11 extends downwardly through the cabinet 1 into the lower region of the tank 2 and has an opening 14 which communicates with the lower end of the tank. An air circulating unit, such as a fan, blower or the like, not shown, is positioned within the casing 7 for providing a forced flow of air. Additionally, the cover 10 closing the opening in the tank, can be provided with heating coils so that it can serve as a hot plate. The supply of current to such coils can be provided through a feed cable located within the support column 11.

Due to the telescoping arrangement of the shell 8 with respect to the tank 2 of the dishwashing machine, it is possible

to clean the oven shell when it is displaced vertically into the tank. Further, the arrangement of the dishwashing machine and the oven affords an optimum use of the available operating space and also provides an efficient arrangement for the use of the various parts involved.

With the tank of the dishwasher open at its top instead of its front, the seal problem associated with a front door is eliminated. The vat-shaped tank functions in the same manner as a conventional automatic dishwasher, since it is equipped with a nozzle system and means for introducing soap or cleanser when the baskets are lowered in position within the tank. Instead of loading and unloading the dishbaskets **4** through a conventional front door opening, the baskets are lifted vertically out of the tank for the loading and unloading operation. The multiple superposed dishbaskets and the cover which closes the tank at table level can be raised and lowered by the lifting mechanism **9** so that the manual process of loading and unloading dishes can be conducted advantageously above table level height whereby the need for bending down during such operation is obviated. Preferably, as indicated in FIG. **4**, the baskets are divided in the center and each half is secured to the column or lifting mechanism so that it can be removed separately from the other part. While the lifting mechanism **9** illustrated in the drawing shows the use of cables or a similar lifting element, it can be appreciated that screws, spindles, or other lifting devices can be similarly employed.

As indicated by its different positions illustrated in FIGS. **1** and **2**, the shell can be displaced vertically between a first position where it laterally defines the oven space and a second position where it is located within the tank of the dishwashing machine. Due to the relative dimensions of the tank, cover, and dishwashing baskets, and the shell, the shell can be completely retracted into the tank so that it is spaced inwardly from the tank surface and outwardly from the baskets so that it does not interfere with the operation of the dishwasher. When not in use, the shell is stored within the tank and, thereby, leaves the space above the cover **10** of the tank free when the oven is not being used. This arrangement provides an especially effective space saving arrangement and, further, whenever the shell is located within the dishwasher during a washing cycle, it undergoes a cleaning operation with its outer surface being cleaned by the washwater which passes between the outer surface of the shell and the tank and its inner surface which is soiled by baking or other use being cleaned by the full intensity of the washing action within the machine.

When the dishbaskets **4** are retained in the normal position within the dishwasher, the shell **8** can be lifted upwardly passing about the baskets and the cover until it forms the lateral surface of the oven, and the cover, which remains in position, forms the bottom of the oven space. As shown in FIG. **1**, the upper edge of the sleeve-like shell contacts the bottom edge of the heating element housing **7** so that the housing forms the upper cover for the closed oven space. It is also possible to position vapor filters and other devices within the housing **7** in an inconspicuous manner.

While heat is provided in the upper end of the oven space by the heating element **6**, it is also necessary to provide a source of heat into the bottom of the oven space. Heat can be supplied into the bottom of the oven by means of a portable or plug-in heater which can be mounted on the support column **11** or by means of a circulating air heater cooperating with the air duct located within the support column. Such a circulating air heater would have its exhaust in the housing **7** above opening **12** and the air forced through the duct enters the oven space at its lower end through the opening **13**. It can be appreciated that devices can be arranged for the intermediate filtering of air passing through the duct. By providing an adequately tight engagement between the shell **8** and the housing **7** and cover **10**, and since the shell is formed of glass or a ceramic material and, therefore, is a poor heat conductor, the problem of losses normally occurring by heat conduction in conventional ovens does not take place in this arrangement.

By means of the air circulating system provided by the duct in the support column **11**, the dishes within the tank **2** can be dried effectively by flowing air through the tank after the requisite rinsing cycle has been accomplished. The flow of drying air into the tank **2** takes place through the opening **14** in its lower end. When using the oven or the dishwasher, the openings **13** and **14** through which the hot air passes, can be selectively closed in dependance on the specific heating operation being performed.

As has been indicated, any required parts or fixtures for the oven, such as grills, pans, grilling utensils and the like, can be secured in any desired manner and the recesses formed in the support column **11** can be used for holding these parts in place. When not in use, the different parts can be removed from the oven and, if necessary, placed in the various dishbaskets so that they are cleaned during the next washing cycle.

Since the present invention is directed to an arrangement for providing the optimum use of kitchen space, for affording the maximum ease in operating a combined oven and dishwashing appliance and for supplying an automatic oven cleaning procedure, the arrangement as described is not limited to any specific configuration. Since the dishwashing machine has been illustrated and disclosed as having a vat-like tank, open at its top and closed at its bottom and lateral periphery, it would be possible to equip the machine with an ultrasonic vibrator located in its lower region rather than with a conventional spray system. Further, the oven can be arranged as a microwave oven or a unit provided for that purpose could be additionally located within the housing **7** of the heating element unit. If microwave operation is employed, a glass cylinder would not be suitable for the shell because the glass does not reflect the microwaves. Rather, a perforated plate would have to be placed around the glass which would provide proper microwave operation and, in addition, afford a view into the oven space. Furthermore, a perforated plate could also serve as a contact guard about the hot shell **8**, with a small space being provided between the shell and the perforated plate. Whether the laterally defining surface of the oven space is a single- or double-walled design, the shell must be arranged for telescoping action into the tank of the dishwashing machine.

In the drawing, the tank **2** and the shell **8** have been shown as having a circular transverse configuration, however, it can be appreciated that other configurations for the tank and the shell are possible, such as polygonal. Further, in place of a single support column **11** a pair of support columns could be used with a lifting mechanism, air duct and other requisite elements located in each of the columns.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. Combination dishwashing machine and oven including an open-topped vat-like tank closed about its lateral circumference, a basket assembly positioned within said tank and arranged to receive dishes to be cleaned therein, means cooperating with said tank for cleaning dishes supported within said basket assembly, and a cover for the open-topped end of said tank, wherein the improvement comprises at least one heating element unit spaced vertically above said cover, and an elongated sleeve-like shell vertically displaceable between a first position within said tank and a second position extending vertically upward from the upper surface of said tank in which second position said shell extends between the upper surface of said tank and said heating element unit.

2. Combination dishwashing machine and oven, as set forth in claim **1**, wherein said shell having an outside diameter slightly smaller than the inside diameter of said tank and an inside diameter larger than the diameter of said basket assembly so that in its first position said shell fits between said basket assembly and the inside wall of said tank.

3. Combination dishwashing machine and oven, as set forth in claim 2, wherein the vertical dimension of said shell is less than the vertical dimension of said tank.

4. Combination dishwashing machine and oven, as set forth in claim 2, characterized in that said shell having an inside diameter slightly greater than the diameter of the peripheral circumference of said cover so that said shell can pass downwardly about said cover into said tank.

5. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that a vertically arranged support member being associated with and extending upwardly from the upper surface of said tank, two lifting devices associated with said support member with one of said lifting devices arranged to displace said shell between its first and second positions and the other said lifting device arranged to displace said basket assembly between said tank and a position spaced above the upper surface of said tank.

6. Combination dishwashing machine and oven, as set forth in claim 5, characterized in that said support member has recesses formed therein between the upper edge of said tank and said heating element unit for detachably securing elements for use in supporting cooking utensils and the like within said oven.

7. Combination dishwashing machine and oven, as set forth in claim 5, wherein said heating element unit is secured to said support member, and said heating element unit comprises a housing enclosing a heating element and forming the upper end of said oven.

8. Combination dishwashing machine and oven, as set forth in claim 7, characterized in that at least one air circulating unit being positioned within said housing of said heating element unit.

9. Combination dishwashing machine and oven, as set forth in claim 5, characterized in that said support member is formed as a hollow column with said lifting devices located within the hollow column, and at least one longitudinally extending air duct located within the hollow column.

10. Combination dishwashing machine and oven, as set forth in claim 7, wherein said air duct having at least two vertically spaced openings, with one said opening communicating with said housing for said heating element unit and the other said opening communicating with the space between the upper edge of said tank and said heating element unit.

11. Combination dishwashing machine and oven, as set forth in claim 9, wherein said air duct extends downwardly to a position adjacent the lower end of said tank and said air duct having an opening communicating with the lower portion of said tank.

12. Combination dishwashing machine and oven, as set forth in claim 5, wherein said basket assembly comprises a plurality of superposed baskets, each of said baskets being divided into two half basket sections and being supported on said support member so that each half basket section can be displaced laterally and removed from said support member.

13. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that the vertical dimension between said cover and the lower surface of said basket assembly is substantially equal to the vertical dimension between the upper edge of said tank and said heating element unit.

14. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that said shell is formed of a transparent heat resistant material which is insensitive to temperature shocks.

15. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that said shell being formed as a double-walled structure comprising an inner wall consisting of a transparent material and an outer wall formed of a perforated metal plate.

16. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that heating coils are arranged in said cover which closes the top opening in said tank whereby said cover serves as a hot plate.

17. Combination dishwashing machine and oven, as set forth in claim 1, characterized in that said tank and said shell being in coaxial arrangement.

18. Combination dishwashing machine and oven, as set forth in claim 1, wherein said heating element unit being vertically displaceable on said support member.

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