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(54) **Household appliance for sanitizing products**

(57) The present invention finds application in the technical field of portable cleaning apparatus for household use, and particularly relates to a household appliance for sanitizing products comprising a container (2) with a top opening (3) for receiving one or more products to be sanitized and a washing liquid, washing means (4)

for vibrationally removing particle impurities on the products immersed in the liquid, sterilization means (5) for reducing microbial counts on the products. The household appliance has a substantially annular outwardly radially projecting rim (6) whose bottom surface (7) has a sufficient minimum radial dimension (r) as to firmly sit on the top edge (M) of a sink (L).

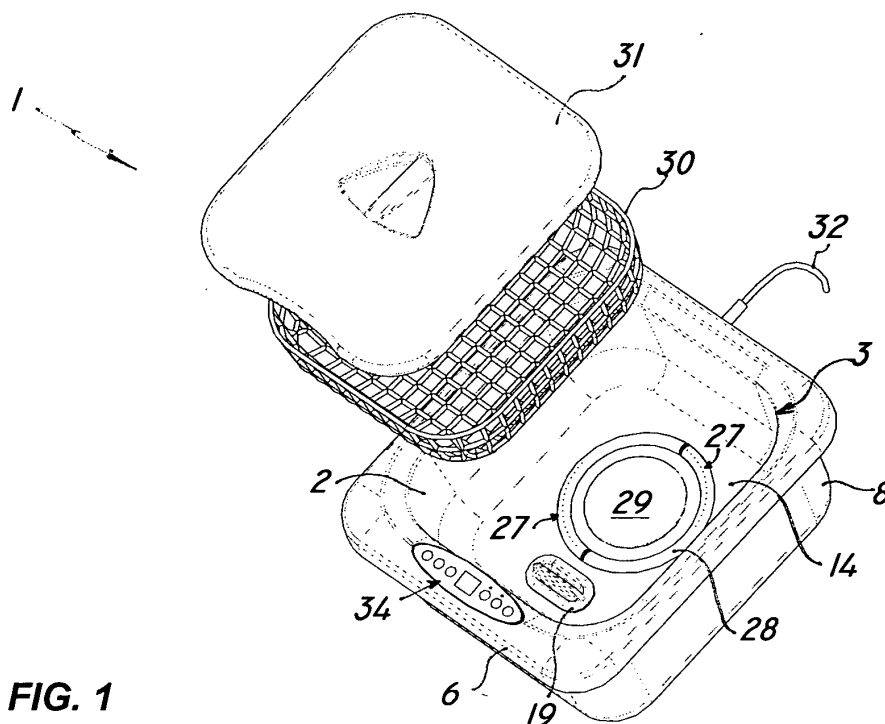


FIG. 1

Description

Field of the invention

[0001] The present invention generally finds application in the technical field of portable cleaning apparatus for household use of food treatment and preservation, and particularly relates to a household appliance for sanitizing food and other objects, such as dishware, nursing bottles, other bottles, and the like.

Background of the invention

[0002] As is known in the art, domestic objects and food products, as well as certain simple medical devices are cleaned and sanitized using chemicals with a germicidal, antibacterial and/or sporicidal effect of various strength.

[0003] Nonetheless, in food sanitization, chemicals can involve alterations of organoleptic properties, and possible hazards for consumers' health if the food products are not adequately rinsed with clean water.

[0004] In an attempt to obviate the above drawbacks, various solutions have been proposed, providing household and industrial devices that can wash and/or sterilize food and objects in general without using chemicals but only strictly physical processes.

[0005] Particularly, devices are known that use ultrasound sources for generating vibrations to remove impurities, such as soil residues or dust from, the surface of food.

[0006] Devices are further known that, possibly in combination with the ultrasonic action, can sterilize food and various objects by producing ozone and blowing it into the washing liquid or directly into the air.

[0007] US 5,927,304 discloses a household appliance for washing food, which is composed of an external container in which washing liquid is poured, and a metal basket for holding food in the liquid.

[0008] One or more sources of sonic or supersonic waves are provided on the inner wall of the latter, to generate such vibrations in the liquid as to penetrate the interstices in the food and remove the impurities deposited thereon, and a UV radiation source produces a germicidal and antibacterial effect for complete food sterilization.

[0009] While this household appliance ensures both impurity removal and food sterilization, it still suffers from the drawback that the washing liquid, generally water, is supplied and drained out, at the beginning and end of the sanitization cycle respectively, through the top opening of the external container. Therefore, water discharge requires lifting and tilting of the whole household appliance, with apparent discomfort to the user.

[0010] In an attempt to obviate the above drawbacks, a few household appliance solutions have been proposed, in which liquid is discharged at the end of the washing and/or sterilization steps using solenoid valves

with automatic or controlled discharge opening.

[0011] US 6,871,654 discloses a household appliance for washing fruits and vegetables using sonic waves, in which water is drained out by opening a solenoid valve located near the bottom of the washing tank and communicating with an external pipe for discharging water into a sink.

[0012] A second solenoid valve, communicating with a second pipe that is designed to be directly connected to a faucet of any domestic point of use, allows further opening for water supply at the beginning of every washing cycle.

[0013] While this solution allows the washing liquid to be supplied and drained out in a simple and convenient manner, with spent liquid replacement after every washing cycle, it still involves complex design and relatively high management costs, and turns out to be of poor cost-effectiveness.

[0014] Furthermore, the need of connecting the water supply pipe to the fauced prevents direct use of the household appliance unless fixed connection thereof with the point of use is provided. Nonetheless, this cannot always be ensured in those places, such as common household kitchen environments, in which little space is available and where fixed installation of the household appliance would require further considerable space.

Summary of the invention

[0015] The object of this invention is to overcome the above drawbacks, by providing a household appliance for sanitization of products that involves simple and inexpensive fabrication and relatively low consumption.

[0016] A further object is to provide a household appliance that is simple and ready to use while ensuring a relatively high degree of sanitization of the products held therein for a long time.

[0017] Another object of the present invention is to provide a household appliance for sanitization of products that can be easily filled with a washing liquid and emptied in a simple manner, with no excessive effort by the user.

[0018] Another important object is to provide a household appliance of simple and sturdy construction that is relatively cost-effective. These and other objects, as better explained hereafter, are fulfilled by a household appliance for sanitization of products as defined in claim 1, comprising a container with a top opening for receiving one or more products to be sanitized and a washing liquid, washing means for vibrationally removing particle impurities on the products immersed in the liquid, sterilization means for reducing microbial counts on the products.

[0019] The household appliance is characterized in that it comprises a substantially annular radially and outwardly projecting rim whose bottom surface has a sufficient minimum radial dimension as to firmly sit on the top edge of a sink.

[0020] Thanks to this particular configuration, the

household appliance of the invention has a very simple and convenient operation, because the working liquid can be filled by simply placing the appliance in a sink.

[0021] Furthermore, the whole sanitization process can be carried out with the appliance within the sink, which affords an apparent size reduction. Advantageously, the household appliance can have discharge means for draining the spent liquid from the container at the end of the washing and/or sterilization steps.

[0022] Suitably, the discharge means may include a downward conduit of small length, which is connected to the container at a hole of its bottom wall and a plug designed to be manually fitted in the hole and removed therefrom.

[0023] Thanks to this additional characteristic, during the discharging step, the user is not required to lift the liquid-filled container, which may require excessive effort.

[0024] Furthermore, the container and/or housing may be made of a plastic material selected from the group comprising thermoplastic resins, such as ABS.

[0025] Thanks to the latter characteristic, the household appliance of the invention requires relatively low fabrication costs, while maintaining high wear strength.

Brief description of the drawings

[0026] Further characteristics and advantages of the invention will be more apparent from the detailed description of a preferred, non-exclusive embodiment of a household appliance for sanitization of products according to the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

- FIG. 1 is a partly exploded perspective view of a household appliance of the invention;
- FIG. 2 is a front view of a household appliance of the invention held in a sink;
- FIG. 3 is an exploded view of the household appliance of FIG. 1, without certain details;
- FIG. 4 is a top view of the household appliance of FIG. 1;
- FIG. 5 is a side view of the household appliance of FIG. 1.

Detailed description of a preferred embodiment

[0027] Referring to the above figures, the household appliance of the invention, which is generally designated by numeral 1, may be used for sanitizing food products as well as dishware, nursing bottles, other bottles, and infant products in general.

[0028] The appliance 1 can also be used in the art of medical and dental care for sterilizing simple medical instruments and devices. According to the invention, the household appliance 1 comprises a container 2 with a top opening 3 for receiving one or more products to be sanitized and a washing liquid, washing means 4 for vi-

brationally removing particle impurities on the products immersed in the liquid, sterilization means 5 for reducing microbial counts on the products.

[0029] According to a peculiar characteristic of the invention, the household appliance 1 has a substantially annular radially and outwardly projecting rim 6 whose bottom surface 7 has a sufficient minimum radial dimension r as to firmly sit on the top edge M of a sink L .

[0030] Thus, the appliance 1 may be directly introduced in the sink L , as shown in FIG. 2, which allows the container to be filled with water drawn directly from the domestic point of use U .

[0031] As shown in FIG. 3, the container 2 may be held in a housing 8 along whose top edge 9 the substantially annular rim 6 may be formed.

[0032] Nevertheless, it shall be understood that the annular rim 6 designed to sit on the edge M of the sink L will not be necessarily formed at the top edge 9 of the housing 8 but may extend all around the side wall 10 at any height, or at the bottom edge 11 thereof.

[0033] The container 2 may have a side wall 12 also having a protruding annular rim 13, substantially similar to the annular rim 6 of the housing 8, and a bottom wall 14 of substantially the same extension as the top opening 3.

[0034] Furthermore, discharge means 15 may be provided for draining the spent liquid from the container 2 at the end of the washing and/or sterilization steps.

[0035] The discharge means 15 may include a downward conduit 16 of small length 1. Preferably, the length 1 of the conduit 16 is substantially equal to the length of the gap defined by the bottom walls 14 and 17 of the container 2 and the housing 8 respectively, so that it will not project out of the latter.

[0036] Here, the bottom wall 17 of the housing 8 would obviously have a hole, not shown, which substantially coincides with the outlet 18 of the conduit 16.

[0037] Advantageously, the conduit 16 may be connected to the container 2 at a hole of the bottom wall 14 thereof, also not shown.

[0038] During operation of the appliance 1, this hole may be closed by a manually removable plug 19 to allow drainage of the washing liquid from the container 2 directly into the sink L at the end of the washing and/or sterilization step.

[0039] Thus, the user is not required to lift and tilt the whole heavy appliance 1 filled with liquid, to discharge the spent liquid, and may carry out this step in a very easy and hazardless manner.

[0040] Furthermore, both the housing 8 and the container 2 may be made of a plastic material selected from the group comprising thermoplastic resins, such as ABS.

[0041] Nonetheless, these components may be also formed of other materials, such as metal or metal alloys, to increase the effectiveness of ultrasonic waves.

[0042] The configuration as shown in FIG. 3 shows that both the washing means 4 and the sterilization means 5 may be located in the housing 8 and below the

container 2 and constructed in accordance with substantially known technologies.

[0043] For example, the washing means 4 may include a frequency generator 20 which is designed to generate sonic waves of predetermined frequency within the liquid held in the container 2, by exciting the frequency transducer 35.

[0044] Particularly, the waves may be of ultrasonic type with frequencies in a range from 20 kHz and 50 kHz and preferably of about 40 kHz, although 5% oscillations will be allowed around this value.

[0045] The sterilization means 5 may include a circuit 21 for forced distribution of a sterilizing fluid into the chamber 2. Preferably, the sterilizing fluid is ozonized air.

[0046] In this case, the distribution circuit 21 may include a pump 22 for drawing in air from the outside environment, and an ozone generator 23 connected to the delivery pipe 24 of the pump 22.

[0047] In one preferred embodiment, the ozone generator 23 may be a step-up transformer which defines a chamber therein for ozonizing the air delivered by the pump 22 and is adapted to generate a high frequency and high voltage electric arc in the air delivered into the ozonizing chamber.

[0048] The latter may be in fluid communication, by means of appropriate connection pipes, not shown, with a substantially annular distribution chamber 25 underlying the container 2.

[0049] The distribution chamber 25 may have a first series of holes, generally designated by numeral 26, in fluid communication with an ozonizing chamber for drawing in ozonized air therefrom and a second series of holes, generally designated by numeral 27, opening into the container 2 for feeding ozonized air therein.

[0050] Furthermore, the distribution chamber 25 may be defined by a ring 28 with the second series of holes 27 formed therein, attached to the periphery of a disk-shaped plate 29 placed on the bottom wall 14 of the container 2.

[0051] Also, the plate 29 may be coated at its top with a layer of a material containing silver nanoparticles so that, when it is immersed in the liquid, it can release positive silver ions which are known to have antibacterial and germicidal properties.

[0052] According to a further configuration, not shown herein, the sterilization means 5 may include, in addition to or instead of the ozone generator 23, a UV ray generator held within the container 2.

[0053] A plastic or metal perforated basket 30 may be also placed in the container 2, for holding the products within the washing liquid throughout the steps of the sanitization cycle, and for facilitating removal of the sanitized products at the end of the cycle. The basket 30 may be stationary or moved by suitable drive means, not shown.

[0054] As particularly shown in FIGS. 4 and 5, the top opening 3 of the container 2 may be closed by a cover 31. These figures also partially show the power cord 32 allowing connection to the mains or any other voltage

source for operation of the various components of the household appliance 1.

[0055] Nonetheless, in addition to or instead of this power supply arrangement, a voltage source may be also provided in the housing 8, such as one or more commonly available batteries of adequate amperage, not shown because they are known per se.

[0056] Finally, a number of different washing and/or sanitization programs may be preset in a special micro-processor 33 for selection through a display 34 located on the top edge 13 of the container 2.

[0057] The above disclosure clearly shows that the invention fulfills the intended objects and particularly meets the requirement of providing a household appliance for sanitizing products that allows simple and inexpensive fabrication and is easy and ready to use.

[0058] The household appliance of the invention is susceptible of a number of changes and variants, within the inventive principle disclosed in the appended claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0059] While the household appliance has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A household appliance for sanitizing products, particularly food, dishware and the like comprising:

- a container (2) with a top opening (3) for receiving one or more products to be sanitized and a washing liquid,
- washing means (4) for vibrationally removing particle impurities on the products immersed in the liquid;
- sterilization means (5) for reducing microbial counts on the products;

characterized in that it has a substantially annular outwardly radially projecting rim (6) having a bottom surface (7) with a minimum radial dimension (r) sufficient to firmly sit on the top edge (M) of a sink (L) .

2. Household appliance as claimed in claim 1, **characterized in that** said container (2) is located in a housing (8) along whose top edge (9) said substantially annular rim (6) is formed.

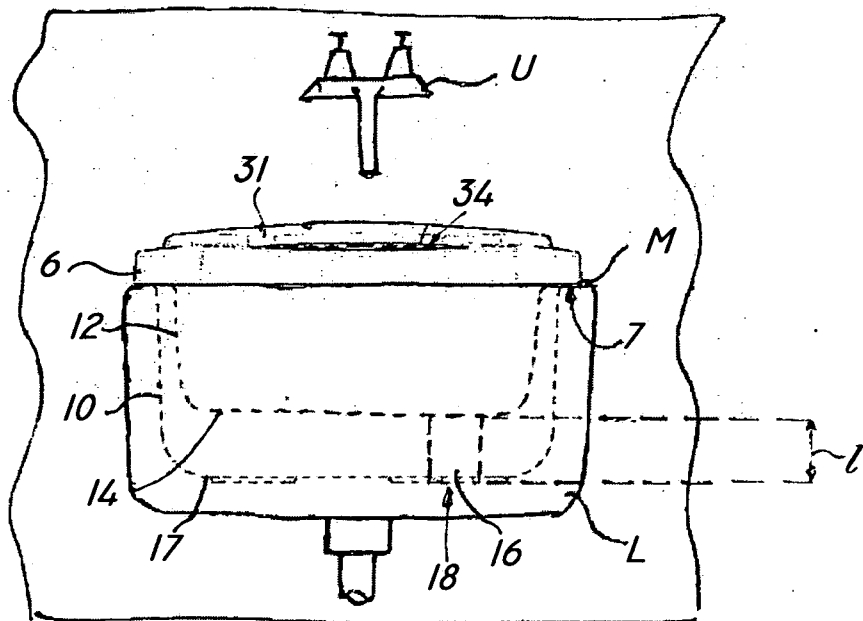
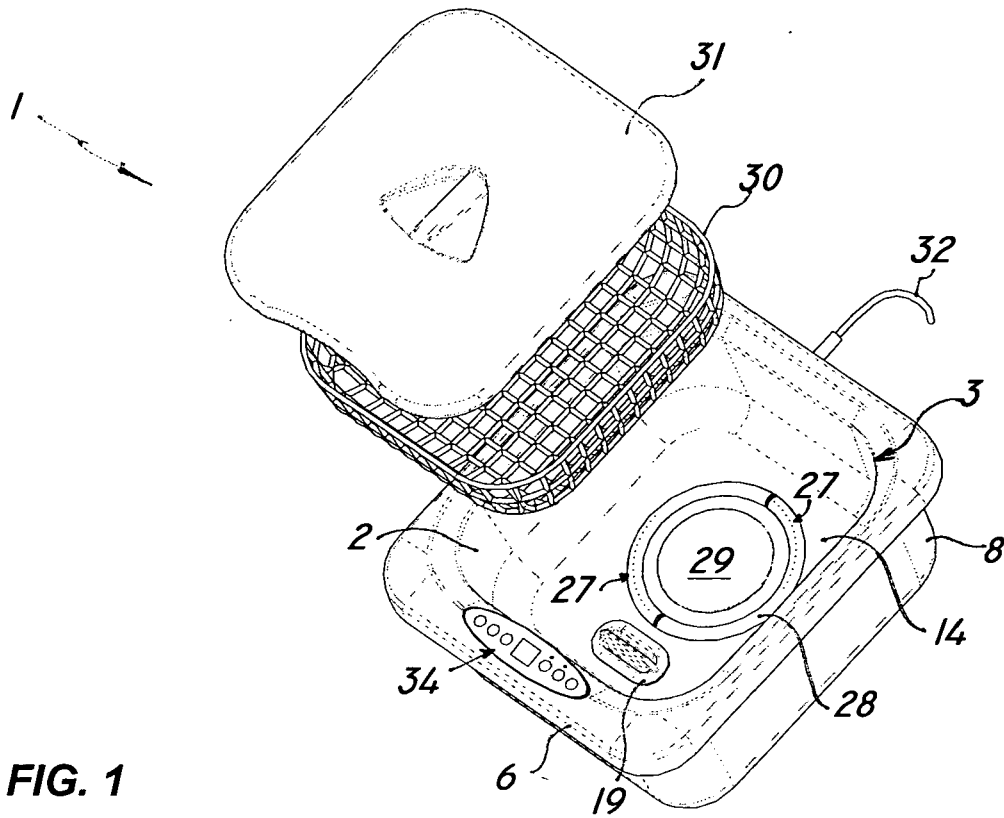
3. Household appliance as claimed in claim 1, **characterized in that** said container (2) has a side wall (12) and a bottom wall (14), said bottom wall (14) having

substantially the same extension of said top opening (3).

4. Household appliance as claimed in claim 1, **characterized in that** it has discharge means (15) for draining off the spent liquid from said container (2) at the end of the washing and/or sterilization steps. 5
5. Household appliance as claimed in claim 4, **characterized in that** said discharge means (15) include a downwardly directed conduit (16) of limited length (1), which is connected to said container (2) in correspondence of a hole of said bottom wall (14). 10
6. Household appliance as claimed in claim 5, **characterized in that** said discharge means (15) further include a plug (19) designed to be fitted in said hole, said plug (19) being manually removable to allow drainage of the washing liquid from said container (2) directly into the sink (L). 15 20
7. Household appliance as claimed in any one of the preceding claims, **characterized in that** said container (2) and said housing (8) are made of a plastic material selected from the group comprising thermoplastic resins. 25
8. Household appliance as claimed in claim 7, **characterized in that** said thermoplastic resin is ABS. 30
9. Household appliance as claimed in any one of the preceding claims, **characterized in that** said washing means (4) include a frequency transducer (20) located in said housing (8) below said container (2) for generating therein sonic waves of predetermined frequency. 35
10. Household appliance as claimed in claim 9, **characterized in that** said predetermined frequency is selected from the range of ultrasonic frequencies from 20 kHz to 50 kHz and is preferably close to 40 kHz. 40
11. Household appliance as claimed in any one of the preceding claims, **characterized in that** said sterilization means (5) include a forced distribution circuit (21) for feeding a sterilizing fluid to said container (2). 45
12. Household appliance as claimed in claim 11, **characterized in that** said sterilizing fluid is ozonized air, said distribution circuit (21) comprising a pump (22) for aspiration of air from the outside and an ozone generator (23) connected to the delivery side (24) of said pump (22). 50
13. Household appliance as claimed in claim 12, **characterized in that** said ozone generator (23) is a tension gain transformer which defines internally thereof a chamber for ozonizing the air delivered by said

pump (22).

14. Household appliance as claimed in claim 12, **characterized in that** said distribution circuit (21) comprises a substantially annular feed chamber (25) located underneath said container (2).
15. Household appliance as claimed in claim 14, **characterized in that** said feed chamber (25) has a first series of holes (26), in fluid communication with said ozonizing chamber for drawing in ozonized air therefrom and a second series of holes (27), opening into said container (2) for forced feeding of ozonized air therein.
16. Household appliance as claimed in any one of the preceding claims, **characterized in that** it further comprises a perforated basket (30) located within said container (2) for collecting the food therein throughout the sanitization cycle, and allowing removal of the sanitized products at the end of the cycle.



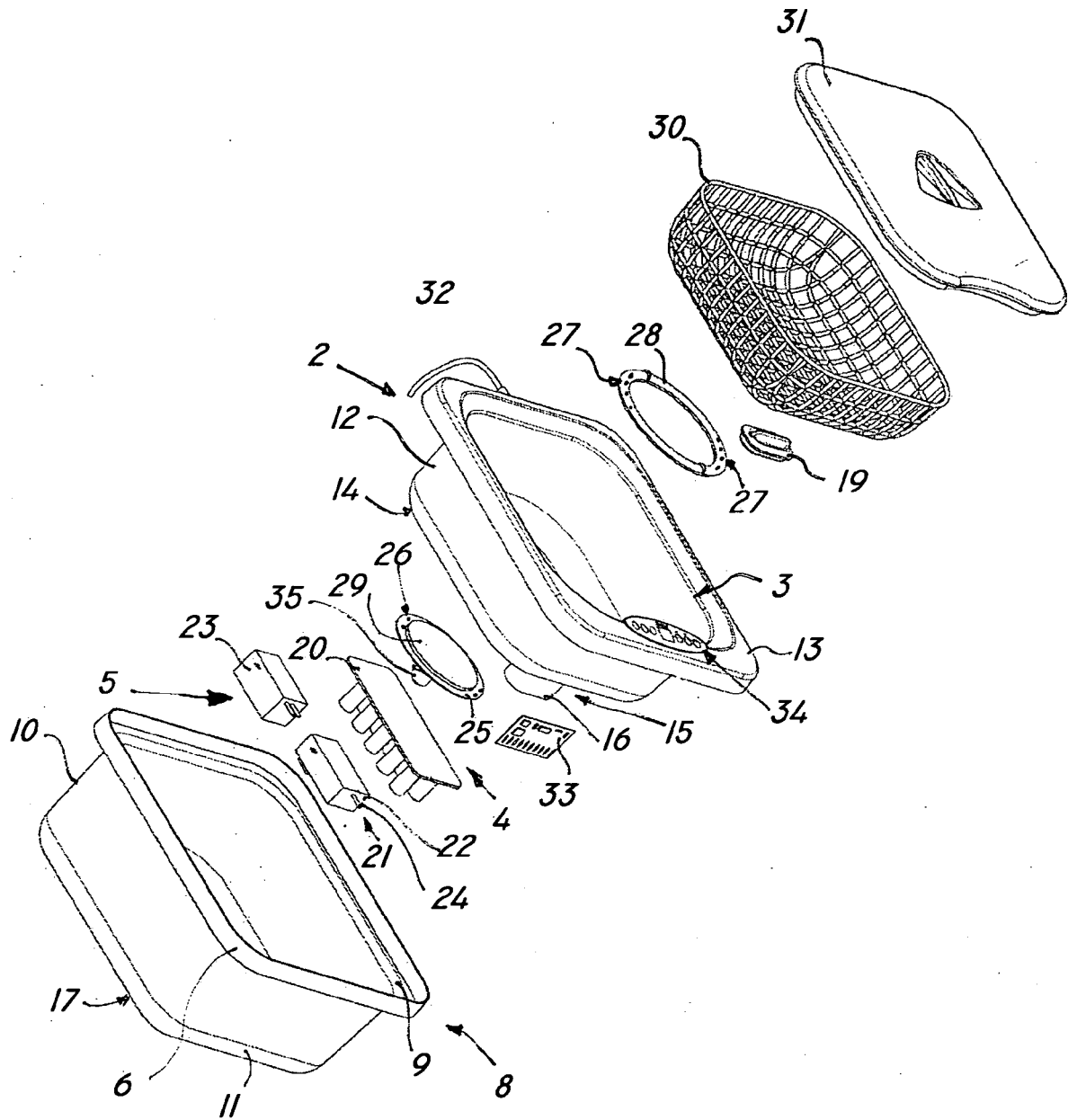


FIG. 3

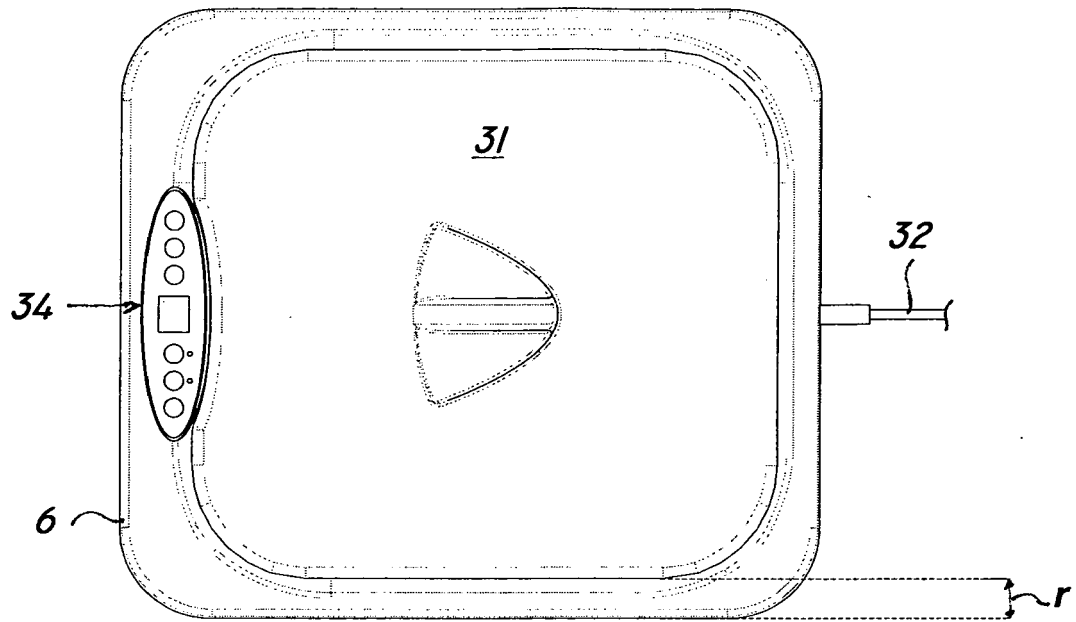


FIG. 4

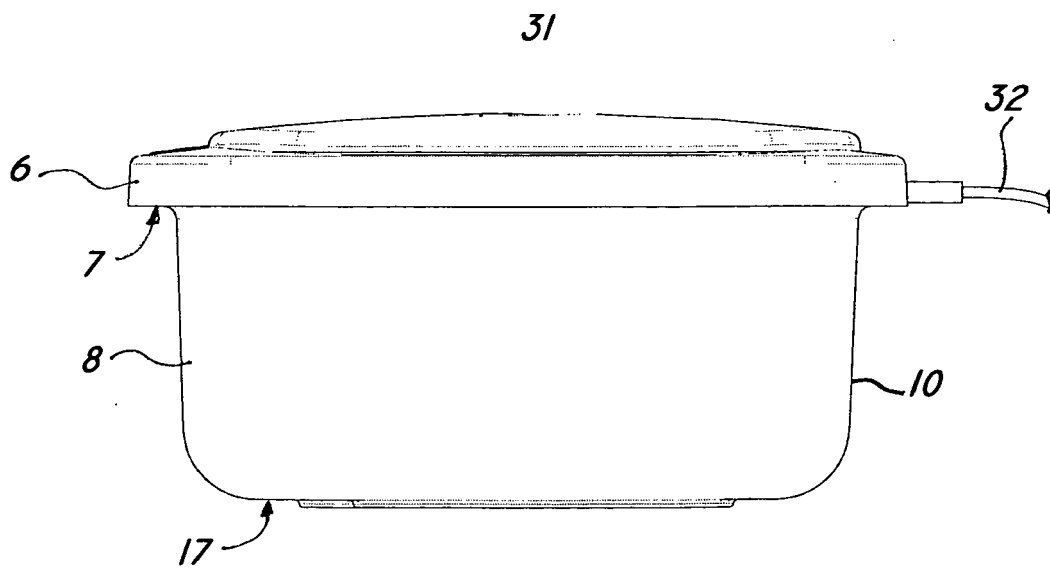


FIG. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 00 0420

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 May 2008	Examiner Hannam, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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