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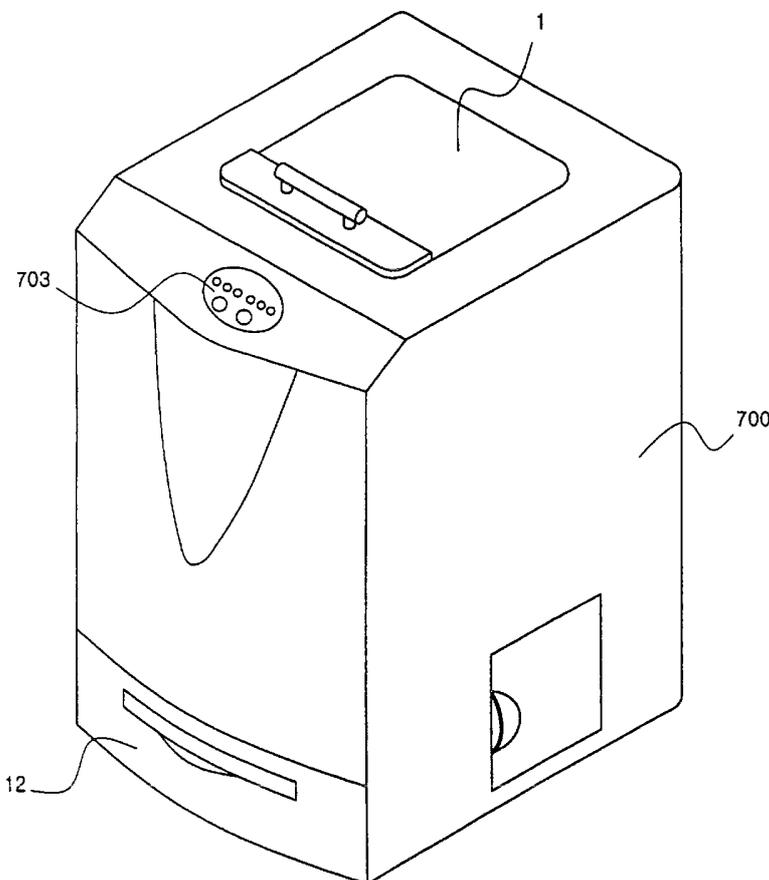
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(54) Title: FOOD WASTE DISPOSER AND AUTOMATIC PROCESS



(57) Abstract: Disclosed are method and apparatus for automatically disposing food wastes. The apparatus of the present invention includes an injection part through which food wastes are injected; a crushing part for crushing the injected food wastes; a drying part for drying the crushed food wastes; a cooling part provided with a series of vortex tubes for allowing vapor generated from the drying part to pass therethrough and is adapted to liquefy the vapor of high temperature; an ozone generator installed at one side of the pipe connected to the lower portion of the cooling part; a purifying part connected to the lower portion of the ozone generator and is adapted to purify the remained air having a nasty smell discharged by a light catalyst process after passing the cooling part; a condensed water discharging pipe for discharging the condensed water which is purified in the purifying part; and a gas discharging pipe for discharging the purified gas.



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**FOOD WASTE DISPOSER AND AUTOMATIC PROCESS****TECHNICAL FIELD**

The present invention relates to an apparatus and method  
5 for disposing food wastes, and more particularly to an apparatus  
for automatically disposing food wastes, which can be installed  
at the lower portion of a sink die or other extra places, and adapted  
to finely crush food wastes in a crushing part, dry the crushed  
food wastes in a disk-type drying part, cool a vapor containing  
10 a nasty smell generated the drying process with a cooling part,  
purify condensed water and the nasty smell gas in a purifier and  
discharge the purified condensed water and clean air to the outside,  
and a method for the same.

**15 BACKGROUND ART**

Various kinds of pollution problems have become social issue  
because of urbanization and industrialization, especially  
environmental pollution gives gradually serious and harmful  
influence to the human and the nature. The main factors causing  
20 the environmental pollution include various kinds of living wastes,  
industrial wastes, etc.

Generally, the food wastes generated as by-products in homes  
or in food processing plants such as Kim-chi plants and radish  
preserved with salt are thrown away together with other garbages,  
25 which leads to an increase in the amount of the food wastes and also

require lots of time and labor to dispose them. Further, the wastes provide a habitat to flies, mosquitoes, etc., and they generates a nasty smell because of containing a lot of water, if they are left to stand for a long time period. A lot of pollutants are generated in waste depot so that lands, soils and rivers adjacent to the waste depots are polluted, which contributes to destruction of environment.

As a result, the Korean government introduces a garbage separating system in order to separate food wastes and garbages from each other while collecting them to dispose them. Therefore, people should collect the food wastes generated every day or during each regular period in a specific container in order to dispose the food wastes. Further, people suffer from an inconvenience of placing the collected food wastes outside home in a designated date.

Recently, researches on many methods for efficiently disposing the food wastes are in progress in various aspects. Further, the methods for fermenting or drying the food wastes to produce fertilizers or composts have been widely known.

Korean Patent laid-open Publication No. 97-5083 discloses a method which sorts foreign substances from food wastes as raw materials while sterilizing, drying, cooling and crushing them and then adds the resulting sub-materials of a particle type to feeds for chickens.

Korean Patent laid-open Publication No. 2002-892890 discloses a method and device for disposing food wastes, in which the salty

degree of the food wastes is decreased by mechanical processes such as charging, crushing, dehydrating, drying, discharging and purifying of the food wastes without using microbes and water controlling drugs, thereby preventing generation of a nasty smell.

5 Korean Patent laid-open Publication No. 2002-65162 discloses a device for dehydrating and drying food wastes.

Korean Patent laid-open Publication No. 2002-26413 discloses a device for disposing food wastes which is installed at a sink die and has a crushing chamber for crushing the food wastes and a drying  
10 chamber for dehydrating and drying the crushed food wastes, the crushing chamber and the drying chamber being vertically arranged in series.

Korean Patent laid-open Publication No. 2001-88750 discloses a device for automatically disposing food wastes, which is installed  
15 at the lower portion or the outside of a sink die and includes a displaying part and controlling part for automatically controlling the a compact crushing part, a dehydrating part, a fermenting and packing part and a solenoid valve for automatically supplying water to the crushing part and the dehydrating part, and a method thereof.

20 Korean Patent laid-open Publication No. 2000-63431 discloses a device for disposing food wastes which is installed at a sink die and includes a compressor for compressing the food wastes and openable and closable means for allowing the compressed food wastes to be selectively passed therethrough.

25 Korean Patent laid-open Publication No. 2002-33935 discloses a

food wastes dehydrating and drying device for homes, which is adapted to crush and dehydrate the food wastes, and dry them with heat to decrease their volume, and which is maintained in a vacuum state.

5 Korean Utility Model Registration No. 96-28937 discloses a feed processing device for disposing food wastes, which includes water separating means for separating water from the food wastes by rotating them, extruding means for squeezing the food wastes and extruding the squeezed ones in the form a yarn, drying means for  
10 drying the extruded food wastes, cutting means for cutting the dried food wastes, and packing means for packing the cut food wastes.

Korean Utility Model Registration No. 20-286130 discloses a food wastes barrel which is attached to the inside of a sink die for removing a nasty smell from food wastes and sterilizing them using  
15 ultraviolet rays and ozone.

Korean Utility Model Registration No. 20-299595 discloses a magnetic dehydrating device which is installed at a sink die and is provided with a magnetic body attached on the bottom surface of a filter and a magnetic holder installed at the top surface of a  
20 compressing plate insertable into the filter.

Korean Utility Model Registration No. 20-192950 discloses a food waste disposing device for a sink die, which includes a screw for crushing and compressing the food wastes using driving means, a reservoir for reserving water drained by operation of the screw  
25 therein, a crushing and dehydrating chamber, drainage barrels, net

barrels and so on.

Korean Utility Model Registration No. 20-212194 discloses a triple screw-typed food waste disposing device for only a sink die.

5 Korean Utility Model Registration No. 20-2150055 discloses a food waste disposing device which is installed at a drain of a sink die and includes a main body having a drain port and an outlet passage at a conical lower portion thereof. Korean Utility Model Registration No. 20262383 discloses a system for feeding and drying food wastes. Korean Utility Model Registration No. 20-290660  
10 discloses a device for dehydrating and drying food wastes. Korean Utility Model Registration No. 20-280518 discloses a waste basket which has a function for removing a nasty smell and for sterilizing using ultraviolet rays and ozone. Korean Utility Model Registration No. 20-280066 discloses a food wastes separating device for a sink  
15 die.

Korean Patent Registration No. 96-14859 discloses a method for disposing food wastes, which finely crushes the food wastes, charges them into a process chamber having a microwave dielectric heater, heats, dries and sterilizes the charged food wastes using microwaves,  
20 thereby producing feeds for domestic animals.

Korean Patent Registration No. 96-7871 discloses a feed producing device which stirs food wastes in a stirrer and blows hot air to the periphery of the stirrer.

The above-mentioned devices require enormous installations  
25 and many incidental devices. The devices cannot fully sterilize food

wastes, so that the food wastes are easily decayed. Further, the food wastes cannot be used as feeds for domestic animals since they contain salt.

Korean Patent Registration No. 10-311657 discloses a wastes  
5 disposing device for homes, which includes a heaping part for heaping wastes, a wastes transferring means installed at the inside of the heaping part for transferring the heaped wastes to a discharging port of the heaping part, a crushing chamber constructed to communicate with the heaping part for receiving the wastes  
10 transferred by the wastes transferring means, a crushing means for crushing the wastes received in the crushing chamber, a solidifying means for receiving the crushed wastes from the crushing chamber and solidifying the crushed wastes in a predetermined shape, a collecting part for collecting the solidified wastes, and a  
15 filtering means connected to the solidifying means for sucking and purifying vapor gas generated from the wastes and discharging the purified gas to the outside.

In the above-mentioned prior arts, the vapor gas transferred to the upper portion through a duct is naturally cooled and then  
20 condensed on the inner wall of the duct and becomes liquid state. The liquefied vapor gas flows down into the lower portion along the duct, thereby deteriorating an efficiency of the device. The vapor gas introduced into the filtering means through the duct contains water which is not condensed, which results in a reduction in performance  
25 of the filtering means. Further, the vapor generated during a drying

process contains fine particles, which may allow people in homes or restaurants to be under an insanitary environment.

#### DISCLOSURE OF INVENTION

5           Therefore, the present invention is an improvement of Korean Utility Model Registration Nos. 20-253243 and 20-282510 entitled "A Device for Disposing Food Wastes", and Korean Patent laid-open Publication No. 2002-31371 entitled "A Device for Disposing Food Wastes " which were early filed by the applicant and inventor of the  
10 present invention, in view of the above-mentioned problems, and it is an object of the present invention to provide a method and apparatus for automatically disposing food wastes, which finely crushes and dries food wastes, cools the gas with a nasty smell generated during the drying process, and purifies and discharges the  
15 cooled gas while purifying air cooled, and which completely dries the food wastes to be used as fuels, discharges clean air without a nasty smell, and which occupies a small area of working space and is excellent in workability.

          In order to achieve the above objects of the present invention,  
20 according to an aspect of the present invention, there is provided a device for automatically disposing food wastes, the device comprising: an injection part through which food wastes are injected; a crushing part for crushing the injected food wastes; a drying part for drying the crushed food wastes; a cooling part  
25 provided with a series of vortex tubes for allowing vapor generated

from the drying part to passes therethrough and is adapted to liquefy the vapor of high temperature; an ozone generator installed at one side of the pipe connected to the lower portion of the cooling part; a purifying part connected to the lower portion of the ozone generator and is adapted to purify the remained air having a nasty smell discharged by a light catalyst process after passing the cooling part; a condensed water discharging pipe for discharging the condensed water which is purified in the purifying part; and a gas discharging pipe for discharging the purified gas.

10 The receiving part 20 for receiving food wastes is formed in such a manner that plural disks having two holes formed thereon are connected to each other. The food wastes are thrown into a lower part through the receiving port 26 at the time of rotation of the receiving part. When any rigid objects such as chopsticks, thick  
15 ribs of animals, etc., are caught by means of the upper plate, the motor 25 senses an overload thereof generated by the objects. At this time, the motor 25 rotates repeatedly in clockwise and counterclockwise directions in several times, so as to prevent the object giving damage to the device of the present invention from  
20 passing through the receiving port 26.

The crushing part 30 for crushing the food wastes, of the present invention, is formed to have two layers consisting of an upper layer and a lower layer.

The feed screw 2 is formed on the upper layer, therefore a  
25 portion of the received food wastes are crushed afterward they are

transferred to a pair of crushing gears 3. The pair of crushing gears 3 formed on the lower layer finely crushes the food wastes received from the upper layer, afterward the food wastes is transferred to the drying part 5 connected to one side thereof. The reducer 51 is  
5 connected to the motor 50 for driving the crushing part 30. Also, the feed screw 2 and the crushing gear 3 are connected to the reducer 51, therefore two parts, that is the crushing part 30 and the reducer 51, are driven by one motor 50. Further, the crushing part 30 can crush the food wastes to be 0.3mm.

10 The drying part 5 of the present invention is a disk type, and has two housings 200 and 300. The heating plate 230 is attached to both outsides of the housings 200 and 300, and it applies heat to the housings 200 and 300. Further, the rotating plate 400 for  
continuously drying the finely ground food wastes is attached both  
15 insides of the housings 200 and 300. Plural discharging ports 210 and 310 are formed on the two housings 200 and 300 with a constant distance in order to discharge the vapor.

The slushy food wastes transferred to the rotating plate 400 are dried by the heating plate 230 formed on both outsides of the  
20 housings 200 and 300, then they are collected into the collecting basket 12.

The first housing 200 and the second housing 300 of the drying part 5 of the present invention are fixed.

The dried object removing pin 270, provided with a spring at the  
25 lower portion thereof and a ball pin, is formed at one side of the

inner portion 202 of the first housing 200, so that the dried object is well dropped into the collecting basket 12.

The stepped recesses 240 and 340 are formed on one side of lower portion of the outside of the first housing 200 and the second housing 300 of the drying part 5, so that the crushed food wastes are easily transferred by minimizing the pressure of the vapor applied from the drying part 30 to the crushing part 30.

The rotating plate 400 is rotated by the driving gear 50 formed at the center portion between the first housing 200 and the second housing 300, plural intermediate gears 600 connected to the driving gear 500 and the rack gear 420 geared with the intermediate gear 600. The rack gear 420 is formed on the inner periphery surface of the rotating plate 400.

The extraneous objects removing pin 430 is installed on the inner and the outer periphery surfaces of the rotating pin 400, so that the fine extraneous objects discharged together with the vapor are not attached to the air recesses 206, 207, 306 and 307 of the inner portions 202 and 302 of the housing.

The driving gear 500 is operated together with the screw 2 by being connected to the rotating shaft formed on the screw 2. The intermediate gear 600 is interposed between the driving gear 500 and the rack gear 420 formed on the rotating plate 400, and also is interposed into the inner portions 202 and 302 of the housings 200 and 300 and the center portion of the rotating plate 400. Thereby, if the driving gear 500 connected to the shaft of the feed screw 2

rotates, the three intermediate gears 600 geared with the driving gear 500 are rotated. Further, if the intermediate gears 600 are rotated, the rack gear 420 formed at the rotating plate 400 and geared with outer portion of the intermediate gears 600 is rotated. 5 Thereby, the rotating plate 400 is rotated in constant position. Therefore, the crushing part 30 and the drying part 5 can be operated by one motor.

The drying part 5 is heated up to 150 degree by the heating plate 230, and rapidly dries and then discharges the food wastes within 10 5~10 seconds. When the starting button is pushed and the drying part 5 is preheated up to the setting temperature by the heater, the drying part 5 is automatically operated by the temperature sensor 704. If food wastes transferred from the crushing part do not exist in the drying part 5, the heat of the upper end of the drying part 15 5 is conducted to the lower end thereof. Thereby, the drying part 5 is automatically stopped operating by the setting temperature of the temperature sensor 705.

The cooling part 8 of the present invention adopts an air-cooling method using an air-cooled fan. The cooling part 8 sucks the 20 gas contained vapor using the vapor sucking fan 7 installed at the intermediate portion of the pipe connected to the hood 6 covering the drying part 5. The outer surface of the vortex tube 16 built in the eddy generating part 15 is cooled by the cooling fan 14, therefore the vortex tube 16 is cooled. Thereby, a portion of gas passing 25 through the vortex tube 16 is liquefied and a nasty smell gas is

transferred to the purifying part 40.

The purifying part 9 of the present invention adopts a purifying method using a deodorant such as ozone, light catalyst, active carbon and zeolite, and has three purifying tops 41, 42 and  
5 43.

The first and second purifying tops are filled with a deodorant such as active carbon. The liquid discharging pipe of the lower portion of the purifying tops is connected to the condensed water discharging opening 702. The ozone generated in the ozone generating  
10 part 13 is flown into the purifying part 9 together with the vapor and the nasty smell gas introduced into the purifying part 9. The guiding plate 45 and the ultraviolet lamp 44 are built in the third purifying top 43. The inner surface of the third purifying top is coated with  $TiO_2$  powder, and the third purifying top finally purifies  
15 the gas.

The connecting member 250 will be not explained since it is generally known like a bolt and a nut.

The device for disposing food wastes of the present invention can be installed at the lower portion of a sink die using a home or  
20 a restaurant etc. After one washes tableware etc., one throws away the remains through a soil pipe. The remains such as water and food wastes are automatically divided, and the food wastes are crushed and fully dried. Further, the vapor and the nasty smell gas generated during the drying process can be purified.

25

**BRIEF DESCRIPTION OF DRAWINGS**

Other features and advantages of the present invention will become more apparent from the following description taken in connection with the accompanying drawings, wherein:

5 FIG. 1 is a perspective view of a device for automatically disposing food wastes according to the preferred embodiment of the present invention;

FIG. 2 is a side-sectional view of the device for automatically disposing food wastes according to the preferred embodiment of the present invention;

10

FIG. 3 is a development view of a receiving part of the device of the present invention;

FIG. 4 is a broken view of a crushing part of the device of the present invention;

15 FIG. 5 is a perspective view of a drying part of the device of the present invention;

FIG. 6 is a broken view of the drying part of the device of the present invention;

Fig. 7 is a view showing a first housing of the drying part of the device of the present invention;

20

FIG. 8 is a view showing a second housing of the drying part of the device of the present invention;

FIG. 9 is a view showing a rotating plate of the drying part of the device of the present invention;

25 FIG. 10 is a plane view of the rotating plate of the drying part

of the device of the present invention;

FIG. 11 is a partial view showing a heating plate of the device of the present invention; and

FIG. 12 is a detailed view showing a cooling part and a  
5 purifying part.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, the method and apparatus for automatically disposing food wastes according to the preferred embodiments of the present invention will be explained in detail referring to FIGS. 1  
10 to 10.

##### The first process:

After setting automatically or pushing the starting button,  
15 one throws food wastes into the receiving part 20 through the receiving port 1 of the upper portion connected to the sink die. Afterward, if the motor 25 operates, the receiving intermediate plate 22 installed in the receiving part 20 is rotated. At this time, the food wastes are transferred to the third through holes 26-2 and  
20 26-3 of the receiving intermediate plate 22 and to the fourth through hole 26-4 of the receiving lower plate 26-4, through the second through hole 26-1 of the receiving upper plate 21. Finally, the food wastes are transferred to the crushing part 20. At this time, if the upper plate catches any rigid objects such as chopsticks etc., the  
25 motor 25 senses the overload caused by the objects. At this time, the

motor 25 rotates repeatedly in clockwise and in counterclockwise in several times, therefore the object enabling to give injury to the device of the present invention is not received.

5        The second process:

When the food wastes are thrown into the crushing part 30, the motor 50 is driven. At this time, the reducer 51 connected to the motor 50 is also operated, thereby the feed screw 2 connected to the reducer 51 and the pair of crushing gears 3 placed on the lower  
10 portion of the feed screw 3 are operated. Thereby, the food wastes are crushed to have 0.3mm grain size, afterward they are transferred to the drying part 5 through the crushed objects feed nozzle 4.

The third process:

15        As the first process begins, the feed screw 2 is driven by the operation of the motor 50. At this time, the driving gear 500 connected to the shaft of the feed screw 2 drives, thereby the three intermediate gears 600 geared with the driving gear 500 are operated. At this time, the rack gear 420 of the rotating plate inner gear  
20 portion 401 attached to the inner periphery of the rotating plate 400 geared to the intermediate gear 600 is operated, and then the rotating plate 400 of the drying portion 5 inserted into the space which is formed by connecting the first and second housings 200 and 300 to each other is rotated.

25        At the same time, the food wastes are transferred from the

crushing part 30, the heating plate 230 formed on the outer surface of the two housings 200 and 300 is operated. While the inside of the two housings 200 and 300 is heated, the food wastes are flown into through the entrance 201. Afterward, the food wastes are flown into the plural crushed object receiving space 410 formed on the rotating plate 400, and they are rotated in the heated two housings 200 and 300. At this time, they are rapidly dried within 5~10 seconds at 150 degree. The vapor and the nasty smell generated during the drying process are discharged through the discharging ports 210 and 310, which are formed on the air recesses 206 and 306 formed on the boundary between the housing inner intermediate portion 204 and 304 and the housing peripheries 203 and 303, and which are also formed on air recesses 207 and 307 formed on the boundary between the housing inner intermediate portions 204 and 304 and the rotating plate driving portions 205 and 305. The fully dried food wastes are collected in the collecting basket 12 installed at the lower portion by the dried objects removing pin 270.

The fourth process:

The vapor discharged to outside of the drying part 5 is discharged to the hood 6 formed at the outside of the drying part 5, and it is transferred to the cooling part 8 by the vapor sucking fan 7 installed at the intermediate portion of the pipe. The cooling part 8 cools the vortex tube 15 by cooling the cooling fan 14 installed at the outside of the vortex tube 15. Afterward, a portion of the

vapor is condensed to the condensed water and the nasty smell gas is transferred to the purifying part 9 together with the ozone generated from the ozone generating device 13 connected to the one side of the vortex tube 15.

5

The fifth process:

The purifying part 9 has three purifying tops filled with the deodorization such as ozone, light catalyst, active carbon and zeolite etc.

10 The transferred vapor and the nasty smell gas are passed through the first purifying top 41, afterward the purified condensed water is discharged through the condensed water discharged port 702 installed at the lower portion thereof and the nasty smell gas is transferred to the second purifying top 42 through the pipe formed  
15 at the upper portion thereof. A portion of the condensed water generated from the second purifying top 42 is discharged through the pipe connected to the condensed water discharging port 702 and installed at the lower portion thereof, and the nasty smell gas is transferred to the third purifying top 43 formed at one side of the  
20 upper portion thereof. The transferred nasty smell gas is guided by the guiding plate 45 formed at the inside of the third purifying top 43 coated with  $TiO_2$  powder therein, and it is purified by the violet lamp 44 installed at the intermediate portion of the inside of the guiding plate 45 and then discharged through the gas discharging  
25 port 701. The above parts are automatically operated to dispose the

food wastes by the auto-controlling part 703 installed at the case 700.

Experimental Embodiment

The device for automatically disposing food wastes of the present invention is directly installed at the lower portion of a sink die, and it disposes the water and the food waste simultaneously.

A small size device has the disposable amount of 650g/hour and the power expense of about 7,000won/month (using 1 hour per one day).  
 A large size device, which can control the disposable amount, has disposable amount of 3kg/hour~10kg/hour and the power expense of about 9,000won/month (using night-power and 7 hours per a day). The data comparing the device of the present invention and other devices are as follows:

15

**TABLE 1**

Comparison in performance between the present invention and other company's products(for small size)

	Present invention	Other company's products (domestic)	Other company's products (foreign)
Disposing Process	Heating-Drying	Microbe-Sweeping	Hot wind-Drying
Disposing Capacity	650g/hour	40g/hour	400g/hour
Power Expense	7,000won/month	20,000won/month	8,750won/month

Price	-	1,000,000won	870,000won
Remarks	Continuous Type	Bio-Chip should be changed every 6 months Discontinuous Type	Discontinuous Type

**TABLE 2**

Comparison in disposing rate between the present invention and other company's products (for small size)

Kind of food	Present invention	Other company's products (domestic) C
-Cooke rice, noodles	Promptly dispose	3 hours
-Each kind of fish	Promptly dispose	3~12 hours
-Orange, apple, melon	Promptly dispose	3~15 hours
-Carrot, cucumber, onion, potato, pumpkin	Promptly dispose	3~15 hours
-Each kind of meat, pig, chicken	Promptly dispose	3~15 hours
-Rind of eggs	Promptly dispose	3~24 hours
-Antibiotic	Disposable	Not disposable
-A matter containing lots of salt		

5

**TABLE 3**

Comparison in specification between the present invention and other company's products (for large size)

	Present invention	Other company's products (domestic)	Other company's products (foreign)
Disposing type	Heating-Drying type	Dry-crushing type	Warm air-drying type
Disposing Capacity	6 kg/hour	6 kg/hour	5 kg/hour
Containing water for the disposal matter	4%	10%	10%
Disposing Temperature	180 degree	140 degree	130 degree
Power expense (Per month)	94,000 won	135,000 won	286,000 won
Price (Won)	-	16,500,000	27,000,000
Remarks	Continuous Type	Discontinuous Type	Discontinuous Type

The device for automatically disposing food wastes of the present invention finely crushes the food wastes and then dries them, therefore every food wastes can be fully dried. However, the prior products dry the food wastes and then crush them, therefore lots of time are required to dry them. Further, the prior products could not fully dispose noodles, cooked rice, rice cakes, fruits and fishes containing lots of grease.

Referring to FIGS. 1 and 2, the structure of the device for automatically disposing food wastes according to the preferred embodiment of the present invention will be explained.

The case 700 covers the device for automatically disposing food wastes. The automatic controlling part 703, provided with a button and an alarm for operating automatically or manually the device, is installed at one side of the intermediate portion of the upper portion of the case 700.

The receiving opening 1 is formed at the intermediate portion of the upper portion of the case 700.

The receiving part 20 for receiving food wastes is installed at the lower portion of the receiving opening 1.

The crushing part 30 for crushing the received food wastes through the receiving opening 1 is installed at the lower portion the receiving part 20.

The drying part 5 of a disk type for drying the crushed food wastes transferred from the crushing part 30 through the transferring nozzle 4 is installed at one side of the crushing part 30.

The collecting basket 12 for collecting the dried food wastes in the drying part 5 is installed at the lower portion of the drying part 5.

The hood 6 for collecting the vapor discharged from the drying part 5 during the drying process covers the outer portion of the drying part 5.

The condensing part 8, for condensing the collected vapor from the hood 6 by the vapor collecting fan 7 formed at one side of the pipe, is installed at the opposite side of the crushing part 30. At this time, the condensing part 8 is piped-connected to the upper  
5 portion of the hood 6 and to the crushing part 30.

The purifying part 9 for purifying a portion of the condensed water generated from the cooling part 8 is connected to the lower portion of the cooling part 8 and also connected to the ozone generator 13.

10 Further, the device for automatically disposing food wastes according to the preferred embodiment of the present invention includes the third purifying top 43 for finally purifying the condensed water in the purifying part 9, the condensed water discharging port 702 for discharging the purified water and the gas  
15 discharging port 701 for discharging the gas.

The receiving part 20 is shown in the FIG. 3.

The receiving part 20 includes three disk typed receiving plates and one sealing member. The three disk typed receiving plates is consisted of the upper receiving plate 21, the intermediate  
20 receiving plate 22 and the lower receiving plate 24.

The upper receiving plate 21 has the first through hole 28 for receiving the shaft of the motor formed at the intermediate portion therein, and the second through hole 26-1 formed at one side of the first through hole 28.

25 The intermediate receiving plate 22 is installed at the lower

portion of the upper receiving plate 21, and has a smaller diameter than that of the upper receiving plate 21. Further, the intermediate receiving plate 22 is provided with the first through hole 28 fixed to the shaft of the motor 25 and the two third through holes 26-2 and 5 26-3 formed at both sides of the first through hole 28, and it is rotated by the motor 25.

The sealing member 23 is installed at the lower portion of the upper receiving plate 21, and stably mounted on the periphery of the intermediate receiving plate 22.

10 The lower receiving plate 24 is installed at the lower portion of the intermediate receiving plate 22 and the sealing member 23, and is symmetric with the upper receiving plate 21. Further, the lower receiving plate 24 is provided with the first through hole 28 for receiving the shaft of the motor 25 formed at the intermediate 15 portion of therein, the fourth through hole 26-4 formed on the side opposite to the second through hole 26-1 of the upper receiving plate 21. Also, the overload sensor 27 is installed at one side of the receiving part 20.

The crushing section 30 is disposed at a lower portion of the 20 receiving device 20 shown in FIG. 4.

The crushing section 30 includes a cover 31 which is connected to a ground food waste conveying nozzle 4 at a side of a lower portion thereof and which has a two layer structure in that an intermediate partition having through-holes 32 is disposed, a conveying screw 2 25 which is disposed on a second layer of the cover 31, a pair of crushing

gear 3 which is disposed on a first layer of the cover 31 and of which a diameter becomes gradually smaller from one end to the other end thereof, a reduction gear which is connected to the conveying screw 2 and the crushing gear 3, for transmitting power, and a driving motor which is connected to the reduction gear 51 and which is disposed under the lower portion of the cover 31.

As shown in FIGS. 5, 6 and 10, the drying section of the present invention includes first and second housings 200 and 300 which have disc shape and the same inner and outer diameters and which are combined with each other to define a space therebetween, a rotation plate 400 which is disposed in the space between the first and second housings 200 and 300 to rotate, and a heating plate 230 which contains the rotation plate 400 therein to be combined with the rotation plate by means of a sealing member 402 for fixing the rotation plate 400 thereto and which is placed at an outside of the housings 200 and 300, for heating the food wastes.

The first housing 200, as shown in FIG. 7, includes an inner portion 202 having inner surfaces in parallel with one another, a pin 270 which has a ball pin shape while being mounted at a side of the inner portion 202 of the housing 200 to have a spring at a lower portion thereof, for removing the dried food wastes, and an inlet port 201 which is formed at one side of the inner portion 202 of the housing 200, for receiving the food wastes crushed in the crushing section 30.

The inner portion 202 of the first housing 200 is divided into

three parts. A housing edge 203 is formed at an edge portion in the inner portion 202 of the housing 200. The rotation plate 400 is seated at an intermediate portion 204 of the inner portion 202 of the housing 200. A rotation plate driving section 205 is placed at a center portion of the inner portion 202 of the housing 200. An air groove is formed at a boundary between the intermediate portion 204 of the inner portion 202 and the edge portion 203 of the housing 200. The other air groove 207 is formed at a boundary between the intermediate portion 204 of the inner portion 202 and the rotation plate driving section 205 of the housing 200. A discharging port 210 is formed in the air groove 206 and 207 to extend through the housing 200. A heating plate 230 is attached to a surface of the first housing 200. A groove is formed on the surface of the housing 200 to enclose an inlet port 201. A groove 240 for insulating heat is formed on the other surface of the housing 200 to be opposite to the heating plate 230.

Temperature sensors 704 and 705 are symmetrically attached to upper and lower portions of the edge portion 203 of the first housing 200.

The second housing 300, as shown in FIG. 8, has a mirror shape similar to the first housing 200, which includes an inner portion 302 having a flat inner surface, and an outlet port 301 which is formed at a side of the inner portion 302 of the housing 300, for discharging the dried food wastes.

The inner portion 302 of the second housing 300 is divided into

three parts. A housing edge 303 is formed at an edge portion in the inner portion 302 of the housing 300. The rotation plate 400 is seated at an intermediate portion 304 of the inner portion 302 of the housing 300. A rotation plate driving section 305 is placed at a center portion of the inner portion 302 of the housing 300. An air groove 306 is formed at a boundary between the intermediate portion 304 of the inner portion 302 and the edge portion 303 of the housing 300. The other air groove 307 is formed at a boundary between the intermediate portion 304 of the inner portion 302 and the rotation plate driving section 305 of the housing 300. A discharging port 310 is formed in the air groove 306 and 307 to extend through the housing 300. A heating plate 230 is attached to a surface of the second housing 300. A groove is formed on the surface of the second housing 300. A groove 340 for insulating heat is formed on the other surface of the housing 300 to be opposite to the heating plate 230.

The rotation plate driving section 205 is installed in a space between the rotation plate 400 and the inner portions 202 and 302 to drive the rotation plate 400, as shown in FIGS. 7 and 8.

A driving gear 500 is disposed at a center portion of the rotation plate 400, of which one end is connected to a shaft of a screw 2 to be driven. Three intermediate gears 600 are arranged around the driving gear 500, of which a part is engaged with the driving gear 500 while the other part engaged with a rack gear 420 of a rotation plate inner gear portion 401 formed at the inner portion of the rotation plate 400. The rotation plate 400 has a

through hole in which the driving gear 500 and the three rack gear 420, which includes pin 430 mounted at a predetermined distance on the inner and outer surfaces of the rotation plate 400 in order that foreign substance which has fine size and is discharged along with vapor is adhered to the air grooves 206, 207, 306 and 307.

The rotation plate 400 is seated between the first and second housings 200 and 300, which has an annular shape similar to the inner portion 302 of the housing. The rotation plate 400 has a plurality of space 410 for receiving the food wastes ground by means of the grinder, and a rotation plate inner combining portion 403 which is combined to the rotation inner gear portion 401 at an inner edge of the rotation plate 400.

The rotation inner gear portion 401 is combined to the inner edge of the rotation plate inner combining portion 403 of the rotation plate 400, which includes a rack gear 420 formed along a periphery of the inner edge of the rotation plate inner combining portion 403 and an inner gear combining portion 404 combined to the rotation plate inner combining portion of the rotation plate 400.

It can be understood that the sealing member 402 is seated between the first and second housings 200 and 300, of which an edge has the same annular shape as that of the edges 203 and 303 of the housings 200 and 300 and which is disposed to enclose the rotation plate 400.

The cooling device 8, as shown in FIG. 12, is a pipe disposed over an upper portion of the hood 6, which includes a vapor absorbing

fan 7 which is placed at a side of the pipe for absorbing the gas containing vapor, a vortex pipe having a vortex device 16 converting the flow in the pipe into the vortex, and a cooling fan 14 which is disposed at a side of the vortex pipe 15 to supply air to the food wastes.

The purifying device 9, as shown in FIGS. 2 and 12, is connected by means of a pipe to the cooling device 8, which has three purifying tower. The purifying device 9 includes an ozone generator 13 for introducing the ozone into the purifying device 9 through a pipe connected to an inlet port, a first purifying tower 41 which has an activated carbon contained therein, for purifying the condensate and the gas having bad smell, a second purifying tower 42 which is disposed at a side of the first purifying tower 41, which is connected to a condensate discharging port 702 formed at a bottom of the first purifying tower in order to discharge the liquefied gas, and which has the deodorant contained therein to receive the purified gas through the pipe.

A third purifying tower 43 is installed at a side of the second purifying tower 42, which includes a guide plate 45 to guide the gas which is secondary purified in the second purifying tower 42 and which is introduced through the pipe. The third purifying tower 43 has the ultraviolet lamp 44 contained at a center portion of the guide plate 45 to purify the gas passing through the guide plate 45, which is coated with fine powder of  $TiO_2$ . A gas discharging port 701 is formed at a bottom of the third purifying tower 43, which is

connected to the gas discharging port 701 to discharge the gas thirdly purified in the third purifying tower 43.

The condensate discharging port 702 is communicated with the sewer pipe of the sink ball to discharge the condensate.

5 The apparatus for automatically disposing the food wastes according to the present invention can be installed in a narrow space, which can contain the crushing section, the drying section, the cooling section, the purifying section and the driving motor for driving these section in the cover having the small size.

10 Furthermore, since the apparatus has an automatic control system, the housewife can control the apparatus for automatically disposing the food wastes. In addition, the apparatus for automatically disposing the food wastes can treat the large amount of the food wastes continuously.

15 Since the apparatus can remove moisture from the food wastes in an extent of 4%, the environment pollution caused by the food wastes can be solved.

Particularly, where the capacity of treating the food wastes is increased, the lifetime of the apparatus can be extended because  
20 the rotation plate can be hardly deformed by the temperature and the pressure.

It is another advantage in that the consumption of energy can be reduced in comparison with the existing apparatus, thereby increasing an economic effect.

25 The forgoing embodiments are merely exemplary and are not to

be construed as limiting the present invention. The present teachings can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, 5 modifications, and variations will be apparent to those skilled in the art.

**CLAIMS**

1. An apparatus for automatically disposing food wastes comprising:

5 a cover having an receiving opening formed at an upper portion thereof, for enclosing the outside of apparatus;

an operating section arranged at one side of the upper portion of the cover and having operation buttons and an alarm;

10 an injection section disposed under the receiving opening of the cover, for receiving the food wastes;

a crushing section placed under the injection section, for crushing the food wastes introduced thereinto;

15 a drying section disposed at one side of the crushing section and which has a disc shape, for drying the ground food wastes conveyed through a conveying nozzle from the crushing section;

a vessel positioned under the drying section, for receiving the food wastes dried in the drying section;

20 a hood enclosing the outside of the drying section, for collecting gas generated from the food wastes during the drying of the food wastes in the drying section;

a cooling section associated with the hood and the crushing section by means of pipes, for cooling gas introduced from the hood by means of a fan mounted in one side of the pipe;

25 a purifying device connected to a lower portion of the cooling section and an ozone generating device, for purifying partly

condensated water generated from the cooling section and bad smell gas;

a purifying tower disposed in the purifying device, for finally purifying the condensated water and the bad smell gas;

5 a condensate outlet port for discharging the purified condensated water; and

a gas outlet port for discharging the purified gas.

2. An apparatus for automatically disposing food wastes as  
10 claimed in claim 1, wherein the injection section has an upper receiving plate, an intermediate receiving plate and a lower receiving plate which have a disc shape, and a sealing member, the upper receiving plate having a through-hole, in which a motor shaft is inserted, at a center portion thereof and a plurality of apertures  
15 formed around the through-hole, the intermediate receiving plate being installed under the upper receiving plate, which has a smaller diameter than that of the upper receiving plate, which has a through-hole, in which the motor shaft is inserted, and which includes two through-holes symmetrically formed about the  
20 through-hole in which the motor shaft is inserted, the sealing member being disposed under the upper receiving plate so as to be seated at an edge of the intermediate receiving plate, the lower receiving plate being disposed under the upper receiving plate and the sealing member, which has the same shape as that of the upper  
25 receiving plate, which has a through hole at a center portion thereof

in which the motor shaft is inserted and through-holes formed around the through hole in which the motor shaft is inserted, to be respectively correspondence to the through-holes formed in the upper receiving plate, wherein further comprises a sensor which is installed at a side thereof to detect overload.

3. An apparatus for automatically disposing food wastes as claimed in claim 1, wherein the crushing section is formed under the injection section, which includes a grinder cover of which an upper portion is opened, of which a lower portion is connected to the conveying nozzle and which has a two layer structure in that a through-hole is formed in an intermediate partition, a conveying screw placed on a second layer of the grinder cover, a pair of crushing gears positioned at a first layer to be gradually tapered from one end to the other end thereof, a reduction gear connected to the conveying screw and the crushing gear to transmit power, and a driving motor disposed under the grinder cover to be connected to the reduction gear.

4. An apparatus for automatically disposing food wastes as claimed in claim 1, wherein the cooling section is a pipe formed over the hood, which has a gas absorbing fan formed at a side of the cooling section, for blowing the gas containing vapor, a vortex flow forming pipe having a vortex flow generator to make gas be vortex flow, and a cooling fan formed at a side of the vortex flow forming pipe to

supply air.

5. An apparatus for automatically disposing food wastes as claimed in claim 1, the purify device is connected by means of a pipe to the cooling section, which has an ozone generator for injecting ozone into the purifying device by means of a pipe connected to inlet thereof, a first purifying tower having activated carbon to purify condensate and bad smell gas, the condensate outlet port being formed under the first purifying tower for discharging the condensate, a second purifying tower which is formed at a side of the first purifying tower to receive the gas firstly purified in the first purifying tower through the pipe and which has deodorant therein, while be connected to the condensate outlet port to discharge the condensate where the vapor is collected at a bottom thereof, a third purifying tower which is installed at a side of the second purifying tower, in which a guide plate is disposed to guide the gas secondly purified in the second purifying tower by means of the pipe while having an ultraviolet lamp to purify the gas passing through a center portion of the guide plate, and which is coated with a fine powder consisting of  $TiO_2$ , and a gas outlet port which is formed at a lower portion of the third purifying tower, for discharging the gas thirdly purified in the third purifying tower, wherein the condensate outlet port is typically connected to a sewer pipe under a sink ball to discharge the condensate.

25

6. An apparatus for automatically disposing food wastes as claimed in claim 1, wherein the drying section has first and second disc-shaped housings which have the same outer and inner diameters and which are combined with each other to define a chamber therebetween, a rotation plate which is disposed in the chamber to rotate, and a heating plate which has the rotation plate contained therein and which is fixed to an outside of the housings by means of a sealing member attached to the rotation plate so as to heat the food wastes, the rotation plate driving section being installed at a center portion of the rotation plate and an inside of the housings to rotate the rotation plate, which has a driving gear which is mounted at the center portion of the rotation plate driving section, of which one end is connected to a shaft of the screw, and three intermediate gears which are disposed around the driving gear, of which one end is engaged with the driving gear while the other end engaged with a rack gear of a gear portion disposed in the rotation plate, in which through-holes are formed in which the driving gear and the three rack gears are inserted, in which pins for removing foreign substance are mounted at a predetermined distance on inner and outer surfaces of the disc in order for the foreign substance not to be introduced in air groove of the housings, wherein the rotation plate are seated in the first and second housings, which has the same annular shape as that of the housings and which has spaces to receive the ground food wastes, of which an inner gear section and an inner securing section are attached to an inner edge, wherein the inner

gear section is attached to the inner edge of the inner securing section, which has a rack gear formed about the inner edge and the inner gear securing section attached to an inner edge securing section of the rotation plate, wherein the sealing member of the rotation plate has the same annular shape as that of the edge of the housing, which is positioned at an outside of the rotation plate.

7. An apparatus for automatically disposing food wastes as claimed in claim 6, wherein the first housing has an inner space, a pin which has a ball pin shape mounted at a side of the housing and which has a spring at a lower portion thereof, for removing the dried food wastes, an inlet port which is formed at a side of the housing, for receiving the food wastes ground in the crushing section, wherein the inner space of the housing can be divided in three portions, which has an edge portion, an intermediate portion at which the rotation plate is seated, and a center portion at which the rotation plate driving section is placed, wherein air groove are formed at a boundary between the intermediate portion and the edge portion of the housing, wherein another air groove are formed at a boundary between the intermediate portion and the rotation plate driving section, wherein the outlet port is formed at two air groove to extend through the housing, wherein the heating plate is positioned at a side of the first housing in which groove is formed to enclose an opening of the first housing, which has grooves formed to be opposite to the heating plate in order to insulate heat,

wherein temperature sensors are disposed at upper and lower portions of the first housing to be symmetrical to each other.

8. An apparatus for automatically disposing food wastes as claimed in claim 6, wherein the second housing is symmetric to the first housing, which has a chamber, an outlet port which is formed at a side of the housing to discharge the dried food wastes, wherein the chamber of the housing is divided in three parts, wherein the edge portion is projected from the housing, wherein the rotation plate is seated at the intermediate portion of the housing, wherein the rotation plate driving section is disposed at a center portion to drive the rotation plate, wherein air groove are formed at a boundary between the intermediate portion and the edge portion of the housing, wherein another air groove are formed at a boundary between the intermediate portion of the housing and the rotation plate driving section, wherein a discharging port is formed at two air groove to extend through the housing, wherein the second housing has a heating plate placed at a side thereof and which has holes formed at a side thereof, in which groove for insulating heat is formed to be correspondence to the heating plate.

9. A method for automatically disposing food wastes comprising the steps of:

(a) introducing food wastes into an apparatus for disposing the same, at which the food wastes are introduced into the injecting

section through an receiving opening communicated with a sewer pipe of a sink ball and then an intermediate receiving plate installed in the receiving opening rotates by means of a motor while the food wastes are moved to a grinder by means of through-holes respectively  
5 formed an upper receiving plate, the intermediate receiving plate and a lower receiving plate;

(b) crushing the food wastes which are moved to the grinder, at which a conveying screw connected to a reduction gear is operated by means of a driving motor to grind the food waste which in turn is  
10 directed by means of a through-hole to a crushing gear placed under the conveying screw to be finely ground at a size of 0.3 mm, and then the finely ground food wastes are conveyed to a drying section by means of a conveying nozzle;

(c) drying the food wastes which are ground by mean of the  
15 grinder, at a temperature of 150 Celsius Degree for 5 to 10 seconds , at which the conveying screw is driven by means of the driving motor at a step (a) while the driving gear connected to a shaft of the conveying screw is operated, at the same time three intermediate gears engaged with the driving gear to be operated, thereby driving  
20 a rack gear to rotate a rotation plate, while a heater disposed at an outside of the housing is operated to heat inside of the housing at a temperature of 150 Celsius Degree, in which the food wastes are introduced into a plurality of ground food waste receiving spaces while rotating in the housing to be dried at the temperature of 150  
25 Celsius Degree for 5 to 10 seconds, then, the food wasted being

collected in a vessel positioned under a dryer by means of pins for removing the food wastes dried in the dryer, while gas and vapor generated during the drying of the food wastes are discharged through the outlet ports formed at air groove;

5 (d) cooling a vortex pipe by means of a cooling fan in order to condensate a part of a vapor from the dryer while gas from vapor is transferred along with ozone from an ozone generator to a purifying device, at which the vapor from the dryer is transferred to a cooling section by means of a vapor absorbing fan before cooling; and

10 (e) purifying the vapor and the gas having bad smell at a first purifying tower of a purifying device filled with deodorant such as ozone, a light catalyst, activated carbon and zeolite and then discharging condensate through a discharging port installed at a bottom of the purifying device, while the gas having the bad smell  
15 is transferred to a second purifying tower to purify and condensate a part of the gas which in turn the condensate is discharged through the discharging port while the remaining gas is transferred to a third purifying tower, which in turn is guided by means of a guide plate coated with fine powder of  $TiO_2$  and then purified by means of  
20 an ultraviolet lamp, finally discharged through a gas discharging port.

10. A method for automatically disposing food wastes as claimed in claim 9, wherein at the step (a), when the food wastes are  
25 introduced into the injection section through the receiving opening

at an upper portion of the injection section connected to the sewer pipe of the sink ball, the motor is operated to rotate the intermediate receiving plate while the food wastes are moved to the grinder by means of through-holes of an upper receiving plate, the  
5 intermediate receiving plate and a lower receiving plate.

11. A method for automatically disposing food wastes as claimed in claim 9, wherein at the step (b), when the food wastes is arrived at the grinder, the driving motor operates while a reduction  
10 gear connected to the driving motor is operated along with a conveying screw connected to the reduction gear and a pair of crushing gear which in turn crushes the food wastes, which is firstly ground by the conveying screw, into particles of 0.3 mm, and then the ground food wastes are transferred through a conveying pipe to a  
15 dryer.

12. A method for automatically disposing food wastes as claimed in claim 9, wherein at the drying step (c), the conveying screw is operated by means of the driving motor while a driving gear  
20 having one end connected to the conveying screw operates along with the conveying screw, at the same time three intermediate gears engaged with the driving gear to be operated, thereby driving a rack gear to rotate a rotation plate, while a heater disposed at an outside of the housing is operated to heat inside of the housing at  
25 a temperature of 150 Celsius Degree, in which the food wastes are

introduced into a plurality of ground food waste receiving spaces while rotating in the housing to be dried at the temperature of 150 Celsius Degree for 5 to 10 seconds, then, the food wasted being collected in a vessel positioned under a dryer by means of pins for  
5 removing the food wastes dried in the dryer, while gas and vapor generated during the drying of the food wastes are discharged through the outlet ports formed at air groove.

13. A method for automatically disposing food wastes as  
10 claimed in claim 9, wherein at the step (d), a cooling device transfers the vapor discharged from the dryer by means of a vapor absorbing fan in a pipe which is connected to an upper portion of a hood formed at the outside of the dryer, which cools a vortex pipe by means of a cooling fan in order to condensate a part of a vapor  
15 from the dryer while gas from vapor is transferred along with ozone from an ozone generator to a purifying device.

14. A method for automatically disposing food wastes as  
20 claimed in claim 9, wherein at the step (e), the vapor and the gas having bad smell are purified at a first purifying tower of a purifying device filled with deodorant such as ozone, a light catalyst, activated carbon and zeolite and then discharging condensate through a discharging port installed at a bottom of the purifying device, while the gas having the bad smell is transferred  
25 to a second purifying tower to purify and condensate a part of the

gas which in turn the condensate is discharged through the discharging port while the remaining gas is transferred to a third purifying tower, which in turn is guided by means of a guide plate coated with fine powder of  $\text{TiO}_2$  and then purified by means of an  
5 ultraviolet lamp, finally discharged through a gas discharging port.

Fig. 1

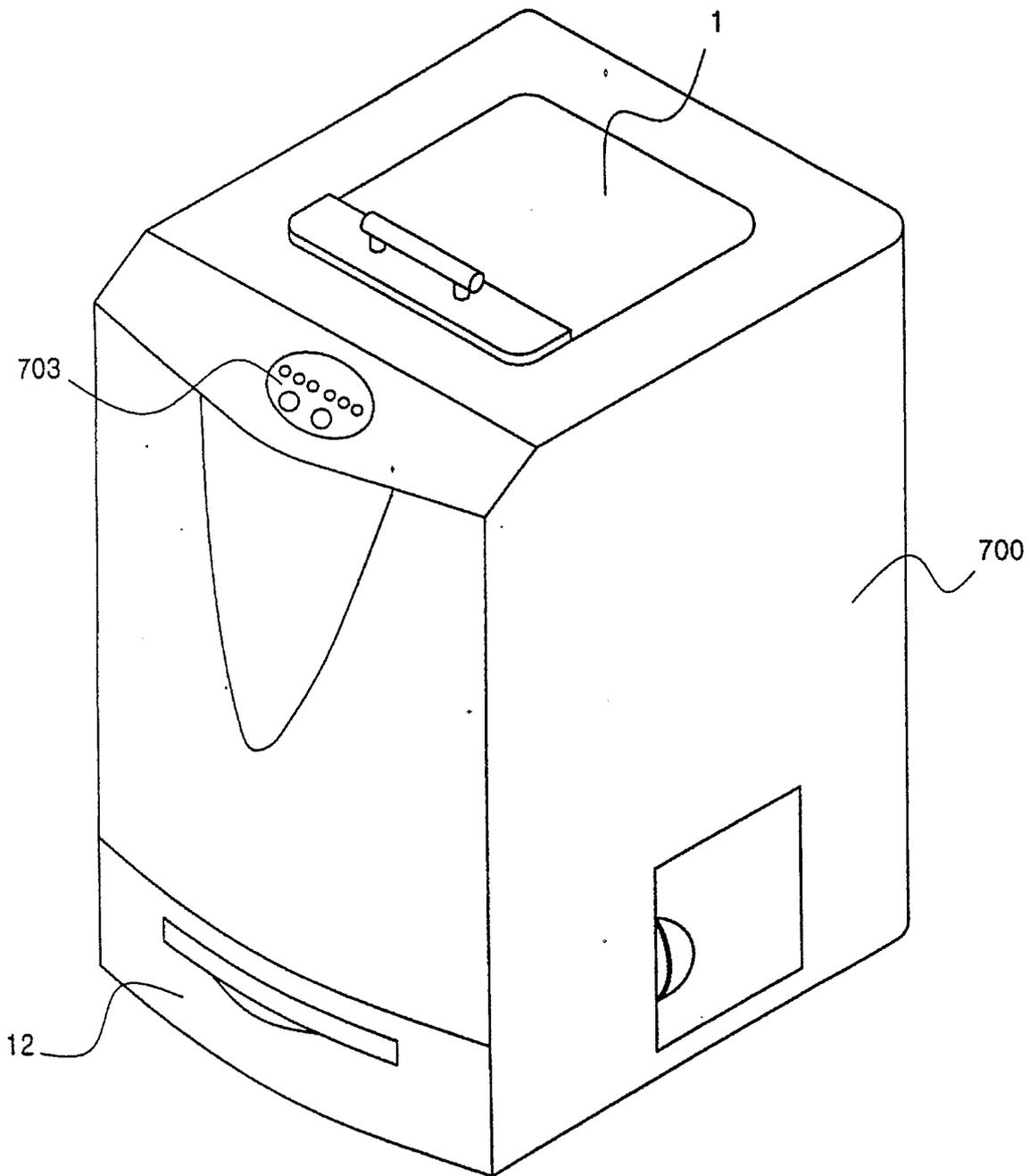
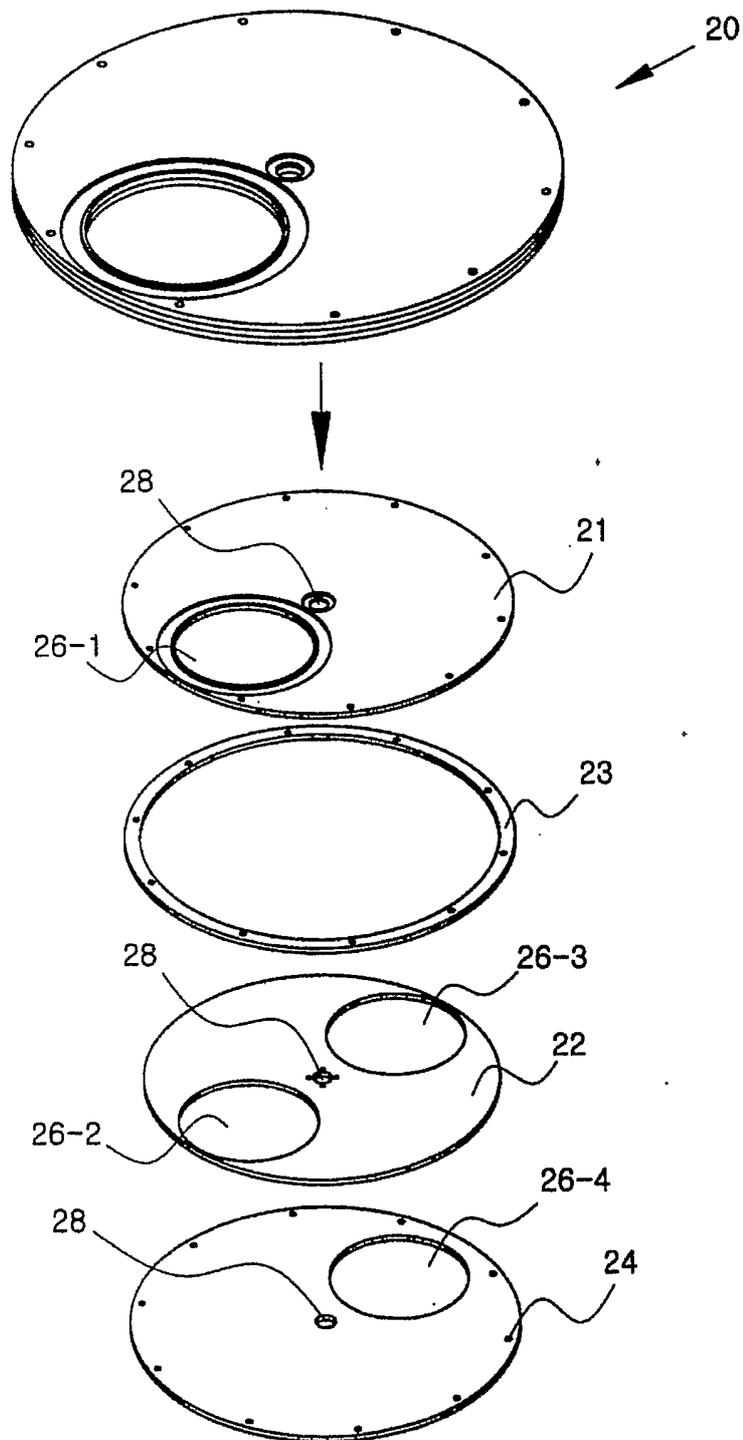




Fig. 3



4/10

Fig. 4

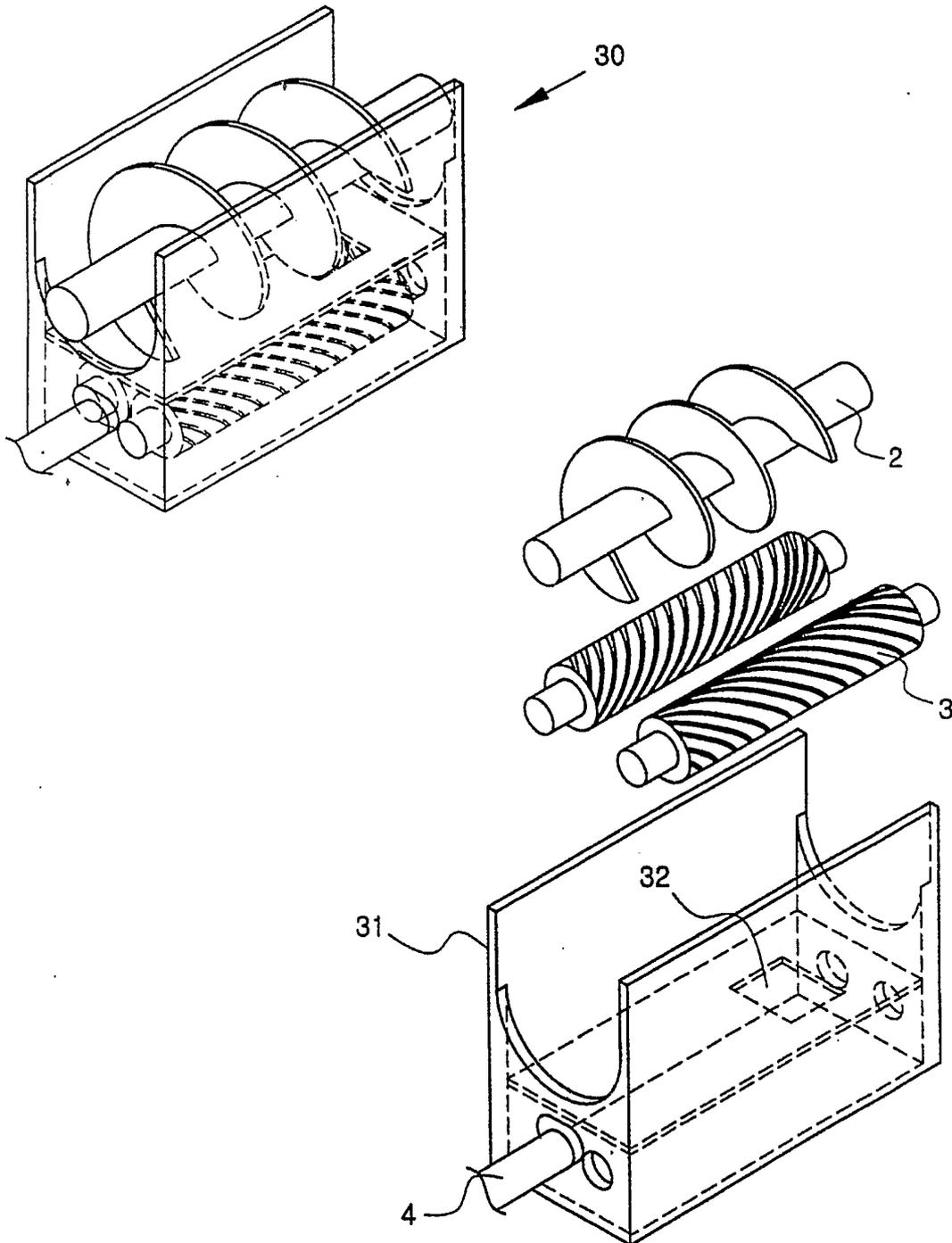


Fig. 5

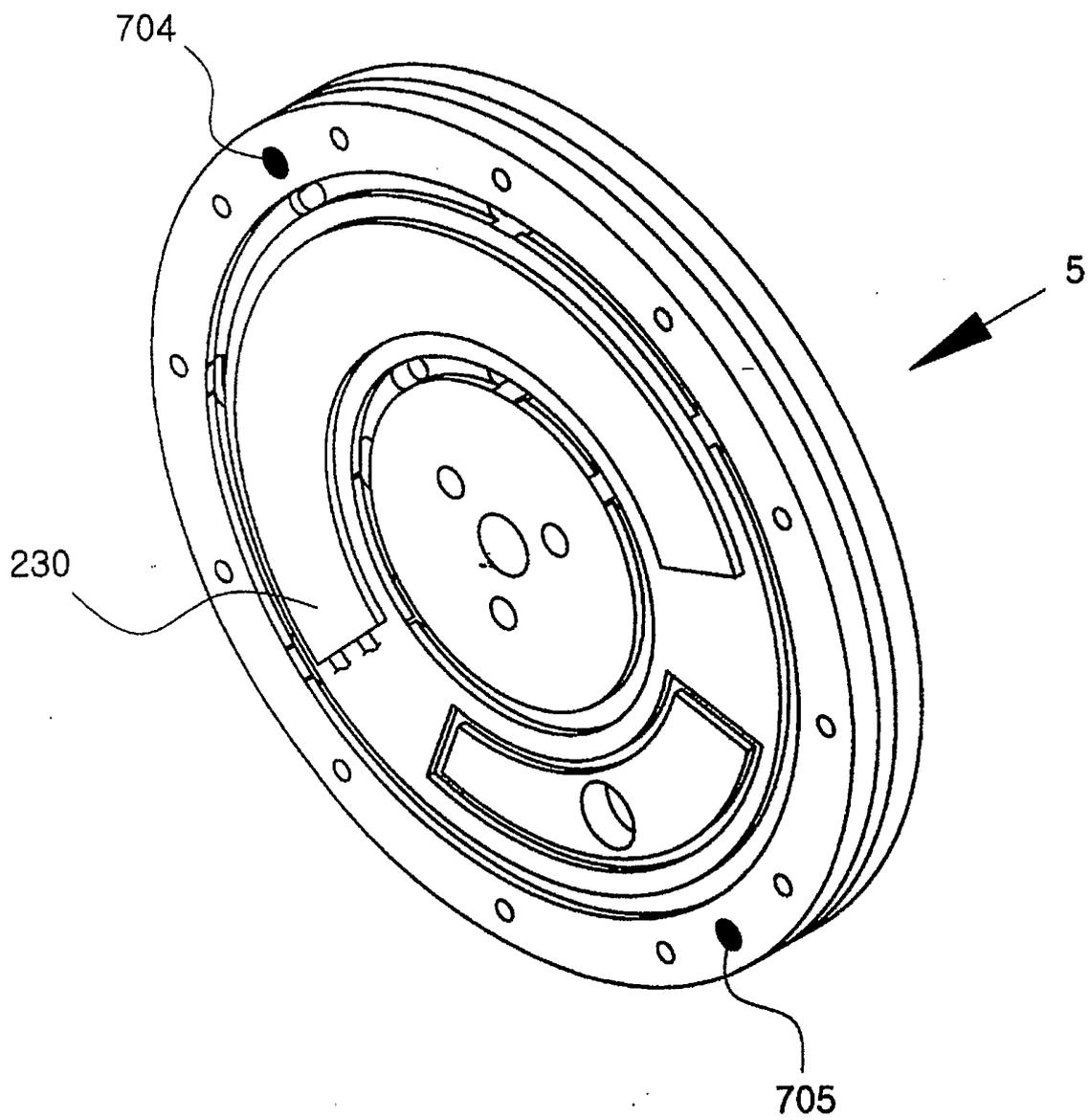


Fig. 6

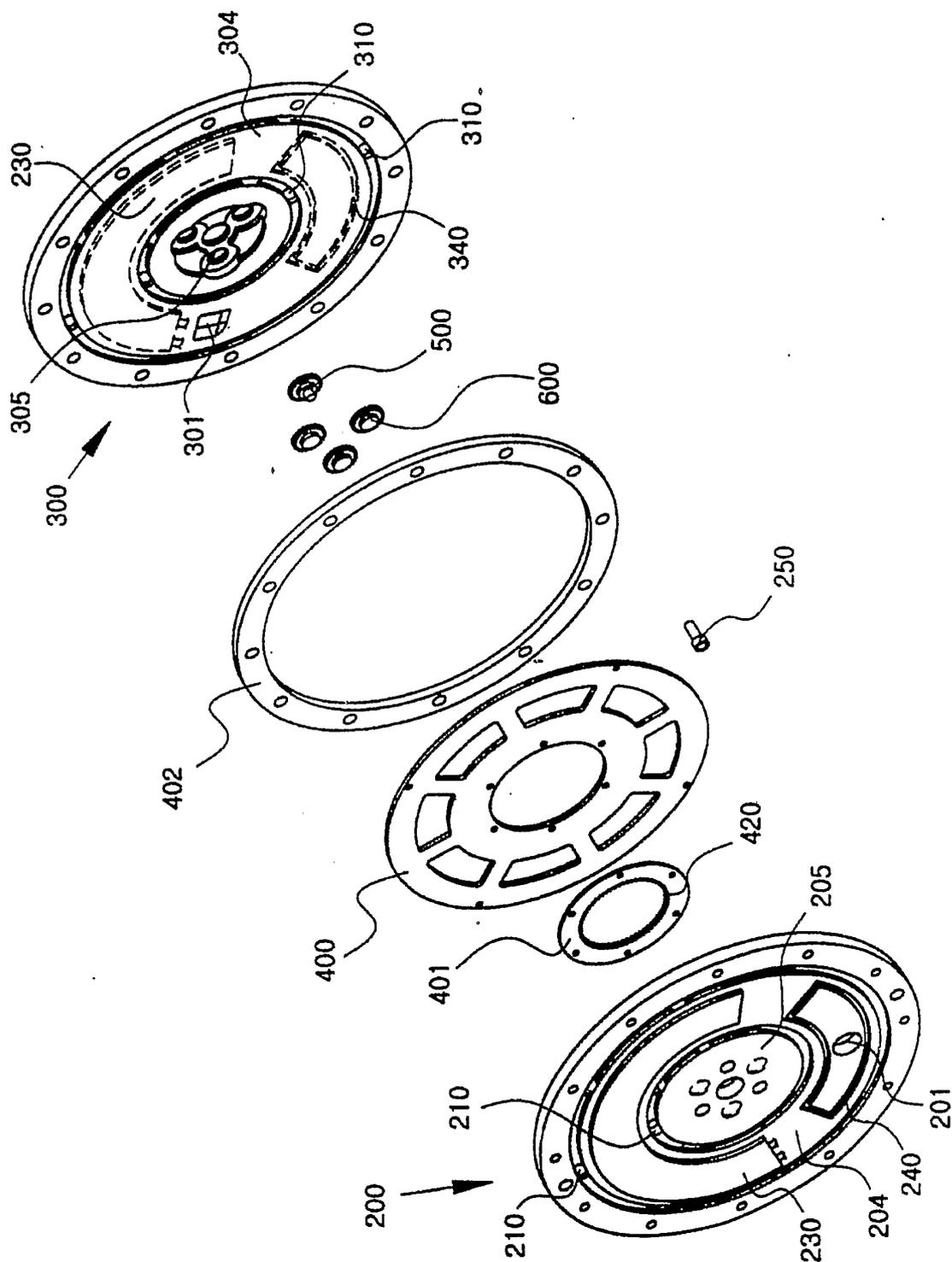


Fig. 7

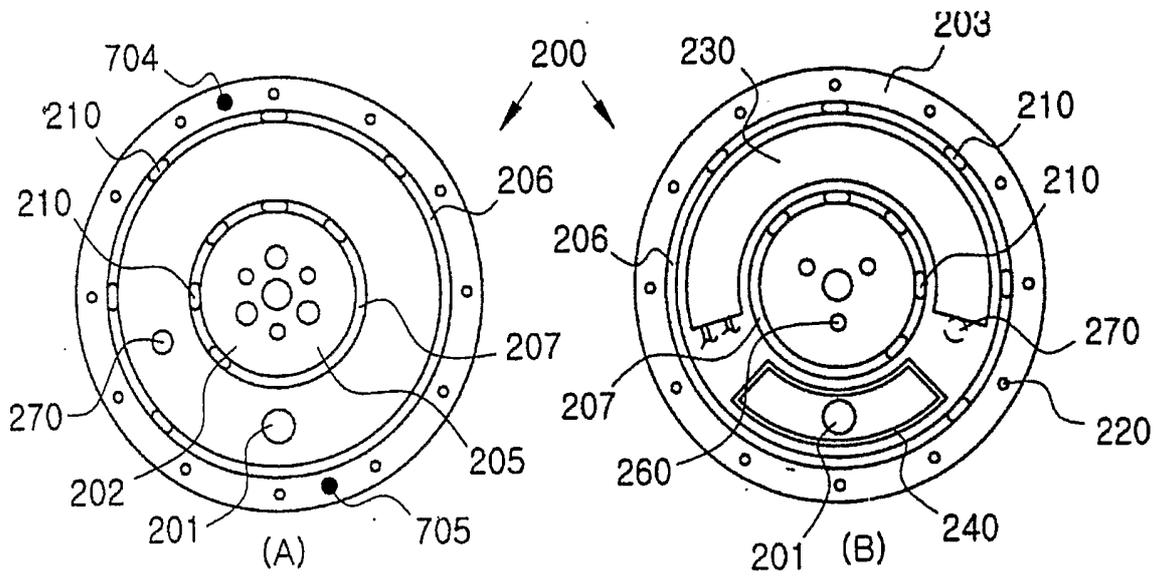


Fig. 8

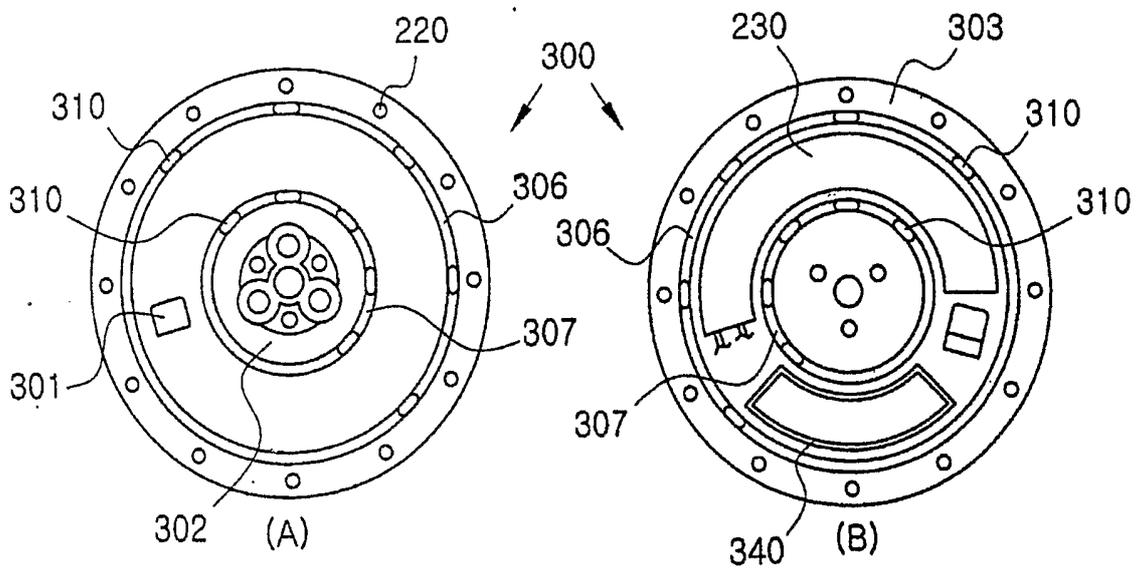


Fig. 9

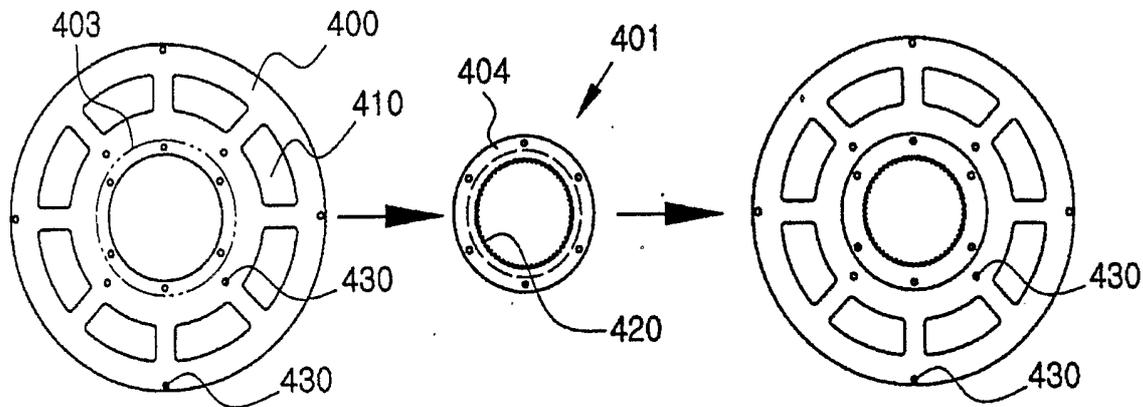


Fig. 10

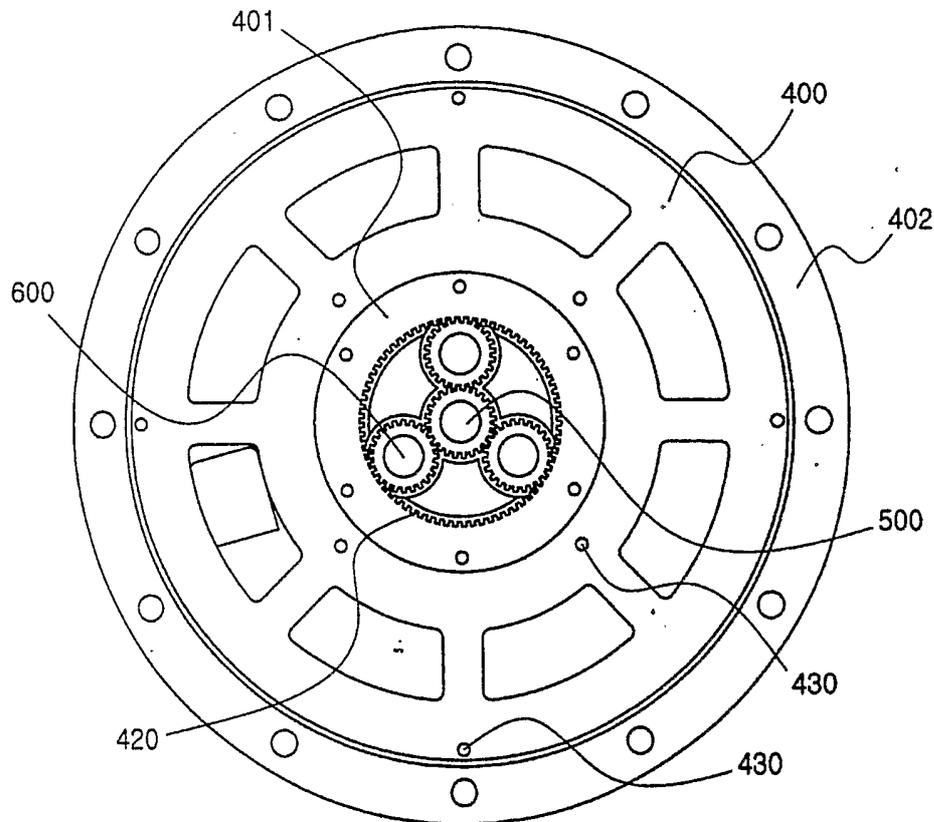


Fig. 11

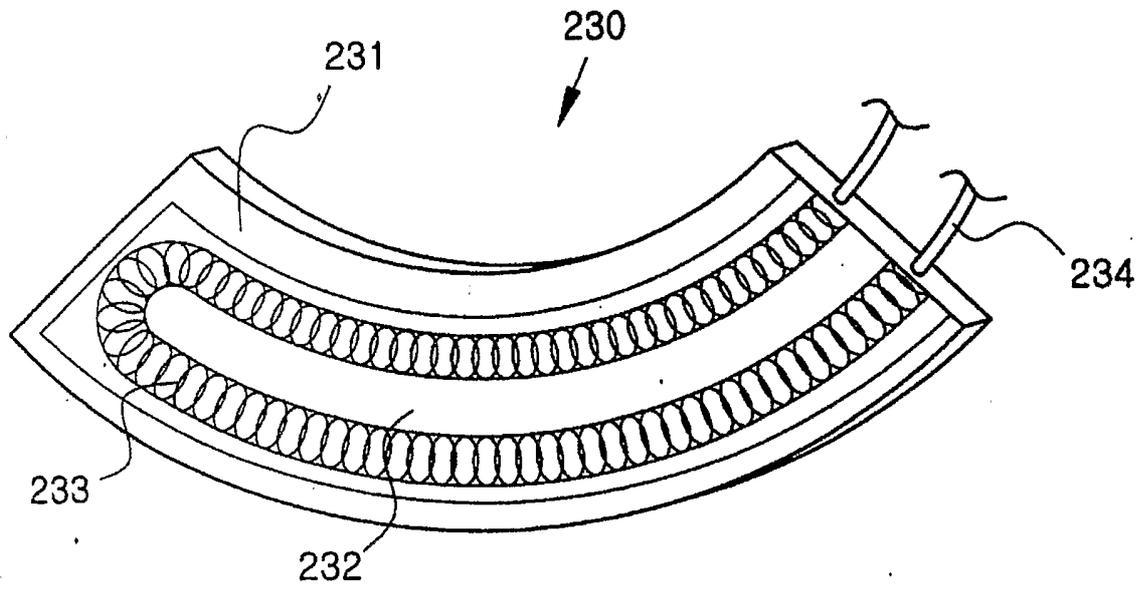
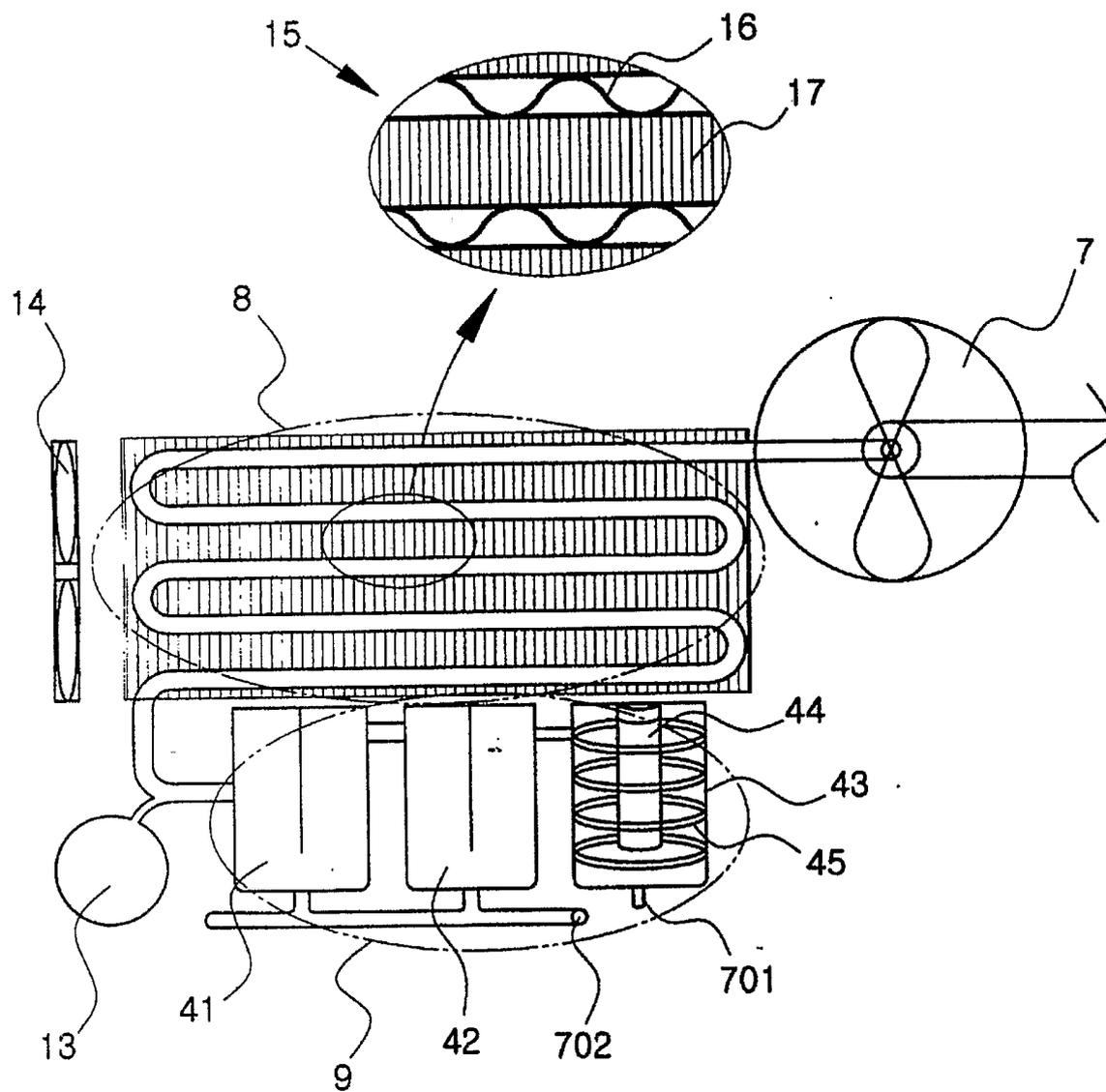


Fig. 12



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR03/00691**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 B09B 5/00, B02C 18/40, E03C 1/266**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B09B, C05F 9/02, B02C 18/40, E03C 1/266

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	KR 0311660 B1 (C&G Industry co.) 02 NOV 2001	1, 3 5-8
Y	KR 98-56659 U (SAMSUNG Elec.) 15 OCT 1998	5
Y	KR 0253243 Y1 (PARK et al.) 22 NOV 2001	6-8
A	JP 08-238470 A (KITAZAWA TERUKIYO) 17 SEP 1996	1-14
A	JP 08-052322 A (YAMATAKE HONEYWELL CO LTD) 27 FEB 1996	1, 5

 Further documents are listed in the continuation of Box C. See patent family annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

07 AUGUST 2003 (07.08.2003)

Date of mailing of the international search report

08 AUGUST 2003 (08.08.2003)

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