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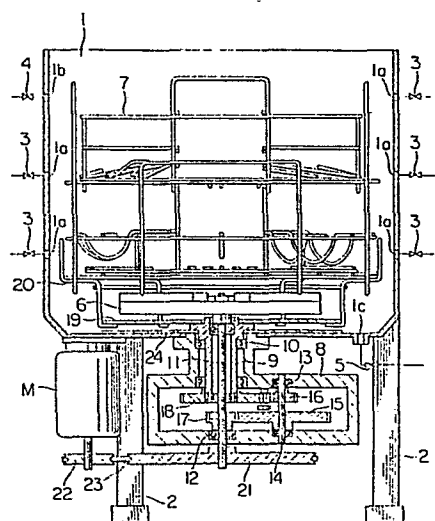
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(54) A washing device.

(57) A washing device is disclosed. The washing device comprises: a washing tank (1) provided with a means (1a, 1b) for introducing water into the washing tank; and, in the washing tank, a rack (7) for receiving and holding one or more articles to be washed;

characterised in that a water-agitating means (6) is rotatably mounted in the washing tank, in that the rack is rotatably mounted in the washing tank and in that there is provided a drive means for simultaneously rotating the agitating means and the rack in mutually opposed directions.

A method of washing one or more article using the washing device is also disclosed.



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A WASHING DEVICE

The present invention relates to a washing apparatus and the method thereof for the tableware including forks, knives, spoons, etc. as well as dishes, cups and glasses.

The washing apparatus for tableware heretofore in use has a box type frame body on which a door is swayingly mounted on the front end opening, and within the frame body is provided a rack for permitting the tableware to stand up, and by a shower means provided on the inner wall of the frame body and a shower pipe rotatably mounted below the rack, the tableware is washed in a shower discharging over the rack.

However, the washing water from the shower is hard to spurt forth all over the tableware completely, and in a country where the tableware with a deep bottom such as a glass, etc. and the tableware formed in various shapes like the Japanese tableware are mostly used, the said washing apparatus has less washing effect, and this gives rise to the fact that the said washing apparatus has scarcely been pervasive.

In addition, some washers wash the tableware by striking a great amount of high pressure jet water against the tableware, but the jet water often tends to damage the tableware. And, even if they are used on the plastic tableware or the like, they are not suited for the washing of the high class tableware which is usually used at a hotel and restaurant.

The present invention provides a washing apparatus for tableware which is capable of removing any filth on the tableware reliably and quickly.

The present invention additionally provides
5 a washing apparatus for tableware such that the tableware can be deprived of filth in a shorter time by a whirlpool flow generated alternately in reciprocating motion in the washing water immersing the tableware, and that energy saving
10 is also effective.

According to a first aspect of the present invention there is provided a washing device which comprises: a washing tank provided with a means for introducing water into the washing
15 tank; and, in the washing tank, a rack for receiving and holding one or more article to be washed;

characterised in that a water-agitating means is rotatably mounted in the washing tank, in that the rack is rotatably mounted in the
20 washing tank and in that there is provided a drive means for simultaneously rotating the agitating means and the rack in mutually opposed directions.

The means for introducing water into the washing tank may comprise a shower or jetting
25 means. Alternatively, or in addition, the introducing means may comprise a water-pouring means.

Conveniently the rack is mounted above the water-agitating means, which is preferably
30 in the form of a plate, and in preferred embodiments the rack is removably mounted in the washing tank. Preferably, the water-agitating means is mounted in the bottom of the washing tank.

According to a second aspect of the present invention
35 there is provided a method of washing one or more article using a washing device according to the first aspect of the present invention, which method comprises:

placing the one or more article in the rack;
spraying hot water, via the means for
introducing water, at the one or more article;

introducing water, via the means for introducing
5 water, into the washing tank, in order to immerse
the rack together with the one or more article;
and

actuating the drive means simultaneously
to rotate the agitating means and the rack in
10 mutually opposed directions and, by the rotation
of the agitating means, to generate a whirlpool
flow in the water present in the tank.

Preferably, detergent is introduced into
the washing tank before the drive means is actuated.
15 As a later step, the one or more article may
be rinsed with hot water introduced via the
means for introducing water. The temperature
of the hot water is preferably in the range of
from 40° to 60°C.

20 For a better understanding of the present
invention, and to show how the same may be put
into effect, reference will now be made, by way
of example, to the accompanying drawings in which:-

Figure 1 shows a vertical section through
25 an embodiment of the washing device according
to the present invention.

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As illustrated in the drawing, the washing tank 1 is supported by legs 2 --. The washing tank 1 has an opening at its upper end, on the inner wall of which are provided a plural number of shower jet outlets 1a, 1a,--, and water supply hole 1b. The piping connected to the shower jet outlet and the water supply hole is provided with valves 3, 4. At the bottom corner of washing tank 1 is provided a drain port 1c. The drain pipe is also equipped with a valve 5.

In the washing tank 1 are provided an agitating plate 6 for causing the water poured into the tank to be given a whirlpool flow and a tableware rack 7 for receiving and holding the tableware, and these are rotated each other in opposed directions by the drive mechanism which will be described hereunder. Namely, a cylindrical shaft 9 for driving the tableware 7 is axially supported pivotally through bearings in the bearing case 8 mounted under the washing tank 1. The upper end of this cylindrical shaft extends outwardly in the washing tank 1. Within and coaxial to the cylindrical shaft 9, a drive shaft 11 for agitating plate 6 is pivotally supported through bearings 12, 12, the upper end of which is made to extend outwardly in the washing tank 1. On the other hand, the rotary shaft 14 axially supported on the bearing case 8 pivotally through bearing 13 is provided with gears 15 and 16 axially attached thereto; one gear 15 is in meshing

relation with the gear 17 connected to the shaft 12 and another gear 16 is in meshing relation with the gear 18 connected to the cylindrical shaft through an intermediate gear (shown by dotted line). The shaft 11 and the cylindrical shaft 9, therefore, rotate mutually in opposed directions. On the upper end of cylindrical shaft 9 located at the inner bottom of washing tank 1 is firmly fixed the center portion of a rotary plate 19, and the rotary plate is provided with a lock frame 20 on its peripheral part. While supported by this frame 20, the tableware rack 7 is rotated together with the lock frame when taken hold of with a hook pin provided upwardly on part of the said frame 20. The upper end of the shaft 11 passing through the rotary plate 19 is coupled to the agitating plate 6. On the contrary, the lower end of shaft 11 is provided with a pulley 21. And, the belt 23 is placed between this pulley and another pulley 22 fitted on the rotary shaft of a motor M installed at the lower portion of working tank 1, thereby imparting the rotary force of the said motor to the shaft 11 and cylindrical shaft 9. On the inner bottom of washing tank is provided a heater 24.

Although, in the embodiment as described above, agitating plate 6 and rotary plate 19 are to be rotated by a single motor M, they may be rotated respectively by separate motors. In this case, the gears 15, 17 are not required, and the motor for driving the tableware rack 7 for rotation will be connected to the rotary shaft 14.

Next, an explanation is made regarding the washing method for tableware in accordance with the present invention.

First, take out the tableware rack 7 from the washing tank 1, then receive and hold the tableware in the rack, for example, keeping dishes, soup dishes, etc. stood up with their surfaces facing outwardly as practicable as possible and allowing glasses, cups, etc. to turn their openings outwardly. Of course the rack 7 should be so designed as to provide appropriately partitioned chambers that can afford to pile up the tableware in two layers, depending upon the shape and size of the tableware.

And then, set the rack 7 with the tableware received and held thereon while being locked by the lock frame 20 provided on the rotary plate 19 in the washing tank 1.

Now, opening valve 3, let water (or hot water) spurt forth from the shower jet outlet 3 toward the tableware rack. This is the preliminary washing for the tableware by which remnants of food stuck to the surfaces of the tableware can roughly be removed. The valve 5 is then kept open in advance for drainage. The shower jetting time may be approximately for 1 - 2 minutes. Turning the tableware rack at this time of preliminary washing enhances the washing efficiency for main washing which will be described later. The shower washing using hot water at this stage is very effective for removal of oil and fat, protein, starch and the like that have adhered to the tableware.

The temperature of this hot water should preferably be within the range of 40 - 60°C for the most efficient removal of those substances, because the beef fat is liquidized at nearly 50°C but hard to be liquidized at a temperature

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below 40°C, and, at a temperature higher than 60°C, the protein tends to be coagulated.

After closing of valves 3, --- and valve 5, the method proceeds to the immersing process by which to cause the tableware to be immersed thoroughly in the washing tank 1.

Put water or hot water into the tank through water supply hole 1b by opening valve 4, add detergent, and keep the tableware submerged completely in the water for a given time dependent upon the degree of filth. At this time, protein is decomposed into an amino acid state, and oil and fat are also decomposed. It is specially valid for paste forming when starch is stiffened. Accordingly, the immersing time varies contingent upon the stiffened condition of starch stuck to the tableware. And it will be more valid for removal of the decomposed substance from the surfaces of the tableware and for increased effects of detergent upon the adhered substance if the tableware rack is then made to turn in intermittent movements normally and reversely in every 2 - 15 seconds.

Afterwards, the main washing or whirlpool flow washing is performed.

If motor M is started, agitating plate 6 and tableware rack are then rotated mutually in opposed directions by the drive means consisting of the said motor, shaft 9 and rotary circular plate 19. The whirlpool flow to be generated among the washing liquid in washing tank 1 by the agitating plate is restrained by rotation of the tableware rack 7, thereby causing water to undergo a disturbed, complicate flow

motion. As a result, water is then forced uniformly to strike filth on the surfaces of the tableware received and held in the tableware rack 7, thus filth is removed. At this time, the number of revolutions of the agitation plate 6 is approximately 500 r.p.m and the same of the tableware rack is approx. 40 r.p.m.

In this process of operation, physical washing is performed by generating a whirlpool flow in the washing water in the washing tank 1 thereby producing impact effects on all the surfaces of the tableware. Rotating the tableware rack in a direction contrary to the whirlpool flow during the whirlpool flow operation allows very effective washing. As for rotation of the tableware rack, it may be rotated normally and reversely in every 2 - 15 seconds corresponding with an inversion of the whirlpool flow.

After completion of main washing valve 5 is opened to drain off the washing water. And, by opening valve 3, let water jet over the tableware to remove detergent and adhered substance from the tableware. In this case, it is also better to turn the tableware rack. Lastly, wash by hot water shower and make dry. The heater 24 may be energized for drying and sterilization as well.

Subsequently, take out the tableware rack 7 or the tableware only from the washing tank 1.

CLAIMS:

1. A washing device which comprises:
a washing tank provided with a means for
introducing water into the washing tank; and,
5 in the washing tank, a rack for receiving and
holding one or more article to be washed;
characterised in that a water-agitating
means is rotatably mounted in the washing tank,
in that the rack is rotatably mounted in the
10 washing tank and in that there is provided a
drive means for simultaneously rotating the agitating
means and the rack in mutually opposed directions.
2. A washing device according to Claim
1, wherein the means for introducing water into
15 the washing tank comprises a shower or jetting
means.
3. A washing device according to Claim
1 or 2, wherein the means for introducing water
into the washing tank comprises, or further
20 comprises, a water-pouring means.
4. A washing device according to any preceding
claim, wherein the rack is mounted above the
water-agitating means which is preferably in
the form of a plate.
- 25 5. A washing device according to any preceding
claim, wherein the rack is removably mounted
in the washing tank.
6. A washing device according to any preceding
claim, wherein the water-agitating means is mounted
30 in the bottom of the washing tank.
7. A method of washing one or more article
using a washing device as claimed in any preceding
claim, which method comprises:
placing the one or more article in the rack;
35 spraying hot water, via the means for
introducing water, at the one or more article;
introducing water, via the means for introducing

water, into the washing tank, in order to immerse the rack together with the one or more article; and

5 actuating the drive means simultaneously to rotate the agitating means and the rack in mutually opposed directions and, by the rotation of the agitating means, to generate a whirlpool flow in the water present in the tank.

10 8. A method according to Claim 7, wherein detergent is introduced into the washing tank before the drive means is actuated.

15 9. A method according to Claim 7 or 8, wherein, as a later step, the one or more article is rinsed with hot water introduced via the means for introducing water.

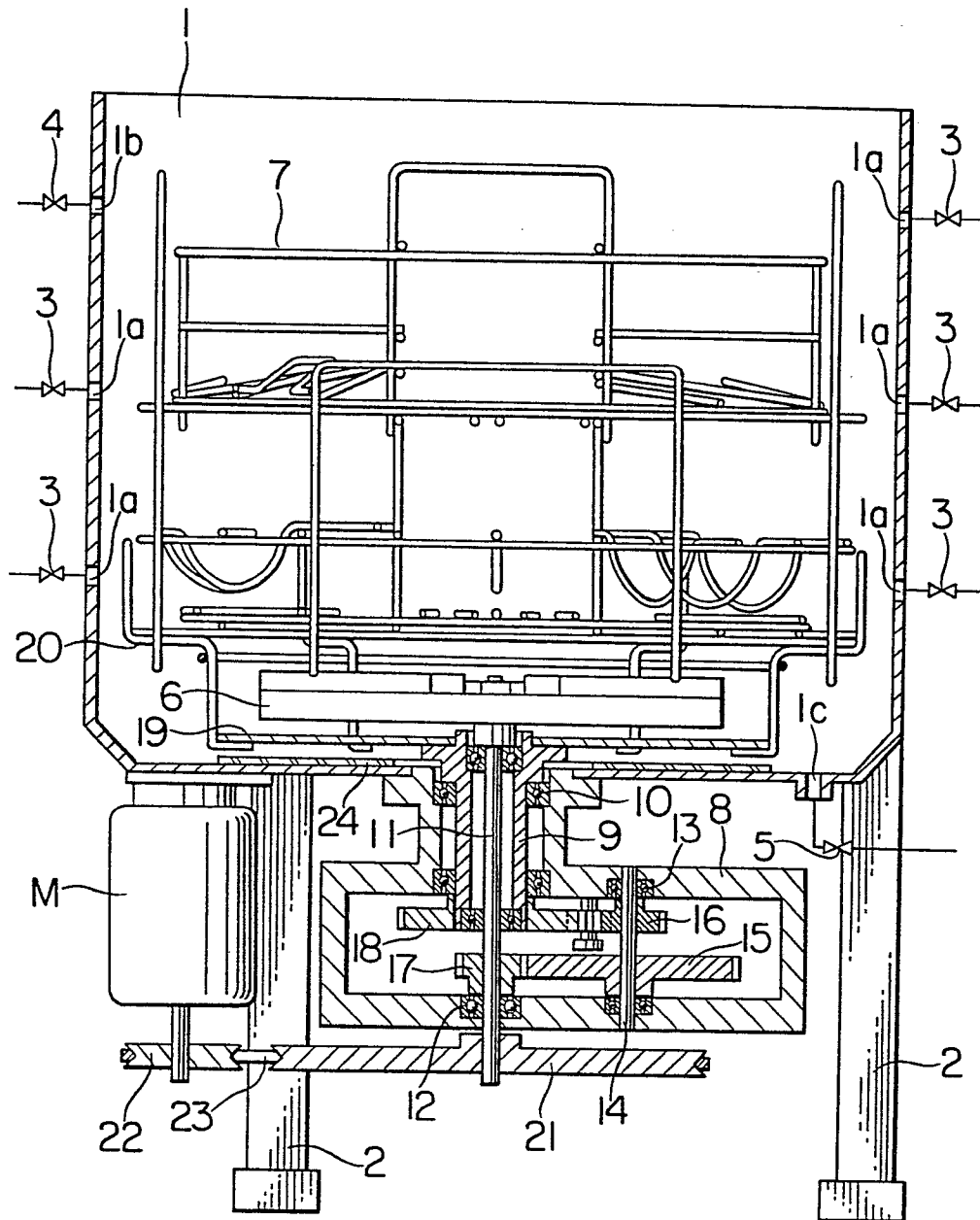
20 10. A method according to Claim 7, 8 or 9, wherein the hot water has a temperature in the range from 40 to 60°C.

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EUROPEAN SEARCH REPORT

0147018
Application number

EP 84 30 6933

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	US-A-3 103 940 (CANE) * whole document *	1,4-6	A 47 L 15/30
A		7	
A	--- US-A-2 642 369 (HUNTER) * column 11, lines 2-74 * -----	2,7-10	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			A 47 L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-01-1985	Examiner SCHARTZ J.
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	