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# (54) Machine for washing objects

(57) Machine (10) for washing objects (12) comprising at least a washing chamber (16) in which the objects (12) to be washed are able to be disposed, pumping members (18) able to make a washing substance (20) circulate, consisting at least of a liquid (22) and of granular elements (24), and delivery members (26) connected to the pumping members (18) and able to deliver the washing substance (20) to the objects (12). The washing chamber (16) comprises a first compartment (30) able to contain the liquid (22), and a second compartment (32) able to contain the granular elements (24) together with the liquid (22). The pumping members comprise a pump (18) able to selectively and/or simultaneously pick up both the liquid (22) and also the granular elements (24), in order to put them into circulation towards the delivery members (26).

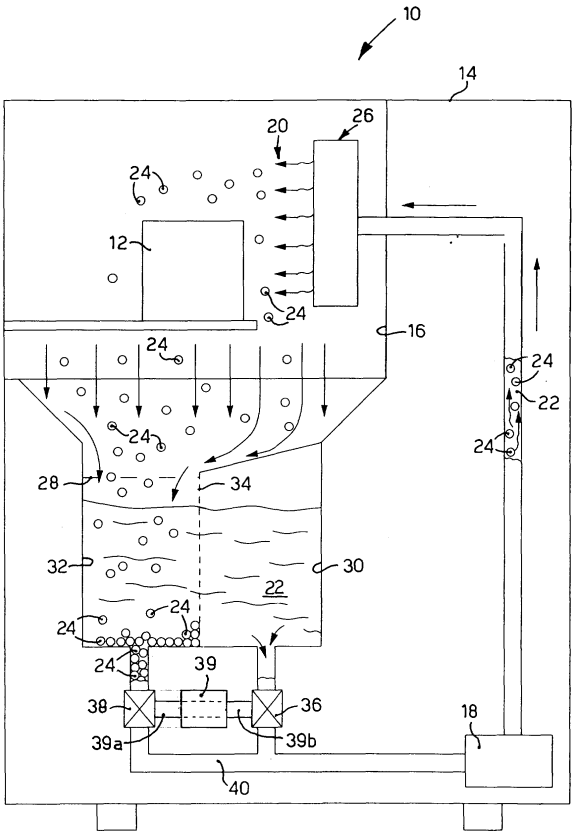


fig.1

EP 1 832 218 A1

## Description

FIELD OF THE INVENTION

**[0001]** The present invention concerns a machine for washing objects by means of a washing substance preferably consisting of water with added detergent material and granular elements, for example grains of plastic material. In particular, after delivery onto the objects to be washed, the machine according to the present invention is suitable to put the washing substance into circulation, separating the liquid from the granular elements.

BACKGROUND OF THE INVENTION

**[0002]** A machine is known for washing objects by means of a washing substance consisting of a liquid and of granular elements.

**[0003]** The known machine is provided with a washing chamber in which the objects to be washed are disposed, with pumps suitable to make the washing substance circulate, and with a plurality of nozzles connected to the outlet pipes of the pump.

**[0004]** The washing chamber comprises a lower container, in which the washing substance is collected after it has been delivered onto the objects to be washed.

**[0005]** The lower container is provided with a first compartment able to contain only the liquid, and with a second container able to contain the granular elements and the liquid.

**[0006]** The known machine has the disadvantage that it requires at least two pumps: a first pump connected to the first compartment to pick up the liquid only, and a second pump connected to the second compartment to pick up the granular elements mixed with the liquid.

**[0007]** One purpose of the present invention is to achieve a machine for washing objects that has a reduced number of components and little complexity.

**[0008]** Another purpose of the present invention is to achieve a machine that is very reliable and that requires little or substantially no maintenance, with a consequent saving in the running costs of the machine.

**[0009]** The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

**[0010]** The present invention is set forth and characterized in the main claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

**[0011]** In accordance with the above purposes, a machine according to the present invention is able to be used for washing objects.

**[0012]** The machine according to the present invention comprises at least:

- a washing chamber in which the objects to be washed are disposed;
- pumping means able to make a washing substance circulate, consisting of at least a liquid and of granular elements, for example made of plastic material; and
- delivery means connected to the pumping means and able to deliver the washing substance towards the objects.

**[0013]** According to a characteristic of the present invention, the washing chamber comprises a first compartment able to contain the liquid, and a second compartment able to contain at least the granular elements and the liquid. The pumping means comprises a pump able to selectively pick up both the liquid contained in the first compartment, and also the granular elements and the liquid contained in the second compartment, in order to put them into circulation towards the delivery means.

**[0014]** The machine according to the present invention allows to selectively pick up the liquid and/or the granular elements with a single pump, and therefore has a reduced number of components and little complexity, advantageously using components normally available on the market, easily accessible and simple to repair.

**[0015]** Advantageously, the machine according to the present invention comprises valve means associated both with the first and also with the second compartment which, in cooperation with the pump, is able to be driven to determine the pick-up from each compartment, and the quantity of liquid and granular elements to be picked up.

**[0016]** According to one form of embodiment of the invention, the pump outlet is connected to the delivery means, while the pump intake is connected to both the first and also to the second compartment.

**[0017]** The valve means advantageously comprises two valves commanded by a single command member. Advantageously, when one of the valves is open, the other is closed, and vice versa.

**[0018]** According to a variant of the invention, the pump intake is connected to the first compartment only, and the machine according to the invention also comprises at least a connection element, connected to the second compartment and disposed between the pump and the delivery means.

**[0019]** The connection element defines, in cooperation with the liquid taken in by the pump, a depression able to pick up the granular elements and the liquid contained in the second compartment, according to the so-called Venturi effect.

**[0020]** This variant allows to transport a volume of liquid with a greater concentration of granular elements compared to known machines, given that the granular elements do not pass through the pump.

**[0021]** According to one embodiment of the invention, the two compartments are separated from each other by separation means, for example comprising a holed metal sheet, which is able to prevent the granular elements

from passing from the second compartment to the first compartment, while still allowing the liquid to pass between the two compartments.

**[0022]** Thanks to the separation means, the two compartments allow to separate the granular elements simply, economically and without requiring any type of maintenance, and substantially without using any part that is movable or to be moved.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0023]** These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic view of a machine according to the present invention for washing objects;
- fig. 2 is a lateral view, partly sectioned, of a machine according to the present invention;
- fig. 3 is a front view, partly sectioned, of the machine in fig. 2;
- fig. 4 is a plane view, partly sectioned, of the machine in fig. 2;
- fig. 5 is a schematic view of a first variant of the machine in fig. 1;
- fig. 6 is a lateral view, partly sectioned, of a machine according to the variant in fig. 5;
- fig. 7 is a front view, partly sectioned, of the machine in fig. 6;
- fig. 8 is a plane view, partly sectioned, of the machine in fig. 6;
- fig. 9 is a lateral view, partly sectioned, of a second variant of the machine in fig. 1;
- fig. 10 is a front view, partly sectioned, of the machine in fig. 9;
- fig. 11 is a plane view, partly sectioned, of the machine in fig. 9;
- fig. 12 is a lateral view, partly sectioned, of a third variant of the machine in fig. 1;
- fig. 13 is a front view, partly sectioned, of the machine in fig. 12;
- fig. 14 is a plane view, partly sectioned, of the machine in fig. 12.

## DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

**[0024]** With reference to fig. 1, a machine 10 according to the present invention can be used to wash objects 12, for example dishes, saucepans, pots and not only.

**[0025]** The machine 10 (figs. 1 to 4) comprises at least a containing structure 14, inside which a washing chamber 16 is made, in which the objects 12 to be washed are disposed. For example, the sizes of the washing chamber 16 are such as to contain a basket 17, of standard sizes, to contain the objects 12.

**[0026]** The machine 10 also comprises a pump 18, for example of the centrifugal type, able to make a washing substance 20 circulate, consisting of at least a liquid 22 and of granular elements 24, preferably but not necessarily having a greater specific weight than that of the liquid 22.

**[0027]** The liquid 22 for example comprises water with a detergent material added, specific for the use of the machine 10, and the granular elements 24 comprise grains of plastic material, of a known type.

**[0028]** The machine 10 also comprises a plurality of delivery nozzles 26, connected to the pump 18 and able to deliver the washing substance 20 to the objects 12.

**[0029]** The delivery nozzles 26 are shaped advantageously so that they are not obstructed by the washing substance 20.

**[0030]** The washing chamber 16 comprises a first compartment 30 able to contain the liquid 22, and a second compartment 32 able to contain the granular elements 24 and the liquid 22.

**[0031]** The first compartment 30 is separated from the second compartment 32 by means of a holed wall 34, for example made of sheet metal, and advantageously kept in a fixed position.

**[0032]** The holed wall 34 is provided with transverse holes, not shown in the drawings, having a size such as to prevent the granular elements 24 from passing from the second compartment 32 to the first compartment 30, but such as to allow the passage of the liquid 22 between the two compartment 30 and 32.

**[0033]** Each compartment 30, 32 is provided with a lower aperture connected by means of a sleeve to a corresponding valve 36, 38.

**[0034]** The two valves 36 and 38 are advantageously connected to two outputs 39a, respectively 39b, of a single command member 39, of a known type and commanded electrically. For example, the two outputs 39a and 39b belong to the same central shaft of the command member 39, able to rotate around its own axis, so as to open and close the valves 38, 39. Advantageously, the two valves 36 and 38 are connected to the outputs 39a and 39b so as to be angularly offset with respect to each other by 90°, so that when one is open the other is closed, and vice versa.

**[0035]** Each valve 36, 38 is connected to a common collector 40 which is in turn connected to the intake of the pump 18.

**[0036]** When the pump 18 is activated, it selectively picks up the liquid 22 from the first compartment 30 and the granular elements 24 and the liquid 22 from the second compartment 32, by means of the collector 40, in order to put them into circulation to the delivery nozzles 26.

**[0037]** If the first valve 36 is open and the second valve 38 is closed, the pump 18 only picks up liquid 22 from the first compartment 30.

**[0038]** On the contrary, when the second valve 38 is open and the first valve 36 is closed, the pump 18 picks

up both the liquid 22 and also the granular elements 24. The quantity of the granular elements 24 is proportional to the aperture of said second valve 38.

**[0039]** The washing substance 20, obtained from the mixture of a determinate quantity of liquid 22 and a determinate quantity of granular elements 24, is thrown under pressure by the delivery nozzles 26 against the objects 12 to be washed, thus generating a mechanical action combined with the detergent action of the liquid 22.

**[0040]** The washing substance 20 then falls back into the second compartment 32, where the granular elements 24 are stopped by the holed wall 34, whereas the liquid 22 continues towards the first compartment 30.

**[0041]** At the top of the second compartment 32 a filter 28 is advantageously disposed, of the removable type, able to block the entry of extraneous objects into the second compartment 32 of a size greater than that of the granular elements 24.

**[0042]** According to a first variant shown in figs. 5 to 8, in a machine 110 according to the present invention, the second compartment 32 is defined by a hopper 134, consisting of a holed lateral wall 135 and a bottom wall 136. According to said first variant, the machine 110 also comprises a connection element, for example an ejector 42, connected to the lower aperture of the second compartment 32. In this configuration, the lower aperture of the first compartment 30 is connected to the intake of the pump 18.

**[0043]** The ejector 42 is connected to the outlet of the pump 18 and defines, due to the Venturi effect, a depression able to pick up the granular elements 24 mixed with the liquid 22, and contained in the second compartment 32, in cooperation with the liquid 22 taken in by the pump 18 from the first compartment 30.

**[0044]** The machine 110 also comprises an interceptor valve 44 disposed between the lower aperture of the second compartment 32 and the ejector 42 and able to be activated to determine the picking up of the granular elements 24 and the liquid 22 from the second compartment 32 and to regulate the quantity of granular elements 24 picked up from the second compartment 32 with respect to the overall quantity of washing substance 20 picked up.

**[0045]** According to a second variant, shown in figs. 9 to 11, a machine 210 according to the present invention comprises a washing chamber 216 having sizes such as to obtain a capacity substantially double that of the washing chamber 16 in fig. 2 or fig. 6, so that two baskets 17, of standard sizes, can be inserted into the washing chamber 216 adjacent to each other.

**[0046]** According to this second variant, the machine 210 comprises two independent pumps 18, each connected to a series of delivery nozzles 26, disposed inside the washing chamber 216, associated with the opposite vertical walls. The two pumps 18 are both connected to the collector 40, common with the two valves 36 and 38, which are connected, as in the solution shown in fig. 1, one to the first compartment 30 and the other to the second compartment 32, and are commanded by the same command member 39.

**[0047]** According to a third variant, shown in figs. 12 to 14, a machine 310 according to the present invention comprises a washing chamber 316 identical to that in the washing chamber 216.

**[0048]** In this third variant, however, apart from comprising two independent pumps 18 as in the second variant described above, the machine 310 also comprises two groups of valves 36 and 38 (fig. 14), each commanded by a command member 39. Moreover, each group of valves 36 and 38 is connected to the corresponding pump 18 by a specific collector 40a, respectively 40b, instead of by a single common collector.

**[0049]** Moreover, in this third variant, a single compartment 32 is provided, disposed centrally, to contain the granular elements 24, which functions as a "second compartment" and which is connected to the two valves 38. At the two opposite sides of the central compartment 32 and separated therefrom by holed walls, two compartments 30 are disposed for the liquid 22, each of which functions as a "first compartment". Each of the two first compartments 30 is connected to one of the two valves 36. In this way we achieve two independent circuits, one for the series of delivery nozzles 26 on the right and the other for those on the left of the washing chamber 316.

**[0050]** It is clear that modifications and/or additions of parts may be made to the machines for washing objects as described heretofore, without departing from the scope of the present invention.

**[0051]** It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of machines for washing objects, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

## Claims

1. Machine for washing objects (12) comprising at least a washing chamber (16, 216, 316) in which said objects (12) to be washed are able to be disposed, pumping means (18) able to make a washing substance (20) circulate, consisting at least of a liquid (22) and of granular elements (24), and delivery means (26) connected to said pumping means (18) and able to deliver said washing substance (20) to said objects (12), wherein said washing chamber (16, 216, 316) comprises a first compartment (30) able to contain said liquid (22), and a second compartment (32) able to contain said granular elements (24) together with said liquid (22), **characterized in that** said pumping means comprises a pump (18) able to selectively and/or simultaneously pick up both said liquid (22) and also said granular elements (24), in order to put them into circulation towards said

delivery means (26), and **in that** valve means (36, 38, 44) are connected to at least one of said first and second compartment (30, 32) and are able to be selectively activated in order to determine the picking up of said granular elements (24) and of said liquid (22).

**2.** Machine as in claim 1, **characterized in that** said valve means comprise two valves (36, 38) connected to a single command member (39).

**3.** Machine as in claim 2, **characterized in that** said command member (39) comprises a central shaft connected on opposite sides (39a, 39b) with said two valves (36, 38), so that when one of said two valves (36, 38) is open, the other is closed, and vice versa.

**4.** Machine as in claim 1, **characterized in that** the intake of said pump (18) is connected to said first compartment (30) and the outlet of said pump (18) is connected to said delivery means (26), and **in that** it also comprises at least a connection element (42) disposed on the outlet of said pump (18) and able to hydraulically connect to each other said second compartment (32) and said outlet.

**5.** Machine as in claim 4, **characterized in that** said connection element (42) defines, in cooperation with the liquid (22) taken in by said pump (18), a depression able to pick up, due to the Venturi effect, the granular elements (24) and the liquid (22) contained in said second compartment (32).

**6.** Machine as in claim 4, **characterized in that** said valve means (44) is disposed between said second compartment (32) and said connection element (42).

**7.** Machine as in any claim hereinbefore, **characterized in that** it also comprises separation means (34, 134) able to separate from each other said first compartment (30) and said second compartment (32), and able to prevent said granular elements (24) from passing from said second compartment (32) to said first compartment, while allowing said liquid (22) to pass freely between said two compartments (30, 32).

**8.** Machine as in claim 7, **characterized in that** said separation means comprises a holed wall (34, 134) disposed in a fixed position.

**9.** Machine as in claim 1, wherein said washing chamber (216, 316) has sizes such as to be able to contain two baskets (17) of standard size, one adjacent to the other, and wherein said delivery nozzles (26) are divided into at least two series, **characterized in that** said pumping means comprises two pumps (18), each connected in output to one of said series of delivery nozzles (26), and in intake to said first and second compartment (30, 32) by means of said valve means (36, 38).

**10.** Machine as in claim 9, **characterized in that** it comprises two of said first compartments (30), disposed on opposite sides with respect to said second compartment (32), **in that** said valve means comprise two groups of valves each comprising two valves (36, 38) connected to a single command member (39), and **in that** each group of valves (36, 38) is connected, on one side, to said second compartment (32) and one of said first compartments (30), and on the other side, to one of said two pumps (18), by means of a corresponding collector (40a, 40b).

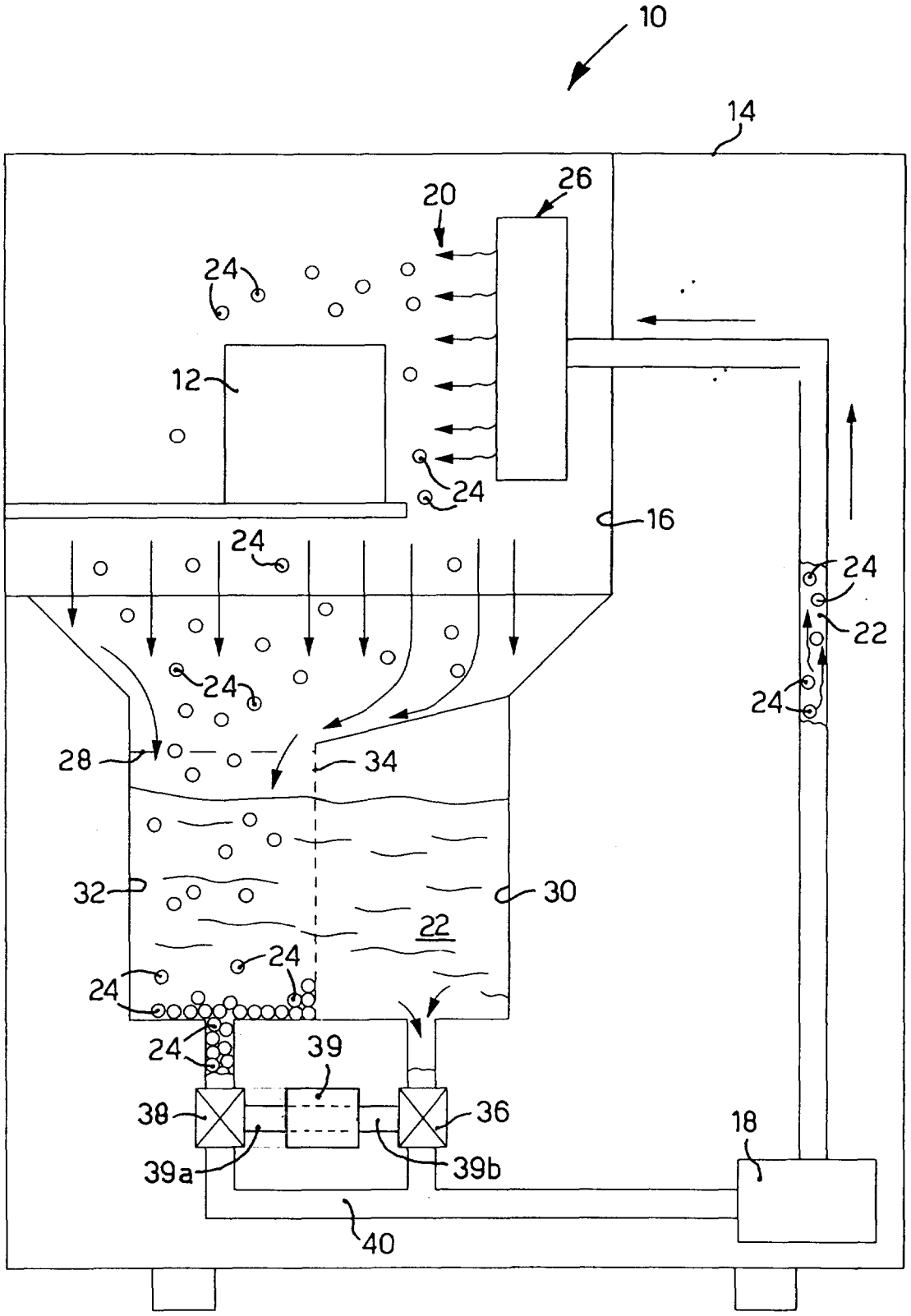
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fig.1

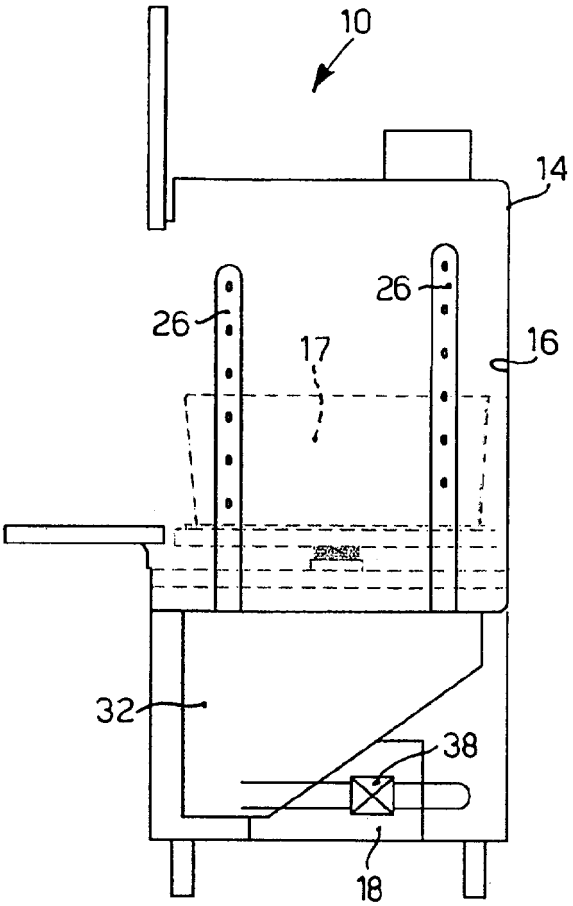


fig. 2

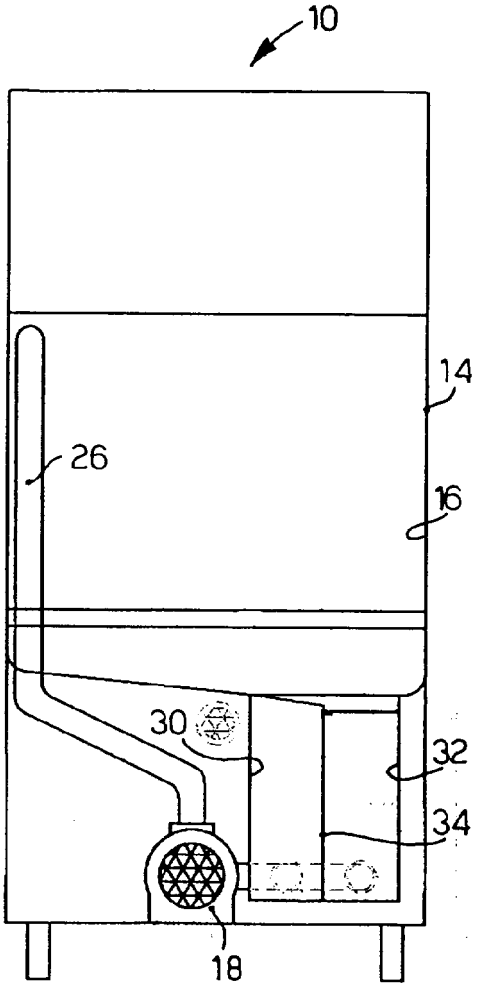


fig. 3

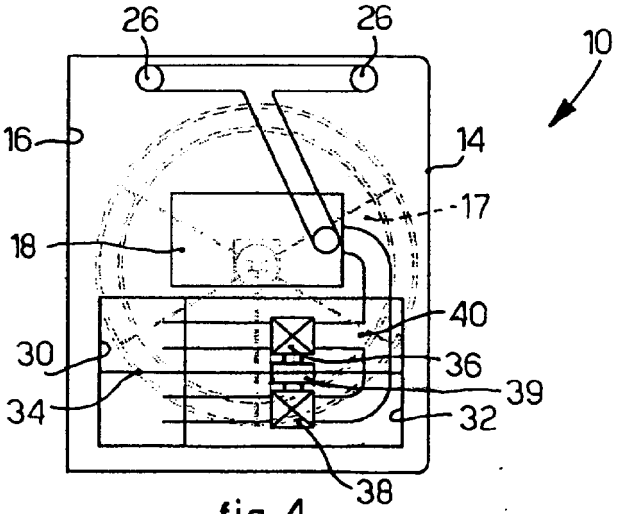


fig. 4

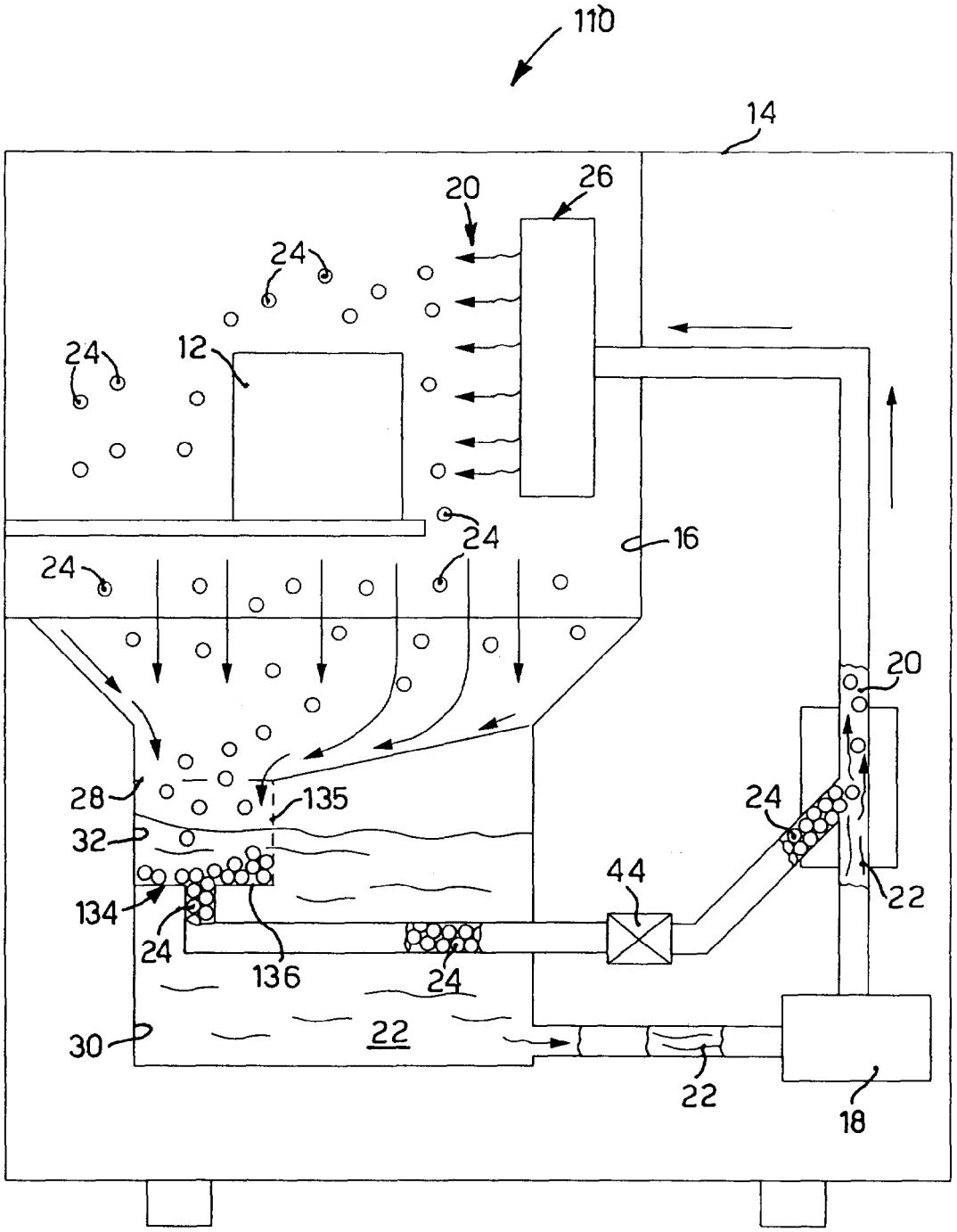
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fig.5

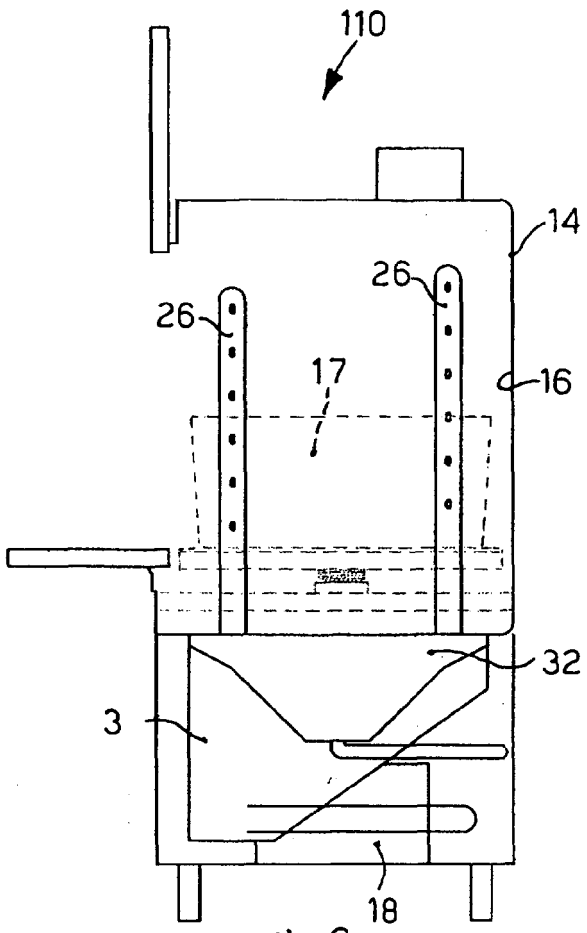


fig.6

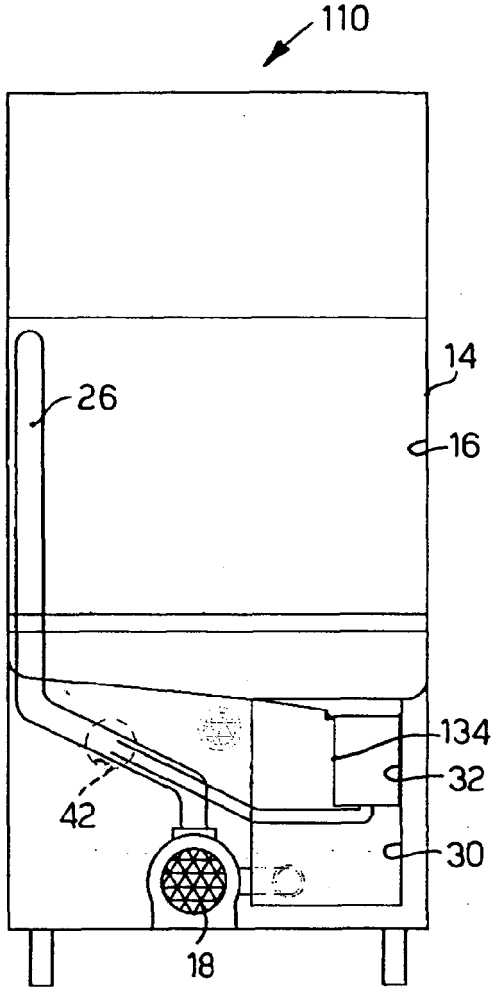


fig.7

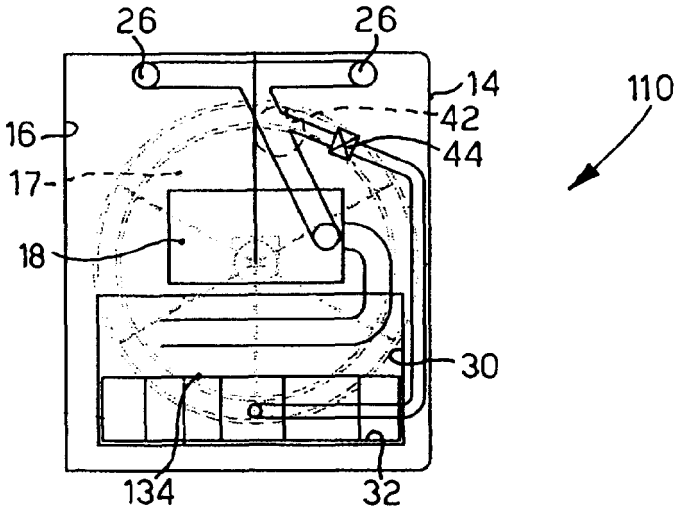


fig. 8

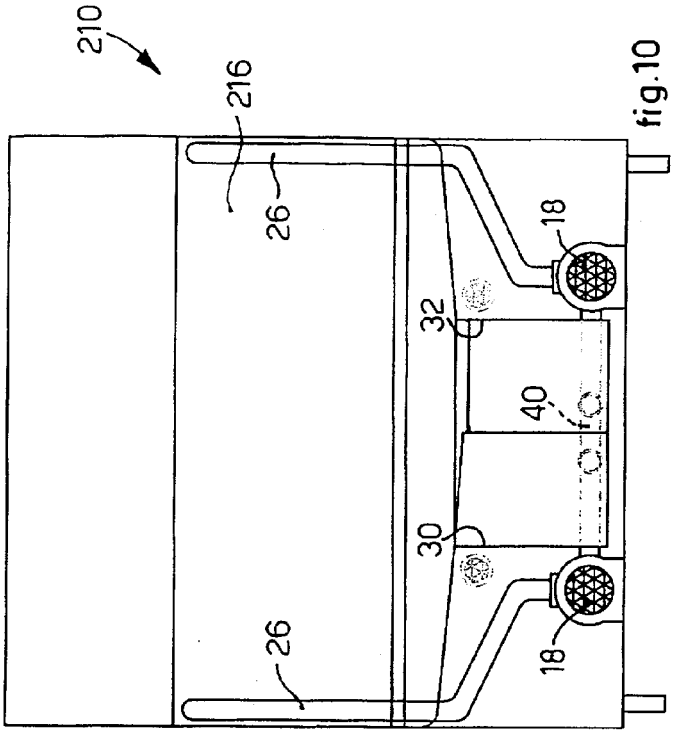


fig.10

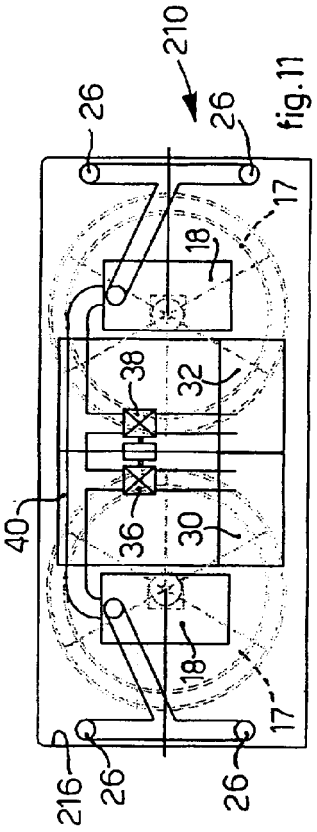


fig.11

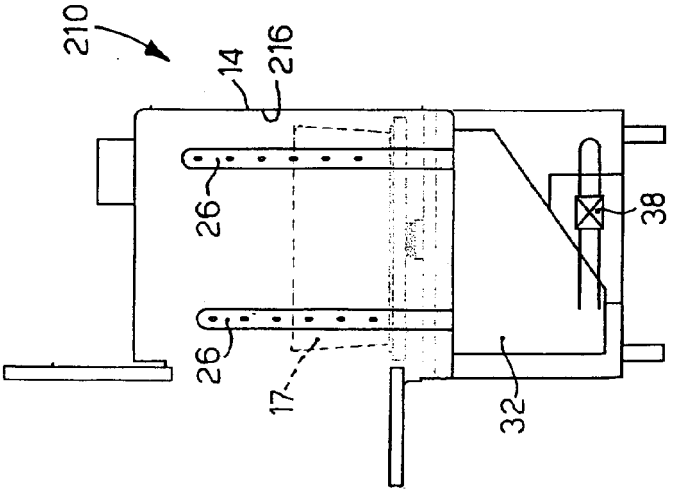


fig.9

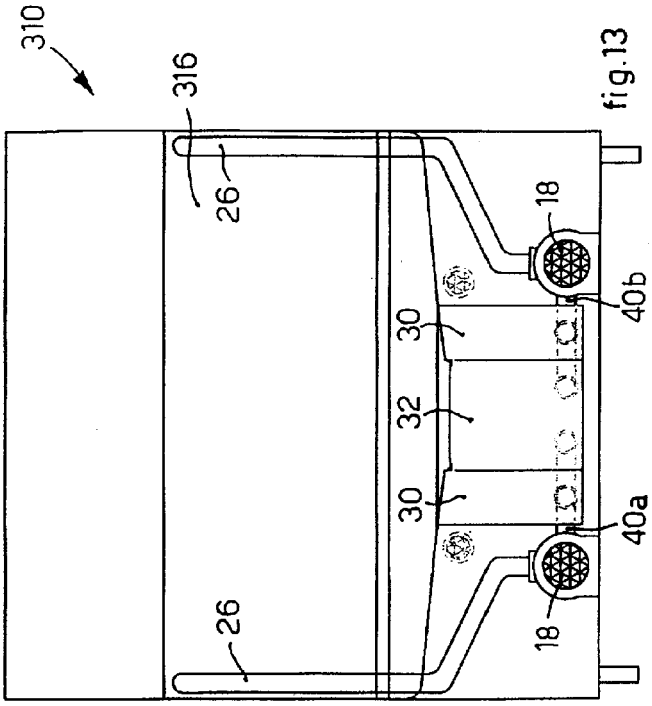


fig.13

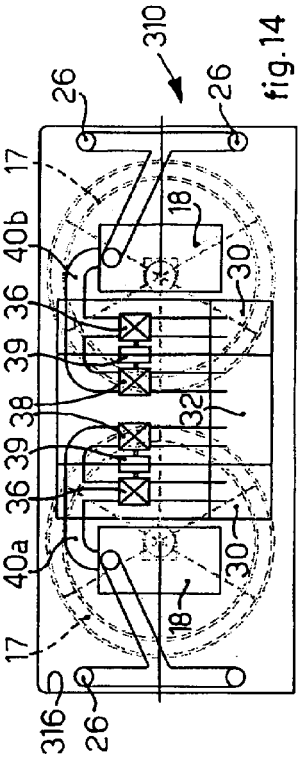


fig.14

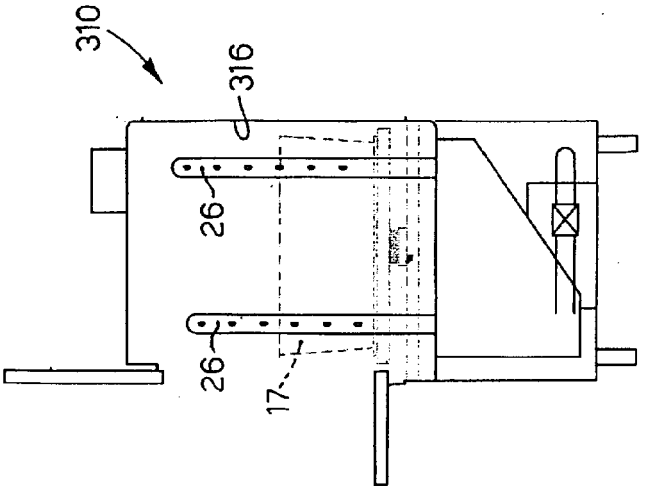


fig.12

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 07 10 3652

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TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 10 July 2007 | Ureta, Rolando |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 3652

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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