Dec. 12, 1961 O. MORI 3,012,262

WASHING MACHINE FOR DISHES

Filed April 14, 1959

Fig.1

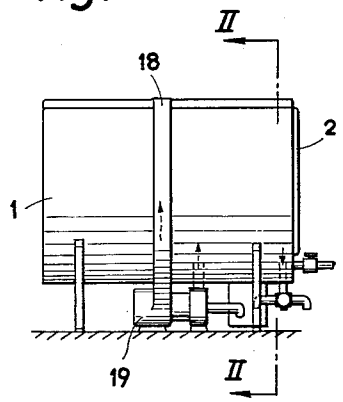


Fig.2

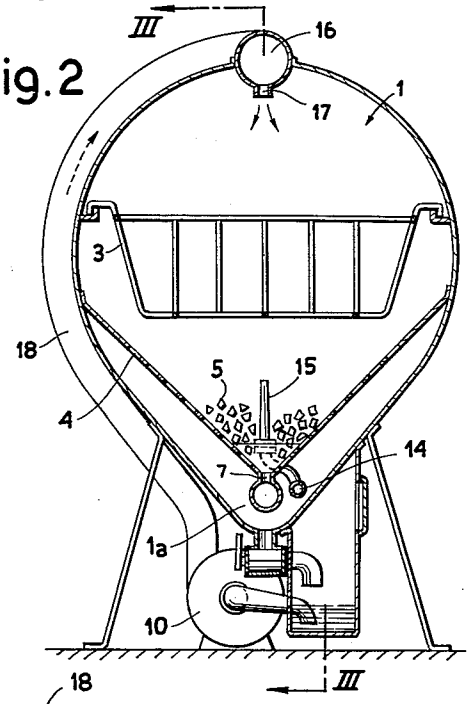


Fig.3

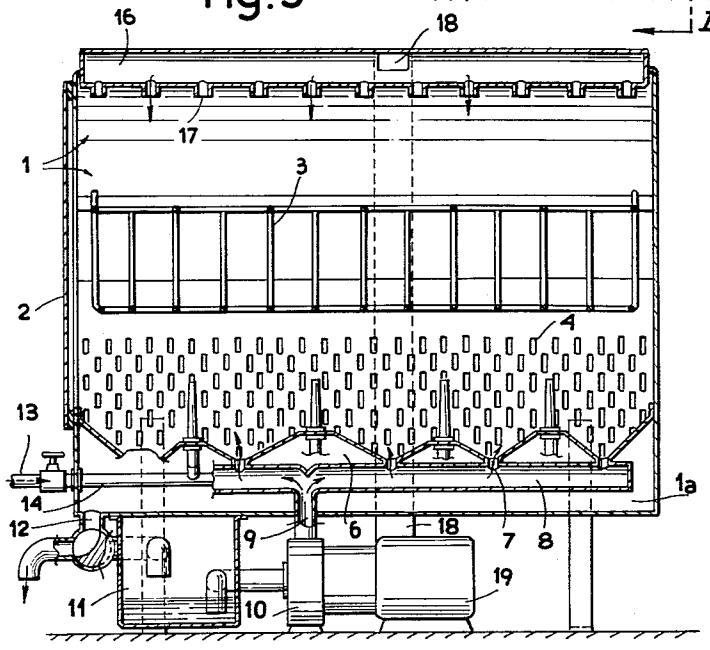
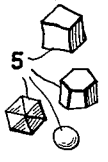


Fig.4



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WASHING MACHINE FOR DISHES

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The invention relates to a process and to a machine to effect the cleaning of dishes and the like for home uses, for shops and the like.

The present invention uses abrasive bodies exerting a mechanical action for dirt removal. The solid bodies are projected by jets of liquid detergents against all exposed sides of the dishes and then fall back to return into the washing cycle.

The machine for washing dishes according to the invention includes a washing chamber wherein the dishes are arranged to be washed with the aid of solid bodies or granules capable of having a mechanical action of removal on the surfaces to be cleaned. The bottom of the washing chamber includes downwardly inclined perforated walls or grids converging toward nozzle orifices, from which liquid detergent jets are projected against the dishes to be washed. The perforated walls retain the abrasive solid bodies which roll on the walls to the nozzle orifices where they are impinged upon by the jets and projected against the dishes to mechanically act thereon. The abrasive bodies then fall down along the inclined walls, while the liquid is collected under the walls.

In addition, suitable means are provided in the chamber capable of performing a final washing with only a rinsing liquid. Means are also provided to dry the dishes by circulation or jets of heated air.

The solid bodies may be metallic or rigid synthetic materials, or elastic materials, such as rubber incorporating abrasive materials like steel wool. The shape of the granules is such that they are capable of rolling.

A nozzle orifice for the liquid jet, capable of impinging and projecting the solid bodies, is located at the bottom of the converging perforated walls in the washing chamber.

When the machine includes nozzles capable of forming liquid jets which impinge on the dishes for rinsing, they may be directed from the bottom towards the top of the chamber. The rinsing nozzles may be raised with respect to the grid bottom of the washing chamber in such a way that the liquid jets for the rinsing do not impinge on the solid bodies, which are collected on the bottom of the washing chamber.

The accompanying drawing diagrammatically illustrates an embodiment of the invention.

FIG. 1 illustrates an outer lateral view;

FIG. 2 illustrates a local section taken along the line II—II of FIG. 1 in an enlarged view;

FIG. 3 illustrates a longitudinal section taken along the line III—III of FIG. 2; and

FIG. 4 illustrates some examples of granules.

According to the accompanying drawing, **1** indicates a generally cylindrical washing chamber which may be axially horizontal or vertical with an access door **2**. This door in the embodiment shown is in the front but it could be otherwise positioned. The access opening should be such as to allow the easy introduction, in the interior of the washing chamber **1**, of a grid framework **3** designed to contain the dishes to be washed with suitable supports in order to locate the dishes in the best positions to receive the upwardly directed washing means. Grid **3** may be introduced, for example, by sliding along slides in the walls of the chamber **1**.

The bottom of the chamber **1** is defined by two downwardly and centrally convergent perforated walls **4**. The walls **4** are provided with passages which are smaller than the dimension of the bodies of a mass of granules or equivalent solid particles having any suitable shape, for example as pellets or one of those indicated in FIG. 4 or any other capable of easily rolling. These bodies may also have irregular contours, but should avoid passing through the openings in walls **4**. The bodies **5** as indicated in FIG. 2 lie on the bottom of the chamber **1** on walls **4**.

At the central lower portion of the chamber **1** between the two portions of walls **4** there are provided other walls **6**, having transversal edges, which form downwardly directed conical cavities from the chamber **1**. Nozzles **7** open at the bottom of walls **6**. These nozzles are in the form of holes which open into a single manifold **8**. The manifold is fed by a delivery conduit **9** of a liquid pump **10**. The liquid pump **10** intakes the liquid from the collecting receptacle **1***a* underlying the walls **4** or from a tank **11** where the liquid, draining under the walls **4** and through a discharge pipe **12**, is collected.

In operation of the apparatus, the dishes are introduced with support **3** into the chamber. The chamber is then closed. A certain amount of washing solution is placed in the tank **11**. A violent projection of the liquid is produced by the pump **10** through the nozzles **7**, directed from the bottom to the top of the chamber, whereby the granules or bodies **5** retained in the bottom of chamber **1**, over the walls **4** are projected by the liquid into the jets so as to move according to free trajectories towards and against the dishes on support **3**. The washing solution and the granules **5** lap all exposed surfaces of the dishes. The washing solution produces a chemical washing action and the abrasive bodies **5** produce a mechanical action of dirt removal. The bodies **5** then fall downwards. The liquid passes down through the openings in walls **4**. It collects at the bottom **1***a* and flows into the tank **11**. The solid particles **5** are retained by the walls **4** and roll until they again reach the jets from nozzles **7**.

The projection of a liquid such as a detergent solution, may also be effected by injecting through the nozzles **7** the liquid entrained by compressed air.

The washing liquid is accumulated in the separate tank **11** with respect to the washing chamber in order to avoid the forming of foam in said chamber; if the liquid does not form any foam it may be directly collected under the walls **4**. The solid particles or granules **5** are cleaned by this same detergent solution from dirt which they mechanically remove from the dishes.

In order to rinse the dishes, there may be provided a rinsing liquid through a conduit **13** which may be connected to the water distribution mains or may be supplied otherwise under pressure. The rinsing liquid is either water or a detergent solution and is at room temperature or appropriately heated. The rinsing liquid passes through the manifold **14**. Nozzles **15** are raised with respect to the orifices **7** and project into the chamber **1** without entraining the granules or solid particles **5**.

A manifold **16** provided with nozzles **17** may allow the input of an airstream or another pressurized gas. The air or gas leaves from a conduit **18** connected to a compressor **19** driven by the same motor which provides the drive of the pump **10**. The dishes are thus dried in a flow of cold or warm air.

The drawing only illustrates one embodiment of the invention which may be varied in form and arrangement without departing from the scope of the appended claims.

What I claim is:

1. A dish washing apparatus comprising a substantially closed casing having a dish washing chamber there-

in, grid support means in said chamber for supporting a plurality of dishes to be washed therein, a tank for containing a liquid detergent, liquid discharge means extending from a bottom portion of the casing, valve means controlling said discharge means and selectively discharging liquid to said tank and to an external drain, a manifold extending along a lower portion of said chamber, said manifold having a plurality of orifices defining washing nozzles turned towards an upper portion of said chamber, pump means connected between said tank and said manifold for drawing liquid detergent from the tank and driving it into the manifold to form jets of liquid detergent passing through said orifices toward said grid support means, whereby the liquid detergent is recirculated through the chamber, inclined perforated walls extending from sides of said casing in said chamber downwardly and converging at said orifices of the manifold, said manifold being disposed parallel to said inclined perforated walls and to said sides of the casing, a plurality of elastic bodies having abrasive material embedded therein disposed for free movement in said chamber, said bodies being located immediately above the manifold when at rest, said bodies being projected upwardly above said walls by the jets of liquid detergent to impinge on and clean all exposed surfaces of dishes supported by said grid support means, and rinsing nozzles supplied with a rinsing liquid to complete cleaning of the dishes, said rinsing nozzles extending upwardly above lowermost portions of said walls and spaced from said orifices to avoid entraining said bodies in the rinsing liquid as it leaves the rinsing nozzles and before it impinges on the dishes.

2. A dish washing apparatus comprising a substantially closed casing having a dish washing chamber therein, grid support means in said chamber for supporting a plurality of dishes to be washed therein, a tank for containing a liquid detergent, liquid discharge means extending from a bottom portion of the casing, valve means controlling said discharge means and selectively discharging liquid to said tank and to an external drain, a manifold extending along a lower portion of said chamber, said manifold having a plurality of orifices defining washing nozzles turned towards an upper portion of said chamber, pump means connected between said tank and said manifold for drawing liquid detergent from the tank and driving it into the manifold to form jets of liquid detergent passing through said orifices toward said grid support means, whereby the liquid detergent is recirculated through the chamber, inclined perforated walls extending from sides of said casing in said chamber downwardly and converging at said orifices of the manifold, said manifold being disposed parallel to said inclined perforated walls and to said sides of the casing, a plurality of abrasive bodies disposed for free movement in said chamber, said bodies being located immediately above the manifold when at rest, said bodies being projected upwardly above said walls by the jets of liquid detergent to impinge on and clean all exposed surfaces of dishes supported by said support means, and rinsing nozzles supplied with a rinsing liquid from a source independent of said tank and pump means, said rinsing nozzles having openings in said chamber spaced from said orifices and forming jets of rinsing liquid in said chamber directed toward said grid support means for washing the liquid detergent and said bodies from the dishes.

3. A dish washing apparatus comprising a substantially closed casing having a dish washing chamber therein, grid support means in said chamber for supporting a plurality of dishes to be washed therein, a tank for containing a liquid detergent, liquid discharge means extending from a bottom portion of the casing, valve means controlling said discharge means and selectively discharging liquid to said tank and to an external drain, a manifold extending along a lower portion of said chamber, said manifold having a plurality of orifices defining washing nozzles turned towards an upper portion of said chamber, pump means connected between said tank and said manifold for drawing liquid detergent from the tank and driving it into the manifold to form jets of liquid detergent passing through said orifices toward said grid support means, whereby the liquid detergent is recirculated through the chamber, inclined perforated walls extending from sides of said casing in said chamber downwardly and converging at said orifices of the manifold, said manifold being disposed parallel to said inclined perforated walls and to said sides of the casing, a plurality of irregularly shaped bodies disposed for free movement in said chamber, said bodies being located immediately above the manifold when at rest, said bodies being projected upwardly above said walls by the jets of liquid detergent to impinge on and clean all exposed surfaces of dishes supported by said grid support means, and means in said chamber and spaced from said orifices forming rinsing liquid jets directed toward said grid support means for washing the liquid detergent and said bodies from the dishes.

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