Aug. 9, 1955 E. E. MENDENHALL ET AL 2,714,892

PLURAL-CHAMBER APPARATUS FOR TREATING OBJECTS

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Fig. 1

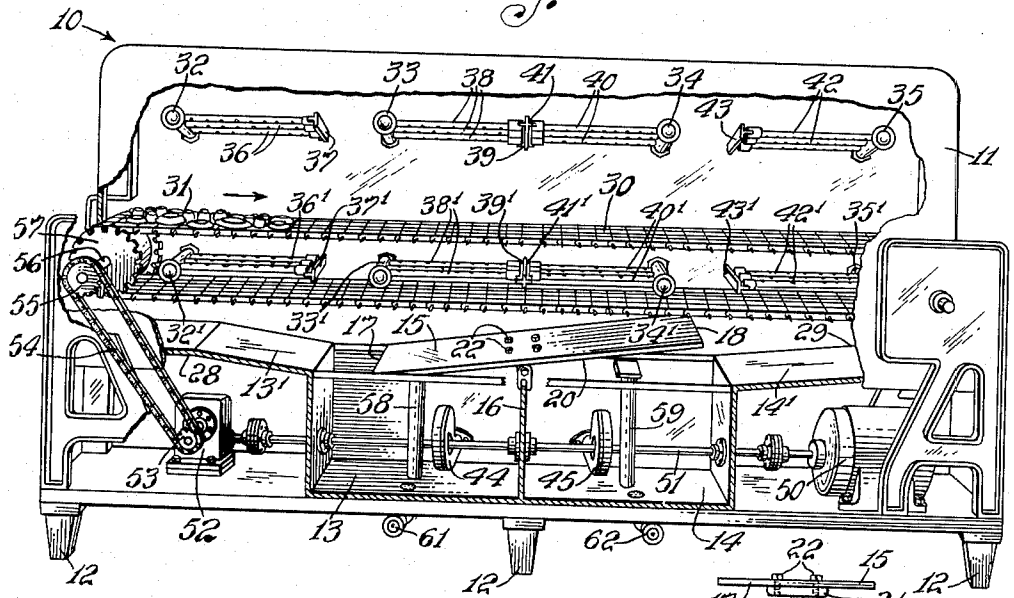


Fig. 2

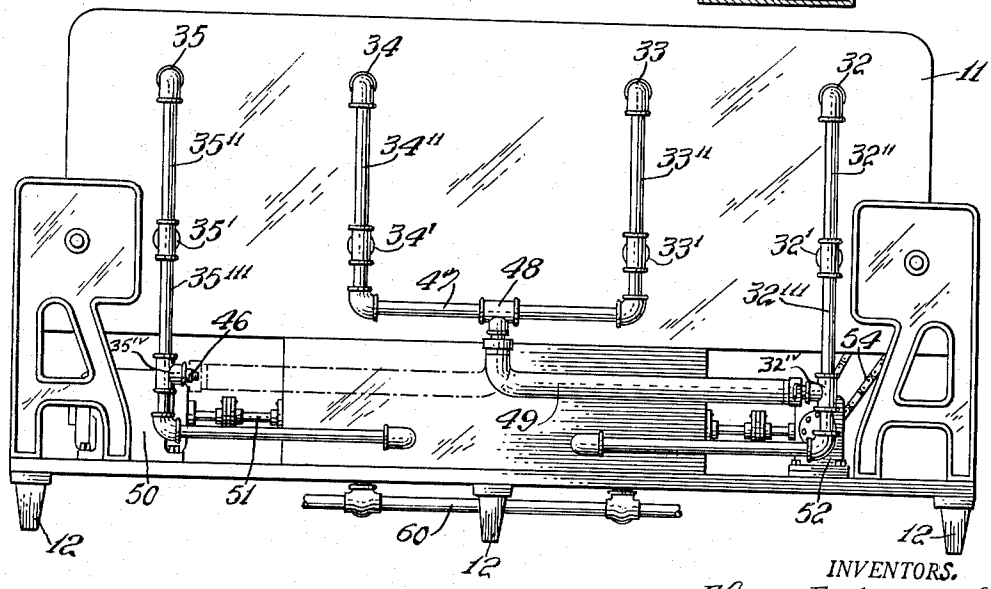
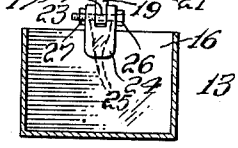


Fig. 3



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PLURAL-CHAMBER APPARATUS FOR TREATING OBJECTS

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6 Claims. (Cl. 134—72)

This invention relates to an improved apparatus for treating objects, and more especially to a two-chamber apparatus in which the objects to be treated are subjected to the action of different materials in each chamber, each action being conducted for a substantially different period of time.

We have found that our novel apparatus is suitable for many purposes, for example, in the treatment of metal parts by washing and rinsing prior to plating the articles; in the treatment of coal to remove dust and then add color thereto; and in dishwashing, involving washing and rinsing steps. While our apparatus is consequently useful for various purposes, our invention will be described with particular reference to its embodiment in a dishwasher in order to illustrate it.

The art of dishwashing deals with two distinct steps or operations: that of washing and that of rinsing the dishes or other articles, such as pots and pans, to be cleaned. It is known that in commercial dishwashers the washing step takes 4 to 5 times as long as the rinsing step, the actual time periods involved being about 45 seconds for washing and about 10 seconds for rinsing.

Inasmuch as dishes are usually placed on constant speed conveyors for passage through the dishwasher, it is clear why conventional dishwashers have a large wash chamber and a comparatively small rinse chamber. It is also obvious that such conventional dishwashers therefore have a definite orientation, i. e., one end is the inlet or wash end and the other is the outlet or rinse end. As a consequence of these considerations, conventional dishwashers have been made either left-to-right or right-to-left, these terms indicating the direction of conveyor travel through the dishwasher.

The disadvantages of conventional bi-chamber dishwashers were at all times appreciated but in times of materials shortages and war such disadvantages assume particular importance. Thus, the luxury of a large inventory all along the channels of distribution in order to assure adequate stocks of both types of dishwashers cannot be afforded, as metal and other materials shortages do not permit the maintenance of such stocks. A much more serious problem is that encountered in the armed services, where the failure to have the proper type of dishwasher available where and as needed may present serious health problems. In this connection it should be noted that the selection of the location of a dishwasher is usually made before it is known which type will be available and hence the chances for a wrong guess are great.

An object of our present invention is to provide bi-chamber dishwasher apparatus for efficiently and quickly cleaning dishes and the like, whether employed in connection with left-to-right or the right-to-left conveyor travel.

A further object is to provide a reversible, bi-chamber dishwasher which can be shipped as a unit from one place to another in assembled form, only a few relatively simple

operations having to be done to set up the dishwasher to suit the requirements.

Other objects reside in the combinations of elements, features of construction, and arrangement of parts, all as will be more fully pointed out hereinafter and shown in the accompanying drawings, wherein there is disclosed a preferred embodiment of our inventive concept.

In general, we accomplish our objects in accordance with this invention by providing an apparatus which in essence comprises a pair of adjacent, horizontally-disposed chambers, a vertically-inclined baffle plate located in said chambers and therebetween, and nozzles located in the aforesaid chambers above the level of the baffle plate in such manner that at least some of the effluent from at least some of the nozzles located in one chamber is deflected by the baffle plate into the other chamber, the volume of the total effluent from all of the nozzles entering the latter chamber being greater than that which enters the former chamber.

In the drawings, which form a part hereof and in which like characters represent like parts throughout:

Fig. 1 is a side elevation of a preferred embodiment of our invention, being in part broken away to expose the essential parts of our apparatus;

Fig. 2 is a rear view of the dishwasher of Fig. 1, also being broken away to show the parts; and

Fig. 3 is a fragmentary, enlarged, detailed view showing the baffle plate of Fig. 1 and associated means for fixedly locking the plate in any desired position.

In the drawings, the dishwasher **10** is mounted in a suitable housing **11** integrally carried by legs **12**. In view of the fact that the direction of conveyor travel in this figure is taken to be from left-to-right, chamber **13** is the wash chamber and chamber **14** is the rinse chamber.

The baffle plate **15** is shown fixedly mounted on the common wall **16** of chambers **13** and **14**, one end **17** of the plate **15** being lower than the other end **18**.

The baffle plate **15** is shown in Fig. 1 fixedly mounted on the common wall **16** of chambers **13** and **14**, with the left end **17** (as viewed in Fig. 1) being lower than the right end **18** of the plate **15**. The plate **15** carries a pin **19** at the center of its under side **20**, the pin **19** being integrally secured to the plate **15** by suitable means such as the bracket **21** and screws **22**. The pin **19** has a horizontal opening **23** therethrough. In adjusting the plate **15** it is placed at a desired angle in the saddle **24** mounted on wall **16** so that the hole **23** in the pin **15** coincides with the holes **25** in the saddle **24** and the bolt **26** is passed through holes **25** and **23** and then secured with the nut **27**.

In transit, the plate **15** may for convenience be secured at any angle or it may be shipped in pivotally-movable condition. In either event, it will now be understood that the securing of the plate at any desired angle is a simple operation.

If desired, other means of pivotally-mounting and securing the plate **15** at any desired angle may be employed. Also, if desired, the engagement of the plate **15** to the wall **16** may be by means of a suitable pipe or tube (replacing the pin **19**) in this case the saddle **24** being wider than shown in Fig. 3 in order to accommodate the tube. In the claims the term "center" as applied to the mounting of the plate is tintended to encompass both the pin and pipe constructions.

The chambers **13** and **14** are provided with side or drain boards **28**, **29**. An endless belt screen conveyor **30** of the conventional type for carrying dishes **31** and other articles to be cleaned extends across the width of the dishwasher **10** above the level of the baffle plate **15**.

Located above and between the conveyor are series of spray pipes and suitable conduits for carrying the wash and rinse liquids. The series above the conveyor com-

prises conduits 32, 33, 34, and 35, conduit 32 being associated with longitudinally-arranged spray pipes 36 with holes on the bottom at suitable intervals, spray pipes 36 being held at their other end by bracket 37 secured to the front and back of the dishwasher by means not shown. Located directly under conduit 32 is conduit 32', which is similarly connected to spray pipes 36' and bracket 37', the pipes here having their holes on top in order to direct the liquid upwards. Conduits 32 and 32' are in the back of the dishwasher 10 joined by suitable piping 32'' (see Fig. 2).

In similar manner conduits 33 and 33' and associated spray pipes 38, 38', brackets 39, 39' and connecting pipe 33'' are arranged to the right, and to the right of the latter series are arranged conduits 34 and 34' and associated spray pipes 40, 40', brackets 41, 41' and connecting pipe 34'', and to the right of the latter are arranged conduits 35 and 35' and associated spray pipes 42, 42', brackets 43, 43' and connecting pipe 35''.

Joined to the lower ends of pipes 32'' and 35'' by means of unions are pipes 32''' and 35''' respectively, the latter being connected by suitable piping to liquid pumps 44 and 45, respectively. Our novel dishwasher is provided when shipped for installation, with T connections 32'v and 35'v near the bottom of pipes 32''' and 25''' respectively. Also provided is a plug 46 which fits the opening in either of these connections.

The lower ends of pipes 33'' and 34'' are joined by suitable piping 47 having a T connection 48 therein, right angle opening of the T 48 being joined to a length of pipe 49 of length and diameter suitable for connecting it to T connections 32'v or 35'v. In the figures shown, pipe 49 is connected to T 32'v and plug 46 is inserted in the opening of T 35'v. Thus, conduits 32, 33 and 34 and 32', 33' and 34' and associated spray pipes 36, 38 and 40 are joined as a unit for the distribution of liquid pumped therein by pump 44 in chamber 13 and conduits 35 and 35' and associated spray pipes 42 form a unit for the distribution of liquid pumped therein by pump 45 in chamber 14.

In order to supply the power for operating pumps 44 and 45 and conveyor 30, suitable means are provided, as for example, the electric motor 50 which in turn gets its energy from a source of electric energy (not shown). The motor 50 is operatively united to pumps 44 and 45 by suitable shafting 51 and to conveyor 30 by suitable shafting 51, reduction gear box 52, driving pulley 53, belt 54, driven pulley 55 and shaft 56 secured to mandrel 57.

Details of the mechanical linkage and associated parts, as gaskets, flanges, etc. are not given as these are conventional.

In order to prevent overflow of the liquids in chambers 13 and 14, overflow pipes 58 and 59 connected to the drain pipe 60 are provided. In order to drain the chambers 13 and 14 of their contents, valves 61 and 62, respectively, associated with drain 60, are provided.

It will be understood that the dishwasher may be easily converted to one involving right-to-left operation, whether the dishwasher is in assembled or unassembled form as shipped. Thus, travel of the conveyor can be reversed in known manner, for example, by crossing the belt 54. The chamber 13 can be converted into a rinse chamber by tilting the baffle plate 15 so that the right end 18 is lower than left end 17 and securing the plate 15 by tightening the nut 27 on bolt 26. Conduits 32 and 32' may be joined as a unit by placing the plug 46 in T connection 32'v. Conduits 33, 34 and 35 and 33', 34' and 35' may be joined as a unit by joining pipe 49 to T connection 35'v.

It will also be understood that when our dishwasher is assembled as shown in the figures, chamber 13, the wash chamber, is provided with wash liquid and chamber 14, the rinse chamber, is provided with rinse liquid. The actual composition of the liquids is not pertinent to this invention.

In operation, when the dishwasher is assembled as shown in the figures, the dishes 31 are carried by conveyor 30 in the direction indicated. Chamber 13 is provided with a suitable liquid for washing the dishes and chamber 14 is provided with a suitable liquid for rinsing the dishes. Pumps 44 and 45 are placed in operation by starting motor 50. The wash liquid is pumped to spray pipes 36, 38 and 40 and 36', 38' and 40', whence they are directed through the holes against the dishes, the sprays from pipes 36, 38 and 40 being directed downwards so as to make contact with the dishes from above, and the sprays from pipes 36', 38' and 40' being directed upwards, making contact with the dishes from below.

Practically all of the effluent from these spray pipes (36, 36', 38, 38', 40 and 40') will, after striking the dishes, be deflected by the plate 15 and drain board 13' into chamber 13 (whence the liquid is recirculated by pump 44 or permitted to drain off by opening valve 61.

Similarly, the rinse liquid from chamber 14 is pumped by pump 45 to spray pipes 42 and 42' and directed against the dishes 31 as the latter pass therebetween on conveyor 30. The rinse spray from pipes 42 are directed downwards striking the dishes 31 from above; the spray from pipes 42' are directed upwards, striking the dishes 31 from below.

Practically all of the effluent from sprays 42 and 42' will, after striking the dishes 31, go directly into chamber 14 or be deflected therein by drain board 14'. From chamber 14 the rinse liquid may be repumped by pump 45 or drained off by opening valve 61.

While our invention has been described in detail as to arrangement of parts in relation to a dishwasher it is to be understood that some modifications may be made herein without departing from the spirit of our invention. In view of the foregoing, no limitations are intended other than those imposed by the scope of the appended claims constructed as broadly as permissible in view of the prior art.

We claim:

1. In an apparatus for treating objects, the improvement which comprises, in combination, a pair of adjacent horizontally-disposed chambers, an adjustable inclined baffle plate located over said chambers so as to overhang part of each of said chambers, said plate incompletely blocking both of said chambers at any position of tilt of said plate, and nozzle means located directly over said chambers above the level of said baffle plate whereby at least some of the effluent from at least some of the nozzles located over one chamber is deflected by said baffle plate into the other chamber, most of the effluent from said nozzles entering this latter chamber and the balance entering the adjacent chamber.

2. In an apparatus for treating objects, the improvement which comprises essentially a pair of adjacent horizontally-disposed chambers, having a common wall therebetween, a baffle plate tiltably mounted over said wall and said chambers, said plate extending over a part of each chamber, means for fixing said plate in any desired inclined position, said plate incompletely blocking both of said chambers at any position of tilt of said plate, and nozzle means located directly over said chambers above the level of said baffle plate whereby at least some of the effluent from at least some of the nozzles located over one chamber is deflected by said baffle plate into the other chamber, most of the effluent from said nozzles entering this latter chamber and the balance entering the adjacent chamber.

3. In an apparatus for treating objects, the improvement which comprises a pair of adjacent, horizontally-disposed chambers having a common wall, a reversible horizontal conveyor over said chambers, means for moving said coneyor, a baffle plate beneath said conveyor and pivotally mounted over said wall so as to overhang part of each of said chambers, means for fixing said plate in any desired inclined position, said plate incompletely blocking both of said chambers at any position of tilt of said plate, and nozzle means located directly over said

chambers above the level of said baffle plate whereby at least some of the effluent from at least some of the nozzles located over one chamber is deflected by said baffle plate into the other chamber, most of the effluent from said nozzles entering this latter chamber and the balance entering the adjacent chamber.

4. In an apparatus for treating objects, the improvement which comprises a pair of adjacent, horizontally-disposed chambers having a common wall therebetween, a reversible conveyor over said chambers, means for moving said conveyor, a baffle plate beneath said conveyor and pivotally mounted at its center on said wall so as to overhang part of each of said chambers, means for fixing said plate in any desired inclined position, said plate incompletely blocking both of said chambers at any position of tilt of said plate, a set each of upper and lower nozzle means directly over said chambers, the effluents from said nozzles being directed against objects carried by said conveyor and the nozzles being located over said chambers above the level of said baffle plate whereby at least some of the effluent from at least some of the nozzles located over one chamber is deflected by said baffle plate into the other chamber, most of the effluent from said nozzles entering this latter chamber and the balance entering the adjacent chamber.

5. In an apparatus for washing dishes and the like, the improvement which comprises a first chamber, a second chamber adjacent to said first chamber, a common wall between said chambers, a reversible horizontal conveyor over said chambers for carrying dishes or other articles to be cleaned, means for moving said conveyor, a baffle plate beneath said conveyor and fixedly mounted at its center on said wall so as to overhang part of each of said chambers in an inclined position with its lower end over the first chamber and its upper end over the second chamber, said plate incompletely blocking both of said chambers at any position of tilt of said plate, upper and lower wash nozzles directly over said first chamber, at least one upper and lower wash nozzle over said

second chamber, upper and lower rinse nozzles over said second chamber, all of said wash and rinse nozzles being located above the level of said baffle plate, said upper and lower wash nozzles located over said second chamber being further characterized by the fact that their effluent is deflected by said baffle plate into said first chamber.

6. In an apparatus for washing dishes and the like, the improvement which comprises a pair of adjacent, horizontally disposed chambers of like size having a common wall, a reversible horizontal conveyor over said chambers for carrying dishes or other articles to be cleaned, means for moving said conveyor, a baffle plate beneath said conveyor, said baffle plate being pivotally mounted at its center on said wall so as to overhang part of each of said chambers, means for fixing said plate in any desired inclined position, said plate incompletely blocking both of said chambers at any position of tilt of said plate, a set each of upper and lower nozzle means directly over said chambers the effluents from said nozzles being directed against objects carried by said conveyor and the nozzles being located over said chambers above the level of said baffle plate whereby at least some of the effluent from at least some of the nozzles located over one chamber is deflected by said baffle plate into the other chamber, most of the effluent from said nozzles entering this latter chamber and the balance entering the adjacent chamber.

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