June 4, 1940. M. N. PARTRIDGE 2,203,029

DISHWASHING MACHINE

Filed Nov. 20, 1935 2 Sheets-Sheet 1

Fig. 1.

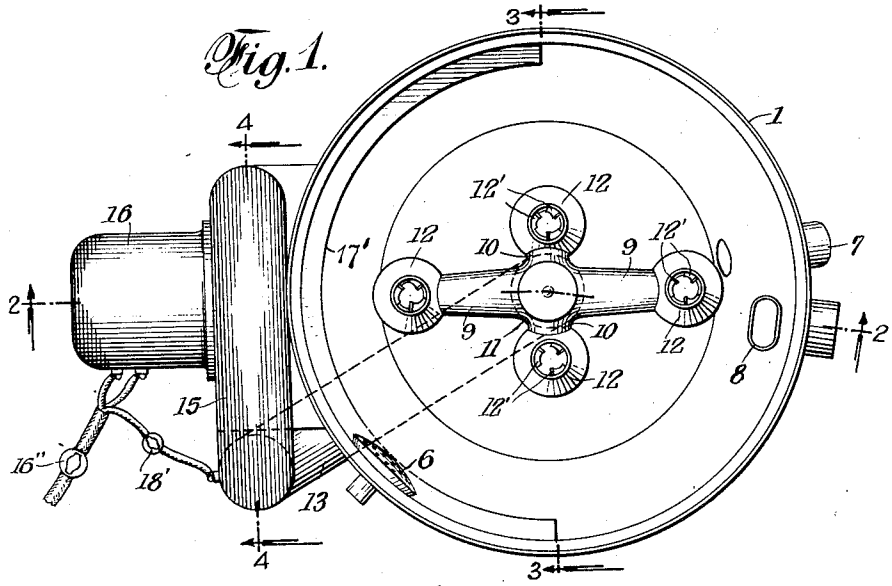
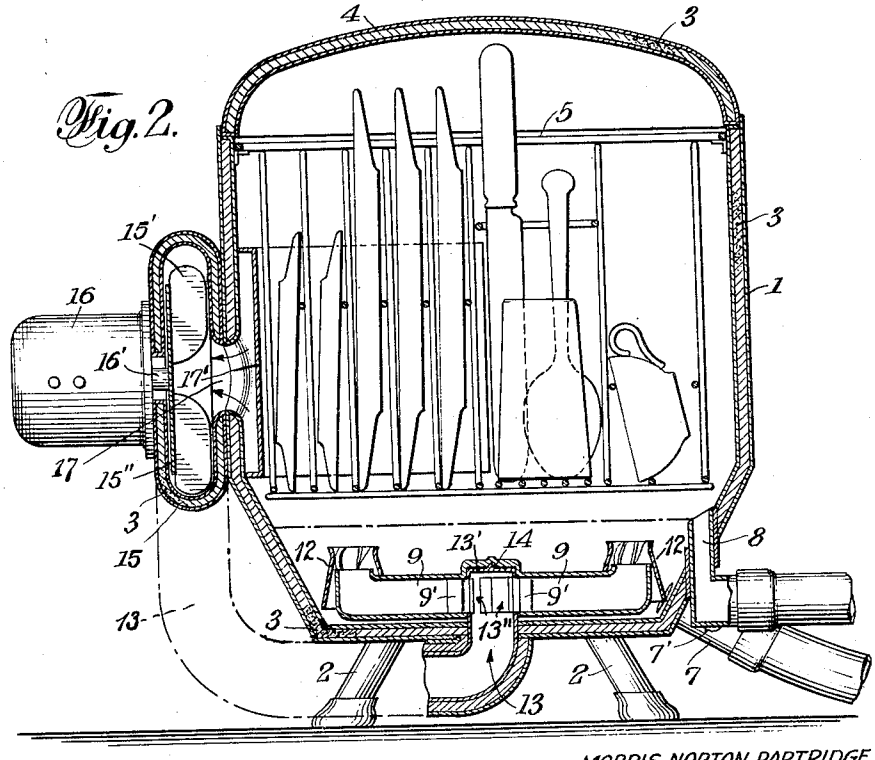


Fig. 2.



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Fig. 3.

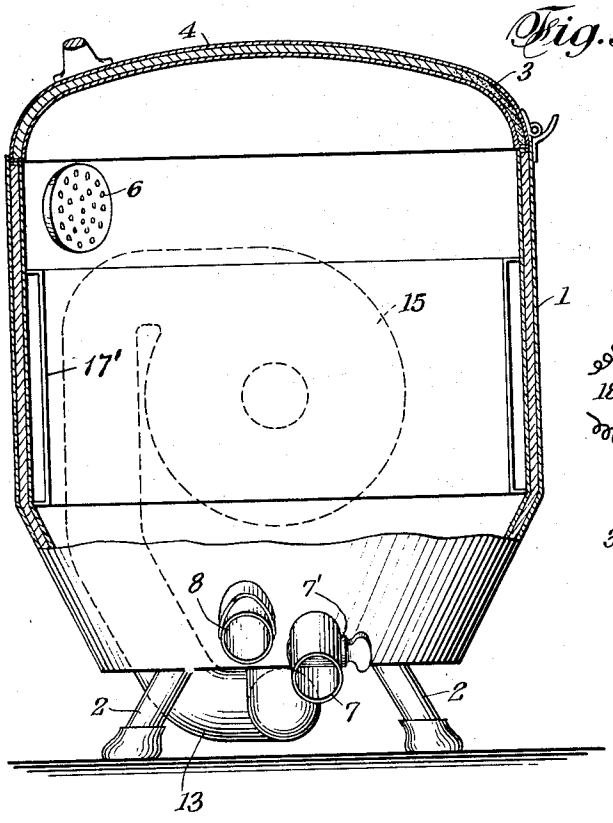


Fig. 4.

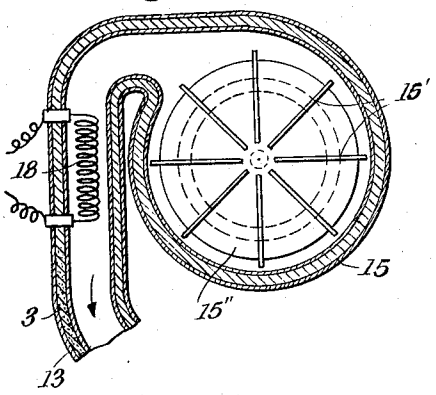


Fig. 5.

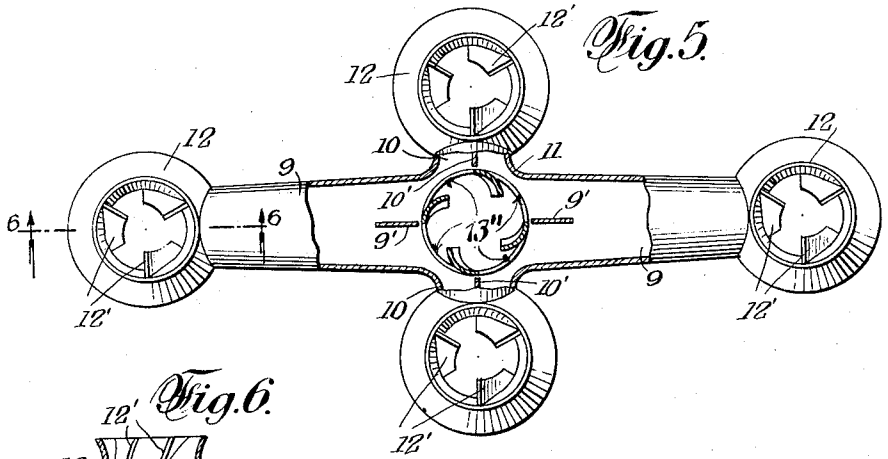
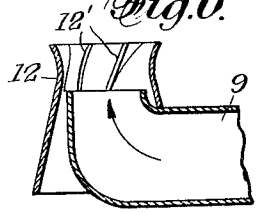


Fig. 6.



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UNITED STATES PATENT OFFICE

2,203,029

DISHWASHING MACHINE

Morris Norton Partridge, East Orange, N. J.

Application November 20, 1935, Serial No. 50,622

15 Claims. (Cl. 141—9)

My invention comprises a novel and useful apparatus for quickly and effectively washing, rinsing, sterilizing and drying dirty dishes, tableware, and the like, and involves a new method of cleansing such ware.

My object is to produce a novel machine of the character referred to; that is simple in construction and operation; that may be economically manufactured; that lends itself admirably to small units for household use; that will be so gentle in operation that fine china and glassware may be safely cleansed therein; that is economical in the use of water and in the use of electric power required for starting and running; that will not only thoroughly cleanse the articles placed therein but, in addition, will effectively sterilize and quickly dry the same; that will eliminate danger of shorting the motor circuits; that will admit of mounting on an ordinary drainboard while yet being so compact that it may be installed in a deep sink; that will eliminate all danger of clogging; that will operate efficiently when supplied with warm water such as available in the usual domestic hot water system as contrasted with machines that require a supply of scalding water.

While the foregoing are some of the chief objects other advantages will be understood and appreciated by those skilled in this art from a reading of the following specification and an examination of the accompanying drawings illustrating one preferred form of my apparatus and in which—

Fig. 1 is a plan view of the apparatus with the cover removed;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, certain parts being shown in elevation and showing the cover in place;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1, certain parts being shown in elevation;

Fig. 4 is a sectional view of an air pump with an air heater shown in elevation;

Fig. 5 is a plan view, partly in section, of the sprayer;

Fig. 6 is a section on the line 6—6 of Fig. 5.

1 represents a tub which is mounted upon suitable legs 2—2. This tub is preferably double walled so as to provide an insulating space between the walls thereof. The insulating spaces are preferably filled by any well known insulating material, portions only of which are indicated at 3—3 at various places in the drawings. The upper portion of the tub is preferably cylindrical in form, while the lower portion tapers inwardly to form a pan-like bottom. 4 represents a cover or closure which fits snugly into the upper part of the tub 1 when the apparatus is in operation. This cover may be easily lifted to permit the articles to be cleaned to be introduced into the washing chamber. The cover is likewise double walled and the space between the walls is likewise filled with suitable insulating material 3. 5 represents a skeleton basket of any well known design into which the articles to be cleansed are placed and by means of which basket all of said articles may be introduced bodily into or removed from the tub 1. In Fig. 2 I have graphically indicated various articles, such as dishes, etc., mounted in such basket. 6 represents the water inlet which is preferably located in the upper part of the tub, as indicated in Fig. 3, and is preferably equipped with a sprayer end. This water inlet may be connected by any suitable hose or pipe with the conventional hot water faucet or hot water supply pipe (not shown). 7 is a drain pipe leading outwardly from the bottom of the washing chamber. 7' represents a suitable valve by which said drain pipe may be opened and closed. 8 represents the overflow pipe the inner end of which penetrates into the tub at a sufficient distance above the bottom to provide the desired water level to be maintained therein. Rotatably mounted on a central support in the lower part of the tub and preferably close to the bottom thereof is what I will term a sprayer. This sprayer provides a plurality of eccentrically located upwardly directed sprayer nozzles on the sprayer arms preferably at different distances from the center of rotation so that as the sprayer revolves all the articles in the tub will be cleansed by traveling fountains of spray. In the drawings the particular form of sprayer body shown comprises two long hollow arms 9—9 and two short hollow arms 10—10 all extending outwardly from a hub 11. 12—12 are the sprayer nozzles of any suitable design which when the apparatus is in operation cause upwardly directed rotating fountains of spray to be projected against the articles to be cleansed. Various means may be employed to cause this sprayer to rotate bodily. In the drawings, 13 represents an air inlet pipe leading from an air pump and thence into the bottom of the pan so as to form an elevated bearing support for the sprayer. In the form shown the inner end 13' of this pipe 13 is closed wholly or partially and is provided with an upwardly projecting central bearing 14 upon which is seated the top wall of the hub 11 so as to provide a practically frictionless support for the rotatable sprayer. The discharge passages 13'' from the air

pipe 13 are directed tangentially from the sides thereof so that when the sprayer is in place streams of air will be projected tangentially into the arms 10 and 11 to cause the sprayer to revolve on the bearing 14. To assist in this the arms 9—9, 10—10 may have plates 9'—10' secured therein vertically and longitudinally against which these tangential air streams impinge. As the air passes out of the ends of the arms 9 and 10 it picks up water at the nozzles 12 and converts it into columns of spray which are projected upwardly in the form of rotating fountains. It will be noted that the nozzles 12 are mounted on the ends of the respective arms 9 and 10 and are each spaced therefrom sufficiently to permit water to freely enter each nozzle from below to supply water to the ascending column of air by which said water is converted into spray and forced against the articles to be cleansed. The interior of each nozzle 12 is preferably provided with suitably pitched vanes 12' or other suitable means to produce a whirling spray effect. Mounted on the side of the tub is a pump casing 15 containing a suitable pump operated by a suitable source of power such as a small electric motor 16. The wall of the pump casing is preferably of double thickness spaced and filled with a suitable insulating material 3. The air pump is preferably of the centrifugal type and comprises a plurality of blades 15' on the face of a disk 15'' which is centrally mounted on the motor shaft 16'. The blades 15' face toward an opening 17 in the side of the tub. In Fig. 4 I have shown a portion of the air pipe 13 which communicates with the bottom of the pan. This air pipe is preferably double walled and the space between said walls is occupied with suitable insulation 3. This air pipe communicates with the interior of the pump chamber in such a manner that the pump will force a down shaft of air through said pipe toward and directly into the arms of the sprayer. 18 indicates an electric heating element, designed to heat the air in pipe 13. 16'' is a switch for the motor circuit. 18' conventionally represents means to control the circuit to the heater. When the motor is started the heater will operate to heat the inner wall of the air pipe 13 and the air or vapor flowing downwardly therethrough. Adjacent the interior side wall of the tub I provide a vertical baffle plate 17' overstanding the opening 17 in the wall of the tub and spaced slightly from said wall but suitably connected thereto as at its upper and lower edges. This provides a space through which vapor generated within the washing chamber may pass from said washing chamber to the pump during the operation of the apparatus. By this means circulation is maintained and moisture in the vapor back of said plate may separate therefrom and quickly return by gravity to the bottom of the tub.

Operation.—To operate the aforesaid apparatus, the basket is first loaded with dishes and other articles to be cleansed. The loaded basket is then inserted into the tub. The cover is then closed. Warm or hot water is then admitted into the pan-like bottom of the tub until it reaches a level determined by the level of the adjustable outlet 8. The motor pump and heater should be preferably started at the same time so that while the pan is being filled the air pipe 13 will be heated and hot air will be circulated through the washing chamber, the first effect of which is to soften any grease on the articles therein to make it more easily removable when the fountains of spray begin to operate. When the water level reaches the sprayers the water will be picked up by the air passing therethrough and the washing operation will begin. During this operation it will be apparent that the hot air or vapor will tend to increase the temperature of the water in the washing chamber. It will be understood, of course, that a suitable detergent is introduced into the washing chamber to mix with the water therein to assist in the washing operation. When the articles have been subjected to the washing process for an adequate time to thoroughly clean the same, the drain pipe 7 is opened and the dirty water is permitted to escape. During this draining period the pump may continue to run. When the pan has been substantially drained the drain pipe 7 is closed and fresh, clean water is admitted through the inlet 6 to again fill the pan. This fresh water is then directed in fountain-like sprays against the washed articles to thoroughly rinse the same. When this rinsing operation is completed, the drain 7 is again opened. This rinsing operation requires but a comparatively short time. When the rinsing water is drained from the tub to a level below the nozzles, the pump will then force hot air into the washing chamber. The temperature of this air, being free of the thermal load of the water, quickly raises the temperature in the tub to such a high degree as to effect a sterilizing of the articles therein. When this has been continued for a sufficient time said articles will become so very hot that when the motor is stopped and the cover lifted to permit free radiation of heat the now cleaned and sterilized articles will so quickly dry that the usual hand drying operation may be omitted.

By reason of the location of the pump on the side of the tub, the overall height of the apparatus is so substantially reduced that the same may be mounted upon an ordinary drainboard and loaded and unloaded with comparative ease. Again, by mounting the pump and motor on the side and providing a suitable baffle for the opening 17 through which circulation of air and vapor is maintained when the pump is in operation, all danger of shorting the motor and heater circuit by escaping or leaking water is prevented. By making the overflow pipe adjustable up and down the water level in the bottom pan may be varied as desired, it being preferable, however, to have said level somewhat above the tops of the sprayer nozzles, as indicated by the dot and dash line in Fig. 2. I have conventionally illustrated the overflow pipe 8 as slidable up and down for the above purpose, it being understood, of course, that the sliding fit of the pipe within the tub should be sufficiently tight to prevent leakage. It is preferable that the sprayer should be held by gravity alone on the bearing point 14. I accordingly make the sprayer sufficiently heavy so that it will just overcome its tendency to float when the pan is filled with water and the arms of the sprayer are filled with air during the operation of the apparatus. This will prevent the sprayer from floating to the surface while still allowing it to so lightly rest on the bearing support 14 that wear and friction are negligible, thereby lessening the power required to start and drive the sprayer as well as adding to its effective life. It will be apparent from the drawings and description thereof that there are no parts to become clogged and that all parts are so accessible that whenever it is desirable to clean the ap-

paratus this can be easily and quickly accomplished.

I have sought to make it clear that I have shown and described only a preferred form of my invention, realizing full well that modifications may be made in the arrangement of and construction of details without departure from the spirit thereof or the scope of the appended claims.

I claim:

1. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, an air driven hollow sprayer rotatably supported in the tub in the space below such articles, a plurality of eccentrically located sprayer nozzles thereon with air passages leading thereto, a power driven air pump, air duct means from the upper portion of said tub to said pump and from said pump to the air passages in said hollow sprayer, a heater for the air in said duct means, means within the nozzles to cause a plurality of columns of said air to be whirled upwardly in said tub from said nozzles, a port for admitting water into the tub, and an outlet port above said nozzles and below the articles to be cleansed.

2. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, an air driven hollow sprayer rotatably supported in the tub in the space below such articles and having air passages leading to eccentrically located upwardly directed spray nozzles thereon, a power driven air pump, air duct means from the upper portion of said tub leading to said pump and from said pump to the interior of said hollow sprayer, a heater for the air in said duct means, a port for admitting water into said tub, and an adjustable outlet port below the means for supporting the articles to be washed and above said nozzles for establishing the normal water level in said tub.

3. In a machine of the character described, a tub adapted to contain liquid, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, a hollow sprayer rotatably supported upon a central bearing in the tub in the space below such articles and having a plurality of upwardly directed sprayer nozzles located at different distances from its axis of rotation, a power driven air pump, air duct means leading from the upper portion of said tub to said pump and from said pump to the interior of said hollow sprayer to rotate the latter, a heater for said duct means, and means to cause fountains of air and liquid to be directed upwardly in said tub from said nozzles while said sprayer is rotating.

4. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, a hollow sprayer rotatably mounted in the tub in the space below such articles and having eccentrically located upwardly directed nozzles with water inlets adjacent thereto, a power driven air pump, air duct means from the upper side portion of said tub to said pump and from said pump to passages in said hollow sprayer, a heater for the air in said duct means, and a vertically positioned baffle means in the upper side portion of the tub to protect the inlet to said air pump.

5. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, an air driven hollow sprayer rotatably mounted in the tub in the space below such articles, an electric motor driven air pump, air duct means from the upper side portion of said tub to said pump from said pump to passages in the interior of said hollow sprayer, an electric heater in the descending portion of said duct means for heating the air flowing through said duct, and means eccentrically located on said sprayer to cause a mixture of said air and water to be directed upwardly in said tub from said sprayer in a plurality of movable fountains of spray.

6. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleansed in said tub and spaced above the bottom thereof, a hollow air driven sprayer rotatably mounted in the tub in the space below such articles, a power driven air pump, air duct means from the upper portion of said tub to said pump and from said pump to passages in the interior of said hollow sprayer, a heater for the air in said duct means, and eccentrically located mixer nozzles to cause said air within the body of said sprayer to be directed upwardly in said tub from said sprayer to pick up water at said nozzles and form vertically directed fountains of spray, and means to maintain a water level adjacent the nozzles outlets.

7. In a dishwashing machine, a tub, means for holding therein articles to be cleansed above and spaced from the bottom thereof, means for creating a plurality of rotating upwardly directed fountains of spray at certain times and only upwardly directed columns of hot air at other times, and means to propel and heat said air, said second named means including a hollow centrally supported rotatable member with a plurality of mixer nozzles thereon at different distances from the center of rotation thereof.

8. In a dishwashing machine, a tub, means to supply water thereto and hold it at a predetermined level therein and remove it therefrom at will, a rotatable centrally balanced sprayer having a plurality of outwardly extending hollow arms of different length having upwardly directed spraying nozzles on their ends for creating and directing traveling fountains of spray upwardly therefrom, an air duct leading from the upper portion of said tub to said sprayer, and means to recirculate air through said duct, sprayer nozzles, and tub chamber and to rotate the sprayer and to mix the air with water at said nozzles to create said fountains and to cause them to travel around and around the interior of said tub.

9. In a dishwashing machine, a tub, means to supply water thereto and hold it at different predetermined levels therein and remove it therefrom at will, a rotatable centrally mounted sprayer having a plurality of outwardly extending hollow arms of different length, spraying nozzles on the ends thereof for directing rotating fountains of spray upwardly therefrom, an air duct leading from the upper portion of said tub to said sprayer, means to recirculate air through said duct, sprayer nozzles and tub chamber, to rotate said sprayer, to mix the air with water at

said nozzles and to create said fountains, and a heater for the inner walls of said duct to heat the air flowing to the tub chamber.

10. In a dishwashing machine, a tub, an air outlet in the upper portion thereof, a baffle therefor secured at its upper and lower edges to the inner wall thereof, an air pump housing outside of said opening and communicating with said opening, a motor driven air pump in said housing, an air duct leading from said pump to, into and above the lower wall of said tub with lateral tangential openings in that portion of the duct projecting into the tub, a sprayer device comprising a hub surrounding said openings and rotatably supported upon said duct, with hollow arms extending outwardly from said hub, said arms having upwardly directed outlets to permit air to be driven upwardly in said tub to generate a plurality of rotating fountains of spray at certain times and of air at other times.

11. In a dishwashing machine, a tub, an air outlet at the side and in the upper portion thereof, a baffle therefor secured to the inner wall thereof, an air pump housing outside of and communicating with said opening, a motor driven air pump therein, an air duct leading from said pump to, into, and above the bottom of said tub, with tangential openings in the sides of that part of said duct projecting into the tub, a sprayer device comprising a hub surrounding said openings and rotatably mounted on the upper part of said duct, with hollow arms extending outwardly from said hub, said arms having upwardly directed outlets to permit air to be driven upwardly in said tub to generate rotating fountains of spray, with plates in said hollow arms located in front of said tangential openings to take the thrust of currents of air therefrom to assist in the rotation of said sprayer.

12. In a machine of the character indicated, a tub and closure therefor, means to support articles to be cleansed in said tub and spaced above the bottom thereof, a spray arm rotatably mounted in said tub in the space below such articles, said spray arm having a nozzle to direct a spray of water and air upwardly in said tub and over the articles to be cleansed, said nozzle comprising substantially concentric spaced apart tube parts, the bottom of at least one of said parts being located and open below the water level in said tub, whereby water and air may be mixed at the nozzle to form a spray, and an air pump for forcing air through one of said nozzle parts to create a spray.

13. In the combination defined in claim 12, said nozzle having angularly positioned vane means to direct the spray in generally spiral form.

14. In the combination defined in claim 12, said spray arm having angularly directed vane means to rotate the same and said nozzle by means of a current of air passing to said spray arm.

15. In a machine of the character described, a tub, a movable closure therefor to permit access to the tub chamber, means to support articles to be cleaned in said tub and spaced above the bottom thereof, a hollow air driven sprayer rotatably mounted in the tub in the space below such articles, a power driven air pump, air duct means from an upper portion of said tub to said pump and from said pump to passages in the interior of said hollow sprayer, a heater for the air in said duct means, and a plurality of eccentrically located upwardly directed outlet nozzles on said sprayer to cause the air from within the body of said sprayer to be directed upwardly in said tub to pick up water and form fountains of spray when the water level is maintained above the outlets of said outlet nozzles.

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