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F. G. BROTZ

DISHWASHER

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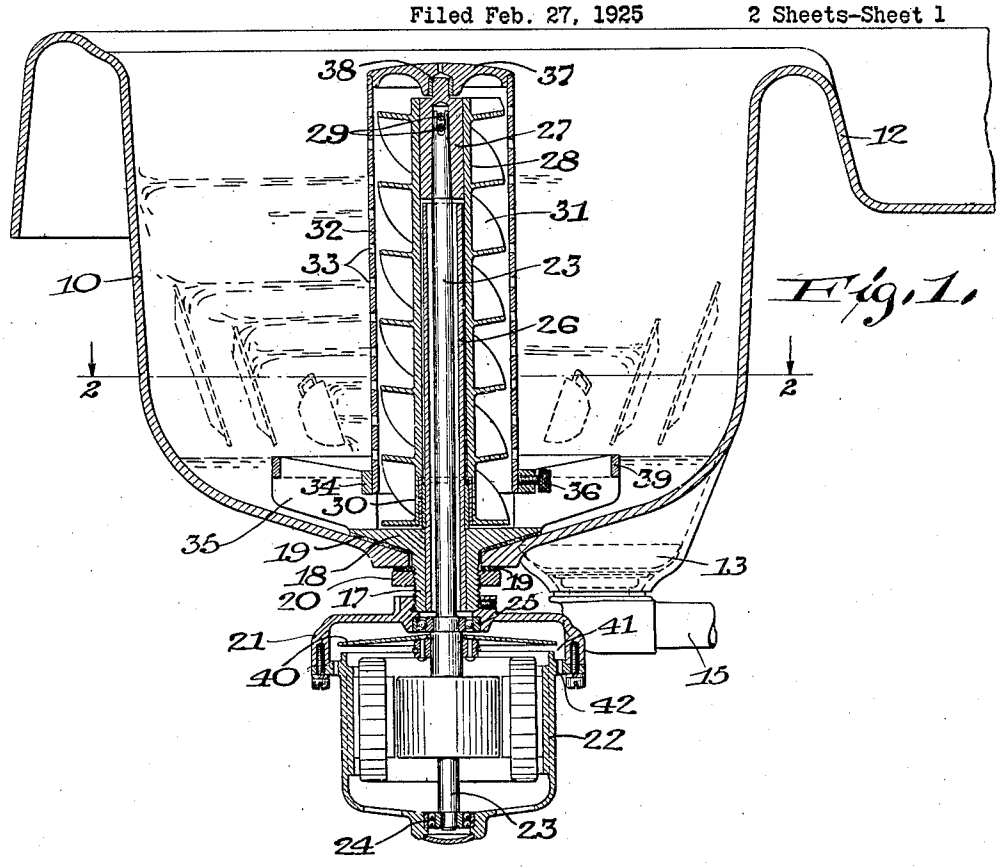


Fig. 1.

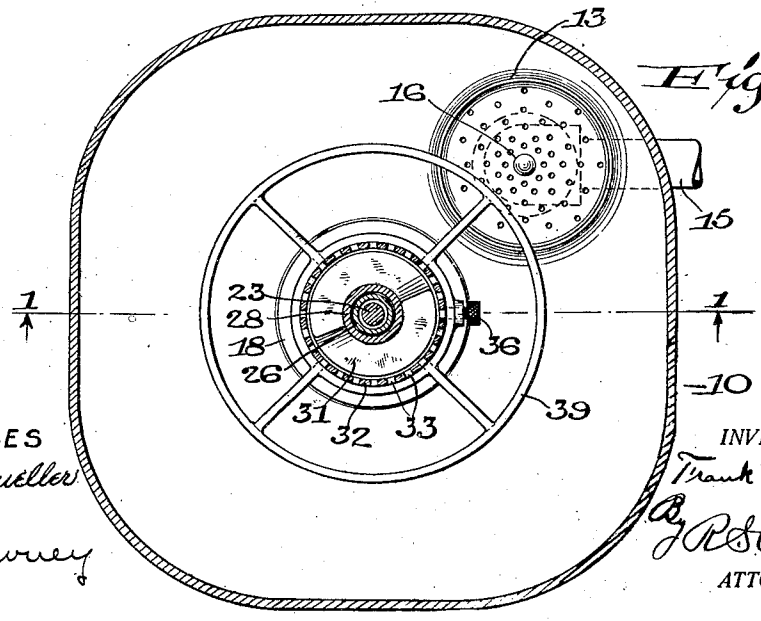


Fig. 2.

WITNESSES

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Fig. 4

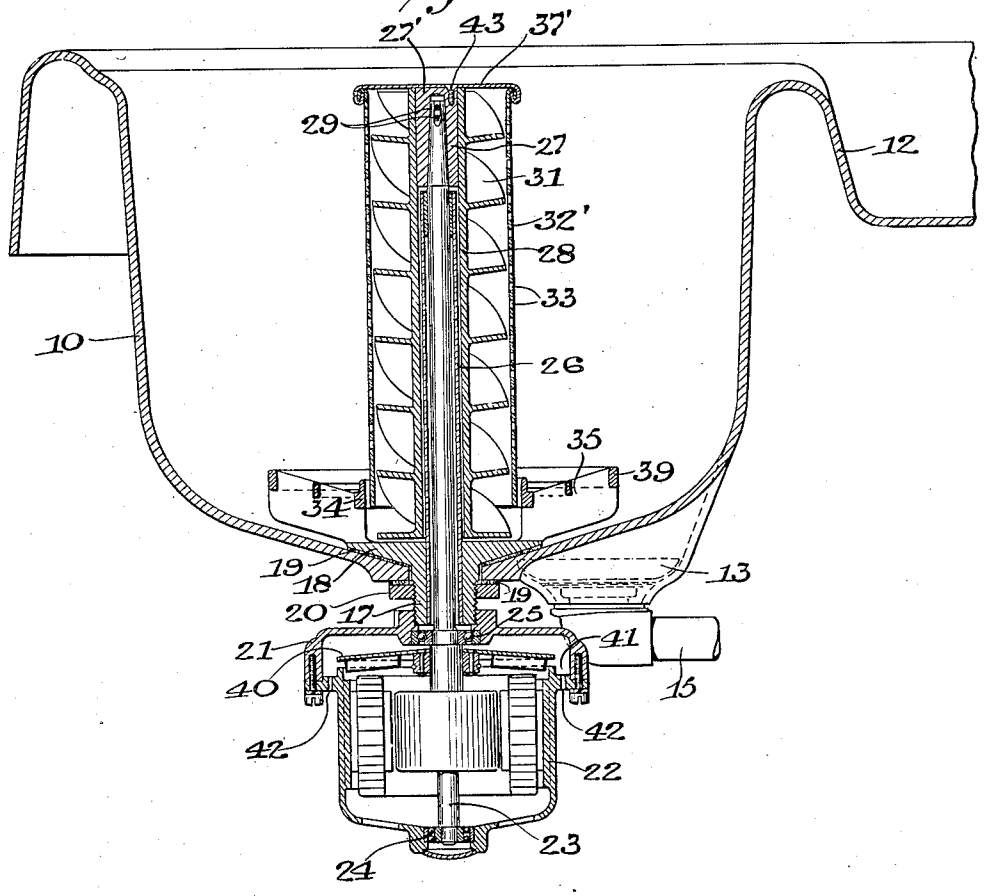
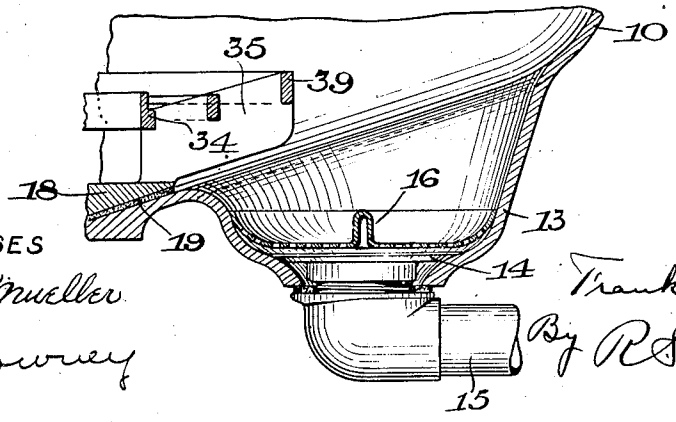


Fig. 3



WITNESSES

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UNITED STATES PATENT OFFICE

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DISHWASHER.

Application filed February 27, 1925. Serial No. 12,032.

This invention relates to dishwashers of the type in which a small quantity of water is rapidly circulated and forcibly ejected upon the dishes to remove the dirt by impact and flushing.

The invention has particular reference to dishwashers of the stationary type and especially to those embodied in or permanently combined with a sink structure but features of the invention are adaptable for various dishwashers and machines of a similar character where rapid circulation and forceful ejectment of a fluid are desirable.

The invention has for its object to reduce to a minimum the quantity of water employed and to evenly distribute numerous jets of water from an upstanding column so that the entire space surrounding the column will be included in the effective range and all of the dishes contained in the receptacle will be thoroughly cleaned by the impact and the flushing flow of the water jets over their surface.

Another object of the invention is to provide a motor driven worm or screw operating in a perforated cylinder with comparatively close fit so that the water will be elevated by the screw and subjected to considerable pressure from the screw to produce the numerous forceful jets of water issuing from the cylinder in all directions and substantially throughout the length of the cylinder.

Another object of the invention is to facilitate the return of the water to the lower end of the cylinder by means of stationary blades for preventing eddy currents therein and at the same time constituting a support for the basket containing the dishes.

Another object of the invention is to mount the motor permanently beneath the receptacle with provision for excluding water therefrom and for eliminating such water as may find its way along the motor shaft.

Another object of the invention is to provide for ready removal of the cylinder and screw for cleaning.

With the above and other objects in view the invention consists in the dishwasher as herein claimed and all equivalents.

Referring to the accompanying drawings, in which like characters of reference indicate similar parts in different views,

Fig. 1 is a central vertical sectional view of a dishwasher constructed in accordance with this invention;

Fig. 2 is a sectional plan view thereof on the plane of line 2—2 of Fig. 1;

Fig. 3 is a sectional detail view of the drain outlet and the removable strainer, and

Fig. 4 is a view similar to Fig. 1 of a modification in which the cylinder turns with the screw instead of remaining stationary.

In these drawings, 10 indicates a container which is preferably of enameled iron construction formed integral with a sink 12. As shown, it is of a general square section with rounded corners, although the sectional shape may be whatever is desired. The bottom preferably slopes toward the center at a considerable pitch, which will facilitate the water circulation, though at one corner there is a depression 13 containing the usual strainer 14 and waste connection 15, but in addition there is provided a cup-shaped removable strainer 16 for facilitating the removal of solids. In practice the drain outlet 15 is controlled by a valve, not shown, and is provided with the common overflow usual with bathtub drains, so that the water level within the container 10 may not exceed a predetermined elevation.

At the center of the depressed bottom of the container 10 is a screw coupling 17 having a conical head 18 to fit the conical depression of the bottom and this coupling is clamped permanently in place with rubber or other gaskets 19 between the abutting surfaces by means of a clamping nut 20, much in the same manner as the drain outlet coupling is connected to a sink in usual practice. Threaded on the protruding end of the screw coupling 17 is a motor housing cover 21 and removably attached to it is a motor housing 22 containing an electric motor, the armature of which is mounted on a shaft 23, which has a step bearing 24 in the end of the motor housing, and a bearing 25 in the motor housing cover. This shaft continues upwardly, preferably as a single shaft, to near the level of the top of the container 10 and surrounding it is a stationary tube 26 tightly fitting in the screw coupling 17 and extending to above the maximum water level so that water cannot overflow therethrough. The end of the shaft 23, which projects above the tube 26, is tapered and slotted to have a

tight fit in the tapering opening of a drive plug 27, which is fixed in the upper end of the bore of a screw sleeve 28, the slot in the end of the shaft taking one or more key pins 29 which extend across said plug and may also extend through the screw sleeve. The lower end of the screw sleeve has a bearing 30 around the tube 26.

A steep pitch blade 31, or a pair of such blades, as shown, extend the length of the screw sleeve and closely fit within a cylindrical casing or sprayer tube 32, which is provided with numerous perforations 33, through which the water is ejected by the screw. This casing 32 is preferably removably clamped within a ring 34 carried by radially arranged blades 35 of the head 18 of the screw coupling so that the lower end of the casing is spaced a sufficient distance from the head 18 to permit the returning water to enter the lower end of the casing. As shown, a set-screw 36 in said ring 34 serves to clamp the cylindrical casing and hold it stationary.

At its upper end the cylindrical casing 32 is provided with a cover plate 37 carrying a bearing 38 for the reduced upper end of the plug 27, thus giving another bearing for the shaft and assuring the centering of the shaft within the cylinder.

Another ring 39 connecting the outer ends of the blades 35 serves as a support for a basket containing the dishes and as a guard to prevent the hands from coming in contact with the screw.

A deflector disk 40 is fixed on the motor shaft below bearing 25 and serves to protect the motor from water which may find its way along the shaft, there being a gutter 41 into which the deflector disk would discharge such water and from which the water would drain through openings 42 provided for that purpose.

In operation it is not necessary with the present invention to use great quantities of hot water for the dishwasher is designed to operate with a minimum quantity of water, approximately one and a half gallons, or the capacity of an ordinary tea kettle, and the normal level of such quantity of water is approximately that of the top of ring 39. The dishes may be arranged on a basket as usual, or otherwise disposed in the container 10, and the motor is started. The motor running at a high speed causes the screw 31 to lift the water within the perforated casing and subject it to considerable pressure, forcing it out of the openings in all directions and for substantially the full length of the casing, the water issuing from such openings in forcible jets, reaching all exposed surfaces with such force as to thoroughly clean the dishes. The water returning to the bottom of the container is immediately taken up by the screw and again forced through the openings so that practically all of the water is in active operation all of the time. This permits of the operation being performed with a minimum quantity of water. The object in accomplishing the operation with a minimum quantity of water is to make it possible to use the water at or near the boiling temperature without the necessity for obtaining sufficient volume by adding water of lower temperature from the water supply as it is found that machines requiring more than the quantity of water that it is convenient to bring to boiling temperature will be operated inefficiently by the tempering of the water in this manner.

Inasmuch as the jets of water are ejected from the cylinder in all directions and at all elevations, all surfaces within the container are subjected thereto, making an efficient cleaning operation under all conditions and, as these jets are horizontal, there is no necessity for a cover for the receptacle, although such cover may be provided if desired. Upon completing the washing operation the drain may be opened to draw off the water and the motor may be continued in operation for a period to subject the dishes to an air bath for drying, the operation of the screw then serving as a fan to create the draft necessary for this purpose. When the motor is stopped and the basket of dishes removed all solid matter will be found collected in the removable strainer 16 and will be removed therewith.

While the perforated cylinder surrounding the screw is stationary, it is obvious that it may be made to rotate with the screw and the modification shown in Fig. 4 embodies this feature. In this construction the perforated cylinder 32′ is made to closely fit the screw 31 so as to turn therewith, the cover 37′ being permanently connected with the cylinder and removably connected with the plug 27′ by means of a screw 43. In this instance the cylinder is somewhat smaller than the ring 34 so as to turn freely therein and, of course, the set-screw 36 is omitted.

The operation of this form of the invention is like that of the other but the turning cylinder causes the jets of water to whirl with it and forcibly sweep over all exposed surfaces within the container.

The presence of the permanently fitted pipe coupling with its attached tube 26 permits of the use of the motor beneath the container without danger of its being injured by water and any water or oil that finds its way along the shaft will be discharged by the disk 40 before it reaches the motor windings. The blades 35 direct the water to the forcing screw, so that there is no delay in the return of the water to the action of the screw, and serve to prevent anything reaching the screw that will interfere with its operation. These blades with their rings also serve to support the basket of dishes and to position the cylin-

drical casing with respect to the screw so that they may fit closely without actually contacting and thus give great efficiency to the lifting and forcible ejecting action of the screw.

The cylindrical casing and the screw may be readily detached for cleaning and the walls of the container are freely accessible so that they may also be easily cleaned.

What I claim as new and desire to secure by Letters Patent is:

1. In a dish-washing machine, a container, a stationary upright perforated cylindrical casing mounted therein having a tightly closed upper end, and a motor-driven screw with its screw blades fitting within the cylindrical casing and extending substantially the full length thereof for lifting water and exerting pressure thereon for forcibly ejecting it through the perforations to produce radially extending powerful jets throughout the container.

2. In a dish-washing machine, a container, a stationary perforated cylindrical casing standing upright therein having a tightly closed upper end and extending to near the level of the top of the container, and a motor-driven screw with its screw blades having close-fitting relation with the walls of the casing to lift water therein and exerting pressure thereon to forcibly eject it through the perforations in all directions for substantially the full depth of the container.

3. In a dish-washing machine, a container, a stationary perforated cylindrical casing mounted on the bottom thereof having a tightly closed upper end, a motor beneath the container having its motor shaft passed through the bottom of the container and into the cylindrical casing, and a screw carried by the motor shaft with its screw blades having close fitting relation with the perforated walls of the cylindrical casing to lift water from the bottom of the container and exerting pressure thereon to forcibly eject it through the perforations of the casing in radially projected powerful jets.

4. In a dish-washing machine, a container, a threaded coupling member passing through the bottom of the container and forming a water-tight connection therewith, a stationary upstanding perforated cylindrical casing mounted on the coupling member within the container and having a tightly closed upper end, a motor threaded on the coupling member beneath the container and having its motor shaft passed through the coupling member, and a screw mounted on the motor shaft within the cylindrical casing for lifting water therein from the bottom of the container and exerting pressure thereon to forcibly eject it through the perforations in radially projected powerful jets.

5. In a dish-washing machine, a container, a threaded coupling member passing through the bottom of the container and having water-tight connection therewith, a stationary upstanding perforated cylindrical casing mounted on the coupling member within the container and having a tightly closed upper end, a clamping nut threaded on the coupling member and engaging the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passing through the coupling member, a tube projecting upwardly from the coupling member and surrounding the motor shaft and extending above the water level of the container, and a screw mounted on the motor shaft and surrounding the tube and working within the cylindrical casing to lift water from the bottom of the container and exerting pressure thereon to forcibly eject it through the perforations of the cylindrical casing in radially projected powerful jets.

6. In a dish-washing machine, a container, an upstanding motor shaft therein, a screw monuted on the motor shaft, and a stationary perforated cylindrical casing surrounding the screw and having a closed end forming a bearing for the end of the screw.

7. In a dish-washing machine, a container, an upstanding motor shaft therein, a stationary sleeve surrounding the motor shaft, a screw mounted on the motor shaft and having a bearing on the sleeve, and a stationary perforated cylindrical casing surrounding the screw and having a closed end forming a bearing for the upper end of the screw.

8. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the coupling member, a screw mounted on the motor shaft, radially extending blades on the coupling member within the container, a ring mounted on said blades above the bottom of the container, and a perforated cylindrical casing detachably connected with said ring and surrounding the screw.

9. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the coupling member, a screw mounted on the motor shaft, radially extending blades on the coupling member within the container, a ring mounted on said blades above the bottom of the container, and a perforated cylindrical casing detachably connected with said ring and surrounding the screw and having a closed end forming a bearing for the upper end of the motor shaft.

10. In a dish-washing machine, a container, a coupling member passing through

the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the coupling member, a tubular screw surrounding the motor shaft, a plug fitting in the upper end of the screw and having detachable key connection with the motor shaft, a perforated cylindrical casing surrounding the screw and detachably mounted on the coupling member, and a cover on the end of the cylindrical casing forming a bearing for the plug.

11. In a dish-washing machine, a container, a coupling member passing through the bottom thereof, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the coupling member, a disk mounted on the motor shaft above the motor and beneath the coupling member to protect the motor from water that may find its way along the motor shaft, a screw mounted on the motor shaft within the container, and a stationary perforated cylindrical casing surrounding the screw.

12. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor having its motor housing mounted on the coupling member and having its motor shaft passing through the coupling member, a disk on the motor shaft above the motor, there being a gutter in the motor casing into which the disk may discharge water which finds its way along the motor shaft, a screw mounted on the motor shaft, and a stationary perforated cylindrical casing surrounding the screw.

13. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the container, a screw mounted on the motor shaft, radially extending blades on the coupling member, an inner ring and an outer ring carried by said blades, and a perforated cylindrical casing secured to the inner ring and surrounding the screw, said outer ring serving as a guard to protect the exposed lower end of the screw beneath the casing.

14. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the coupling member, a sleeve on the coupling member surrounding the motor shaft, a tubular screw surrounding the sleeve, a plug fitting in the end of the tubular screw and having detachable key connection with the end of the motor shaft, and a perforated cylindrical casing surrounding the screw and forming a bearing for the plug.

15. In a dish-washing machine, a container, a coupling member passing through the bottom of the container, a motor mounted on the coupling member beneath the container and having its motor shaft passed through the container, a screw mounted on the motor shaft, a perforated cylindrical casing surrounding the screw, and radially extending blades on the coupling member within the container to direct water to the screw.

In testimony whereof I affix my signature.

FRANK G. BROTZ.