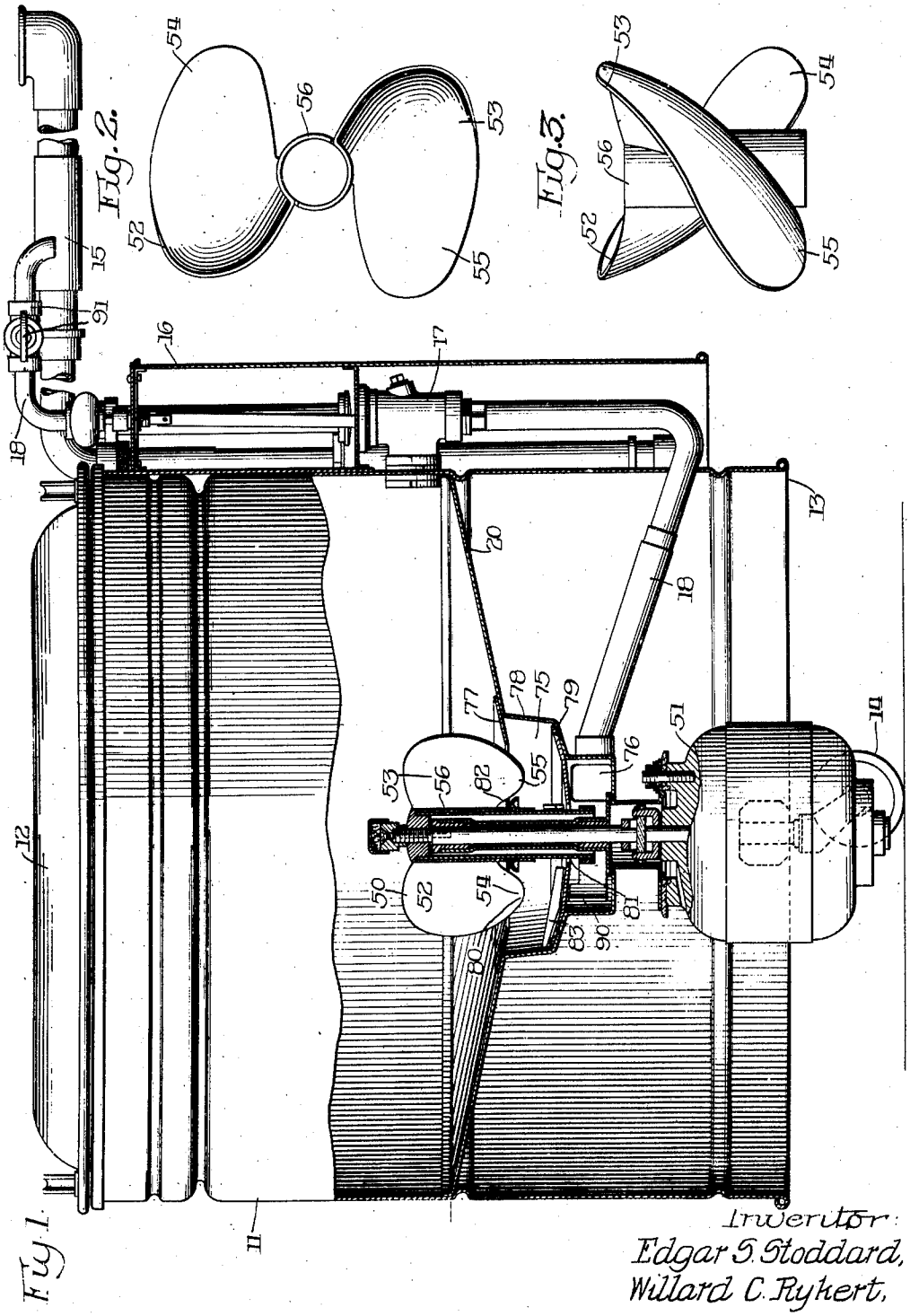
Aug. 28, 1934. E. S. STODDARD ET AL 1,971,588

DISHWASHING MACHINE

Filed Dec. 2, 1930 2 Sheets-Sheet 1



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Fig. 5

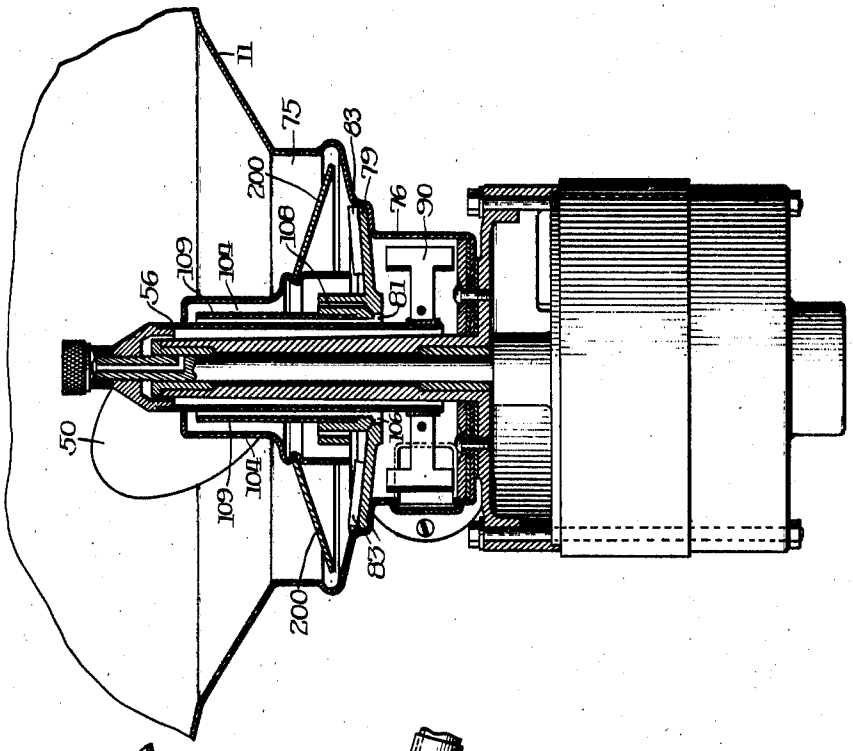
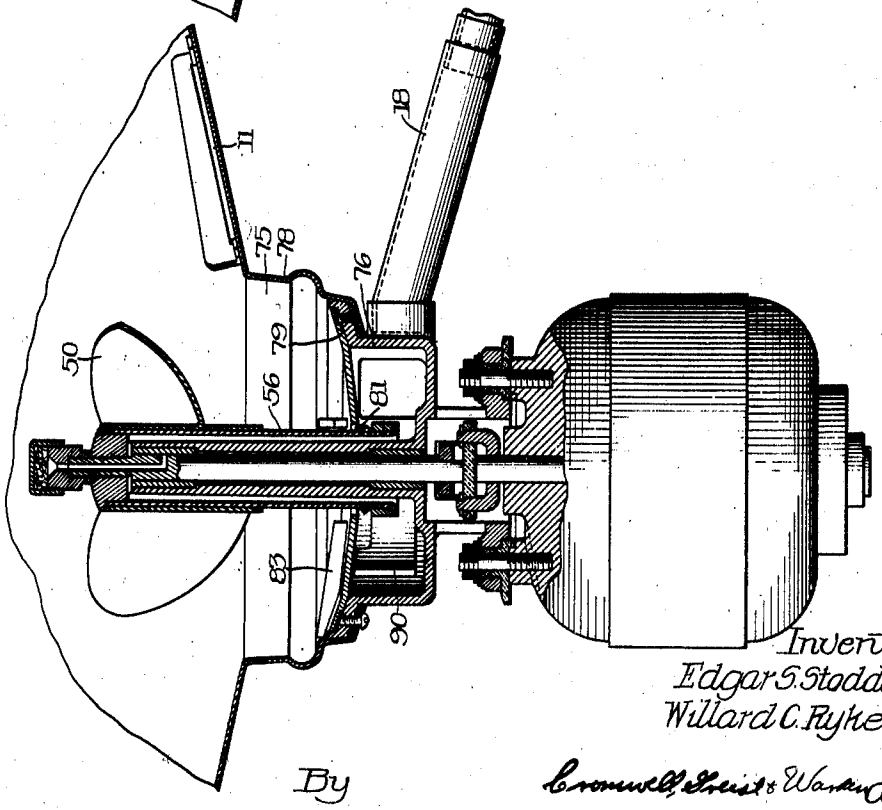


Fig. 4



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DISHWASHING MACHINE

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Application December 2, 1930, Serial No. 499,578

8 Claims. (Cl. 141—9)

The present application discloses and describes certain subject matter of our joint invention which also appears in the co-pending application of Edgar S. Stoddard, Serial No. 344,112, filed March 5, 1929.

This invention relates to improvements in liquid-containing machines and particularly relates to improvements in connection with dishwashing machines in which there is a constantly circulating body of liquid, which is utilized for the cleansing operation.

In most dishwashing and clothes washing machines a body of cleansing or rinse liquid is caused to be circulated and to be contacted with the materials being cleansed. During these cleansing and rinsing operations the liquids utilized will pick up a certain amount of suspended impurities and of grease, both of which have a tendency to decrease the efficiency of the cleansing or rinsing operation. If the liquid contains any substantial quantity of either dirt or grease particles the tendency will be to add such particles to the materials being cleansed rather than to remove them which is the primary purpose of the operation.

It is especially advantageous in the case of washing machines to remove any excessive amounts of grease from the circulating waters. Grease tends to hinder the action of the detergent agent such as soap and to result in decreased efficiency. If large amounts of grease are present in the material to be cleansed either it is necessary to use excessive charges of soap to completely emulsify the grease or the cleansing operation will not take place in a satisfactory manner. In addition, in discharging liquid containing machines of the character described, it is desirable to first discharge those portions of the liquid content which contain the largest proportion of dirt and grease particles, so that the latest discharge and cleaner portions of the liquids will serve to wash those liquids containing the impurities out of the machine.

One object of this invention is to provide a means by which the circulating liquids in liquid-containing machines may be continuously freed of dirt and/or grease particles. Another object of this invention is to provide a means for centrifugally separating dirt and grease particles from a body of liquid.

A further object of this invention is to provide a combination between a dishwashing machine and a centrifugal dirt and grease separator. Other objects will appear during the course of the following description.

In the preferred embodiment of the present invention a compartment is placed in communication with and below the main liquid containing chamber or the washing container in the case of dish and clothes washing machines. The compartment is preferably provided with an outer portion adapted to receive the heavier particles, with an inner portion which is adapted to receive the lighter particles, such as grease, with an intermediate space from which may be removed a substantially clean body of cleansing or rinse liquid, and with an outlet which is preferably situated in the lowest part of the compartment. This outlet may be caused to communicate with the intermediate zone if it is desired to remove the purified cleansing and rinse liquid therethrough. In case grease removal is the primary object the outer compartment may be omitted. Whereas in case dirt removal is the primary object the inner compartment may be omitted.

Although the present invention is shown embodied in a dishwashing machine of the type described or the spray projector type, it is obvious that it may be generally applied to all clothes washing and dishwashing machines. In dishwashing machines of the spray projector type there is a small screw-like impeller with spiral blades positioned in the lower part of the washing compartment. Only the lower part of this impeller is adapted to be immersed in liquid and as it turns it elevates liquid from the pool in the lower part of the washing compartment and sprays it at a high velocity upwardly and outwardly into the washing machine. This liquid will strike the articles to be cleansed at high velocity and will remove the dirt and grease particles therefrom. After having performed this function the liquid will then descend through the washing chamber, and usually in the outer portions thereof, and return to the liquid pool in the bottom of the machine. This return body of liquid will return to the central portion of the pool from which it is adapted to be picked up again by the impeller and projected upon the various objects in the interior of the machine. The centrifugal dirt and grease separating apparatus is preferably positioned directly under and closely adjacent to the central impeller.

The following drawings illustrate one embodiment of the invention as applied to the spray projector type of dishwashing machines, to which the invention is by no means restricted.

Fig. 1 represents a vertical sectional view of

the washing machine showing the impeller and the centrifugal separator apparatus;

Figs. 2 and 3 are enlarged top and side views of one type of impeller that may be used; and

Figs. 4 and 5 show modifications of the structure as shown in Fig. 1.

In Fig. 1 the washing machine is composed of a tank 11, provided with a cover or lid 12, and supported by the depending apron 13 and casters 14. The casters enable the washing machine to be readily moved from place to place. Baskets or trays (not shown) for holding the dirty dishes or other objects to be cleaned are adapted to be placed within the washing chamber. Liquid is admitted to the tank 11 of the machine by means of the conduit 15, which empties into the tank 16, which in turn drains into the main tank 11 by means of the conduit 17. Liquid is removed from the machine by means of a conduit 18 which communicates with substantially the lowest liquid-containing portion of the tank and its chambers.

The impeller 50 which is the liquid circulating and actuating device is positioned in the lower central part of the tank and is driven by means of an inferiorly positioned motor 51. This impeller (see Figs. 2 and 3) consists of two upwardly facing spoon-shaped or concave-shaped projectors 52 and 53 which are inclined upwardly and which are preferably of about the same size and shape. The lower part of these spoon-shaped projectors is continued downwardly to form the circular inclined screw surfaces 54 and 55. These screw surfaces are adapted to extend below the surface of the liquid pool in the bottom of the washing chamber of the tank 11 during operation. It will be noted that the lower portions of the inclined surfaces 54 and 55 are removed from the central cylinder 56, so that they are adapted to pick up water from an area removed from the central cylinder. The pitch of the inclined surfaces 54 and 55 is such that they are adapted to elevate water very rapidly as the impeller is rotated and the curvature of the surfaces 52 and 53 is such as to prevent the water from sliding off the side of the blades while projecting the water upwardly and outwardly against the articles to be cleansed. The particular construction and shape of these blades is more fully described in co-pending application Serial No. 344,111, filed March 5, 1929, which has matured into Patent No. 1,870,317, granted August 9, 1932.

In liquid communication with the lowest part of the main tank 11 is a well chamber 75 and below this well chamber, and in liquid communication with the lowest portion thereof, is an additional discharge chamber 76. The discharge chamber 76 communicates with the liquid discharge conduit 18 of the washing machine. The outer portion of the well chamber 75 is partially enclosed by means of the upper wall 77, the outer wall 78 and the lower wall 79. Both the upper wall 77 and the lower wall 79 are provided with circular openings 80 and 81 (see also Figs. 4 and 5) which are caused to be annular in shape due to the positioning of the cylindrical impeller apparatus 56 in the central portion thereof. The annular opening 80 is made much larger than the annular opening 81, and it is made of sufficient width so as to accommodate and receive the lower ends 54 and 55 of the impeller. Affixed to the central impeller apparatus is a shelf or lip 82 which is adapted to enclose the liquid in the central portion of the well chamber 75 adjacent the lower ends 54 and 55 of the impeller. This shelf or lip 82 rotates with the impeller structure, and its outer end is curved downwardly from the depending portions 54 and 55 of the impeller. The lower portion of the chamber 75 is provided with baffles 83 which tend to prevent rotary motion of the water in that portion of the chamber. The depending portions 54 and 55, the portion of tube 56 within the chamber 75 and the reaction through the opening 81 of the rotary blades of the centrifugal discharging device in the chamber 76 set up the rotary swirling motion in the chamber 75. If desired, however, the rotary motion may be set up by other means, for example, by means of outwardly projecting blades attached to that portion of the cylinder 56 which is within the chamber 75. The water in the separating chamber 75 should be set in rotary motion and according to the present invention it may be set in motion in any desired manner regardless of the shape or character of the water impelling device utilized.

The lower chamber 76 which may be combined with the upper chamber 75 in certain embodiments of the present invention also contains means for setting up a centrifugal motion of the water contained therein. In the particular embodiment of the invention shown this is accomplished by means of the outwardly projecting blade or blades 90 which are attached to the lower part of the central cylinder 56. As stated before, the lower chamber 76 communicates with a discharge outlet 18. When this discharge outlet is opened by means of the cock 91 the centrifugal force set up in the chamber 76 should be sufficient to exhaust substantially all the liquid contained in the tank, the blades 90 being shaped and positioned so as to accomplish this object. When the machine is not discharging the centrifugal device 90 is adapted to receive the heavier particles initially collected in the outer portion of the chamber 75 and force them into the discharge conduit 18 so that they will be removed from the machine at the first instant when the cock 91 is opened.

When the machine is in operation the water will pass upwardly and outwardly into the body of the tank 11 and return to the sloping bottom 20 which will cause it to drain to the central lower portion adjacent the chambers 75 and 76 and the impeller 50. As the liquid returns it will carry with it a large amount of dirt and grease from the articles being cleansed. This liquid will descend in large part into the chamber 75 by means of the circular opening 80. While in this compartment it will be set into rapid whirling motion as previously set forth and the dirt and grease particles will be thrown to the lower part and collected by the upper walls 77. At the same time the grease particles which are lighter will move towards the central portion of the pool and collect under the shelf portion 82 which is proportioned so that it will be about at the central level of the pool during operation. This will leave the portion of the body of liquid in the chamber 75 into which the depending portions 54 and 55 extend substantially free from either dirt or grease particles and the downwardly projecting portions 53 and 54 of the impeller will remove liquids from this portion of the chamber. The larger particles in the outer portion of the chamber 75 will gradually agglomerate and descend to the lower portions of such chamber and roll into the chamber 76 by means of the opening 81. The baffles 83 will prevent the swirling of the liquid in the lower part of the chamber 75 and thus prevent such particles from being picked up again in this cham-

ber. The centrifugal device 90 in the chamber 76 will force all the solid particles into the conduit 18 and will in this manner cause them to be exhausted first when the machine is being discharged.

Figures 4 and 5 set forth modifications directed particularly to the construction of the chambers 75 and 76. In Fig. 4 it will be noted that upper wall 77 of chamber 75 is not utilized nor is the lip 82. The small annular opening 81 is still present in wall 79 as are the baffles 83. And in all other ways this device is practically similar to the one shown in Fig. 1. A centrifugal motion is set up in the chamber 75 by means of rotation of the impeller 50, the tube 56 and the reaction through the opening 81 of the rotating blades of the centrifugal device in the chamber 76 as described. This modification is primarily for the removal of dirt particles from the cleansing material. The hindering effects of the grease particles may be taken care of by means of materials placed in the cleansing liquid.

By the centrifugal motion of the liquid in chamber 75 the dirt particles are forced downwardly and outwardly to the lower outer walls of the chamber 75. The baffles 83 prevent swirling of the water in the lower part of chamber 75 causing the dirt particles to agglomerate and pass downwardly along wall 79 through the annular opening 81 to chamber 76. Centrifugal motion is set up in chamber 76 by the blades 90 as described and the dirt particles forced outwardly and into the outlet 18.

Figure 5 shows the separation of dirt particles from the cleansing fluid as applied in a device that is more fully described and claimed in the co-pending application of Edgar S. Stoddard, Serial No. 389,696, filed August 31, 1929, which has matured into Patent No. 1,937,100, granted November 28, 1933. In this modification a valve mechanism regulates the amount of fluid necessary to operate the machine. The impeller tube 56 has positioned about it a generally bell-shaped stationary shell 104 spaced a substantial distance above the lower wall 79 of the chamber 75 to aid but not to interfere with efficient removal of food particles from the lower interior portion of chamber 75. The annular opening 81 in the lower wall 79 of chamber 75 is nearly closed by a sleeve valve annulus 108 positioned about the impeller tube 56 but spaced therefrom. This annulus seats upon the beveled edge 106 of the wall 79. Within the annulus 108 is a cylinder 109 enclosing the impeller tube 56 but spaced a substantial distance from said tube allowing for the passage of water and food particles between the tube 56 and the cylinder 109. It is also spaced from the top of shell 104 within which it is positioned.

The actuating device for this valve is described in the co-pending application mentioned above. It is sufficient for this invention to say that when the annulus 108 and cylinder 109 are in closed position on the beveled edge 106 the liquid from chamber 75 to enter chamber 76, must pass upwardly through the shell 104, over the top of cylinder 109 downwardly between the tube 56 and the cylinder 109 and through the partially closed annular opening 81 to chamber 76. When the valve is opened by lifting annulus 108 from its seat the liquid in chamber 75 may pass directly to chamber 76. Other similar valve arrangements may likewise be used such as a revolving sleeve valve, which in principle is the same as the vertically sliding sleeve valve as shown here.

Baffles 83 are positioned on the lower wall 79 of chamber 76 and lower chamber 75 has the centrifugal device with its blades 90 and its discharge conduit (not shown). As in the apparatus of Figs. 1 and 4 the liquid in chamber 76 is set into centrifugal motion and the dirt particles forced outwardly and downwardly to the non-swirling waters near the lower wall 79 and baffles 83. The dirt particles collect under shell 104 and are either forced upwardly along the channels described, if the sleeve valve 108 is closed, and downwardly into chamber 76, or, if the valve 108 is opened, directly into chamber 76 by way of the opening 81. In either case the dirt particles leave the chamber 75 first, and, due to the centrifugal motion of the liquid in chamber 76 caused by the rotation of blades 90, the dirt particles are forced out at once into a discharge conduit in the same manner (as described and with reference to the structure of Figures 1 and 4).

To aid the agglomeration of dirt particles in chamber 75 an annular apron 200 is positioned about the shell 104. This apron should extend from the shell 104 sloping outwardly and downwardly approximately to the junction of side wall 78 and lower wall 79. However, a substantial space should be left for the passage of fluid and dirt particles past and under the apron. This apron 200 serves to further prevent the possibility of the dirt particles' return to the cleansing fluid and aids in the settling and passing off of these dirt particles to chamber 76 and thence into the discharge conduit.

We claim:

1. In a dishwashing machine of the impeller type, the combination with a tank having a downwardly sloping bottom, of an apparatus for separating dirt and grease from a main body of wash water contained therein, comprising, a well chamber centrally positioned beneath said tank and open thereto, a discharge chamber centrally located beneath said well chamber and open thereto, an impeller shaft centrally positioned in said chambers, an impeller carried by said shaft and having at least a portion positioned within said well chamber, a discharge device carried by said shaft and positioned within said discharge chamber, means to rotate said impeller shaft, impeller and discharge devices, a plurality of baffles on the floor of the well chamber adapted to prevent the swirling of wash water at that point and means adapted to prevent the separated dirt and grease in said well chamber from returning to the wash water.

2. In a dishwashing machine of the impeller type, the combination with a tank adapted to contain a cleansing fluid, of an apparatus for separating dirt and grease particles from said fluid, comprising a well chamber centrally positioned beneath the tank and open thereto, an impeller shaft extending centrally through said chamber, an impeller carried by said shaft partially immersed in said fluid, means to rotate said shaft and impeller in said fluid, a lip carried by said impeller shaft adjacent the upper portion of said well chamber and an inwardly extending shelf in the outward upper portions of said chamber adapted to prevent the return of separated grease and dirt particles from said chamber to said cleansing fluid in said tank, a plurality of baffles on the floor of said chamber adapted to collect the separated dirt and grease particles and a discharge chamber positioned centrally below said chamber adapted for receiving and passing off said grease and dirt particles.

3. In a dishwashing machine of the impeller

type, the combination with a tank having a draining bottom, of means for separating dirt and grease particles from a main body of wash water contained therein, comprising, a well chamber centrally positioned beneath said draining bottom and open thereto, baffles on the well chamber bottom, an impeller shaft extending upwardly into said well chamber, an impeller carried by said impeller shaft, and means in said well chamber beneath said impeller for preventing separated dirt from returning to the main body of wash water in the tank draining bottom.

4. In a dishwashing machine of the impeller type, the combination with a tank having a draining bottom, of means for separating dirt and grease particles from a main body of wash water contained therein, comprising, a well chamber centrally positioned beneath said draining bottom and open thereto, baffles on the well chamber bottom, an impeller shaft extending upwardly into said well chamber, an impeller carried by said impeller shaft, and an apron in said well chamber positioned beneath said impeller for preventing separated dirt from returning to the main body of wash water in the tank draining bottom.

5. In a dishwashing machine of the impeller type, the combination with a tank having a draining bottom, of means for separating dirt particles from the main body of wash water contained therein, comprising, a well chamber formed in said tank bottom and open thereto, means for setting wash water in said well chamber in centrifugal motion, baffles on the floor of said chamber for settling out separated dirt particles, and means in said well chamber for preventing separated dirt particles from returning to the main body of wash water.

6. In a washing machine, a tank having a draining bottom, a well chamber communicating with the lower portion of said bottom, a rotatable upright spray projecting impeller mounted above said well chamber, a centrally perforated partition in said well chamber dividing the same into an upper compartment and a lower compartment, baffles on the upper part of said partition, a centrifugal pump in said lower compartment, and an outlet conduit communicating with said lower compartment and adapted to cooperate with said pump to eject water from said well.

7. In a washing machine, a tank having a draining bottom, an upright spray projecting impeller mounted above the lower portion of said bottom and spaced therefrom, a well chamber communicating with the lower portion of said bottom beneath said impeller, a centrally perforated partition in said well chamber dividing the same into an upper compartment and a lower compartment, baffles on the upper part of said partition adapted to retard rotation of water in the upper compartment, means in said lower compartment for ejecting water therefrom, and baffles positioned on the draining bottom of said tank adapted to retard rotation of water.

8. In a dishwashing machine of the impeller type, the combination with a tank having a draining bottom, of means for separating dirt particles from a main body of wash water contained therein, comprising a well chamber centrally positioned beneath said draining bottom and open thereto, baffles on the well chamber bottom, said well chamber having an inner marginal closure member and an outer marginal closure member, an impeller shaft extending upwardly into said well chamber, and an impeller carried by said shaft and extending into said well chamber between said closures.

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