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AIR FLOW CONTROLLER FOR DISHWASHING AND DRYING MACHINES

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Fig. 1.

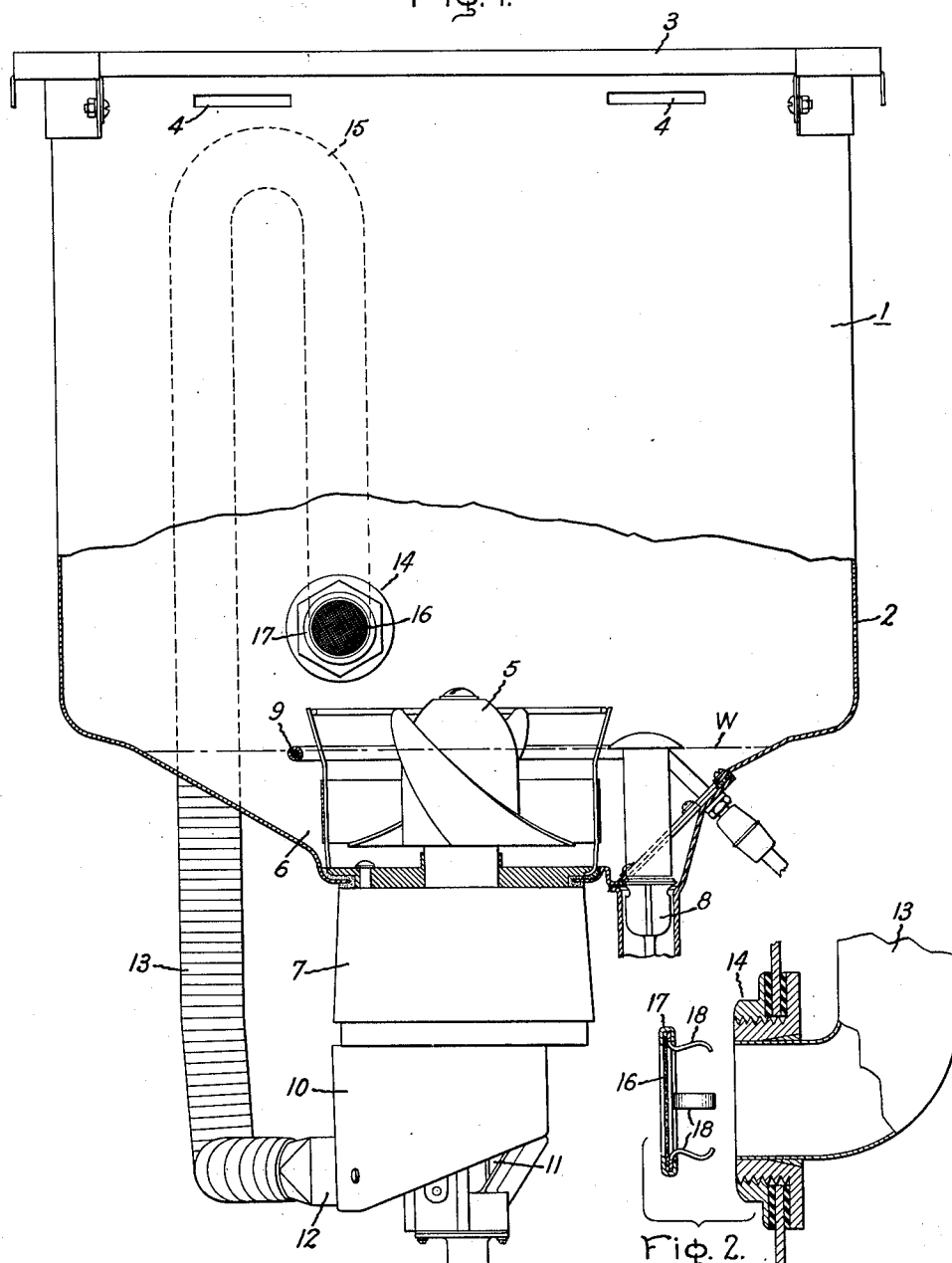


Fig. 2.

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AIR FLOW CONTROLLER FOR DISHWASH-
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My invention relates to dishwashing and dish drying machines and particularly to automatic air flow controlling arrangements for such machines.

Dishwashing machines are well known, in which the dishes, silverware, glasses, cooking utensils, etc. (herein generally called dishes) are placed in wire racks in a tub or vat and hot water or other cleansing liquid is violently sprayed or impelled against the dishes to clean them. At the end of the cleaning operation, whether it is controlled manually or automatically, the final rinsing water is drained out of the tub, the cover of the tub is opened or the tub is otherwise vented to the outer air, and the residual heat of the dishes then evaporates most of the moisture clinging to the dishes to dry them.

In order to hasten the drying operation, as well as to make it more complete, it has been proposed to introduce a supply of outside air into the tub during the drying part of the machine's operation. This outside air may be heated before it enters the tub, but a more satisfactory arrangement is to heat the air in the tub itself, the same heater being used to keep the cleansing liquids in the tub hot during the washing and rinsing operations. It is undesirable to introduce the drying air into the tub during the washing and rinsing cycles because such outside air may reduce the temperature of the cleansing liquids. Therefore, some provision is needed for preventing the introduction of outside air into the tub during washing and rinsing of the dishes, and for permitting and assisting the introduction of outside drying air into the tub during the drying operation.

The principal object of my invention is to provide a simple air-flow controlling arrangement for this purpose. This air flow control should be automatic in operation but have a minimum number of moving parts. It should be inexpensive, easy to manufacture, and should be readily removable from the tub for inspection, cleaning, repair, or replacement.

I have discovered that a simple screen element may be used to cover the opening in the wall of the tub for the incoming drying air, and that such a screen, when wet, will prevent air under low pressure from entering the tub, but the same screen will allow air to pass into the tub if liquid is not supplied to keep it wet. Thus, the operation of my novel air flow control is dependent upon the natural state or condition of the walls of the tub during the various cycles

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of operation of the machine. When the walls are wet by cleansing liquid being circulated in the machine, incoming air is blocked. When the cleansing liquid is not being circulated, and the walls are therefore not wet by the liquid, then air is permitted to enter the tub.

Other objects and further details of that which I believe to be novel in my invention may be clear from the following description and claims taken with the accompanying drawing, in which is illustrated an example of dishwashing and drying machine embodying the present invention and incorporating the novel screen for controlling air flow.

In the drawing, Fig. 1 is an elevational view of an exemplary dishwasher utilizing my invention, certain parts being shown as broken away for purposes of clarity in illustration, and Fig. 2 is an enlarged detail view of the screen element constituting the principal element of my invention shown detached from the air inlet with which it is used.

The dishwasher of the type to which my invention relates will include a tub or vat having substantially vertically extending side walls within which suitable dish-holding racks (not shown) are placed. The tub is closed by a cover which may be opened or removed in order to load dishes into the tub. In machines of the automatic type, the cover is automatically opened at the end of the washing and rinsing cycles so that the dishes may be dried. If desired, however, the cover need not be opened either automatically or manually during the drying operation if vents or louvers are provided in the walls of the tub for the escape of air.

When the machine is operated, a suitable source of hot water provides the tub with a given amount desirable for washing the dishes. The water supply is not shown because it may be any one of a number of well-known types. It is sufficient to state that with the tube of the dishwasher shown here, water will stand in the tub at the level of the dot-dash line W when the impeller or sprayer is not in operation.

The dishwashing and rinsing element may be in the form of a sprayer located in the tub at any convenient spot, such as the impeller 5, shown as located in the bottom or sump of the tub. The impeller is directly driven by a motor 7 located below the tub. If a sprayer of other design is used, a similar motor will be necessary for driving the pump which feeds the cleansing liquid to the sprayer head. The impeller shown in the drawing may be regarded as a sprayer be-

cause it sprays liquid from the sump upwardly and outwardly to rinse the dishes in the racks of the tub, in a continually circulating cycle. Cleansing liquid will run downwardly along the walls of the tub during the washing and rinsing operations of the machine so that the walls are being continually wetted by the cleansing liquid.

When washing and rinsing of the dishes is completed, water is drained from the tub as by the opening of a drain valve 8 located in the lowest spot of the tub. If no additional water is then supplied to the tub, the drying operation will proceed.

To assist in the drying operation, as well as to keep the temperature of the cleansing fluid high during the washing and rinsing operations, a heating element for air in the tub is provided. I have shown this heating element in the form of an annular sheathed type resistance element 9 surrounding the impeller at about the level of standing water W in the tub.

It is desirable that during the drying operation, a source of outside air be provided in order to scavenge the tub of moist air which is left over from the washing and rinsing operations. For this purpose, I provide a blower or fan 10 which may be located immediately below the sprayer pump or impeller motor 7 and be driven by the motor shaft. This blower is provided with an inlet 11 for air outside of the tub, and with an outlet 12 leading to an air duct 13 which is finally connected to an inlet fitting 14 located in a side wall of the tub. It will be noted that the air inlet opening 14 is located above the impeller and the standing water level and to one side of the axis of rotation of the impeller. The duct 13 is also preferably extended upwardly along the outside of the tub to a point near the top of the tub and is then turned downwardly as at 15 to be connected to the air inlet 14. This bend will prevent water from backing up into the air blower during operation of the machine, and will provide natural drainage for the air duct in case water is inadvertently introduced into the air duct.

With the arrangement shown, the blower will be continually supplying the tub with air under low pressure as long as the motor is operating. Also, as long as the motor is running, the impeller will also be rotated. Therefore, during normal washing and rinsing cycling of the machine, air will be introduced through the air inlet fitting 14 unless some means is provided to prevent it. My invention provides such a means for preventing the flow of air through the medium of a fine metallic screen 16 which is removably held within the opening of the inlet fitting 14. This screen has an annular outside frame 17 and spring legs 18 which have a frictional fit with the inside of the inlet opening 14, so that the screen may be removed and replaced within the opening. A 14-mesh brass cloth screen made of wire having a diameter of 0.020 inch has been found satisfactory for the purpose intended.

With the screen in place in the air inlet opening, and with water or cleaning solution being circulated by the sprayer-impeller within the machine, the pressure of air from the blower 10 is insufficient to allow air to enter the tub through the inlet 14 because the openings in the screen are covered by the cleansing liquid flowing down the walls of the tub. However, when water is drained from the tub and is no longer running down the walls, the openings in the screen will also drain and the air under low pressure from the blower will pass through the screen and into

the tub. The incoming air will thereupon be circulated by the impeller, which now acts as a fan, and the heater will heat the circulating air. Moisture-laden air will be exhausted from the tub through the louvers or openings 4 if they are provided, or through the opening in the tub closed by the cover when the machine is washing or rinsing. It will thus be seen that as long as washing or rinsing is being done by the machine, outside air will not be introduced for circulation. However, as soon as the washing or rinsing is completed, air from outside will be introduced so that the dishes may be dried.

The screen element may be readily removed for inspection, cleaning, or replacement or repair. It is automatic in its operation and has no moving parts whatever. Its inexpensiveness and ease of manufacture are obvious.

As will be evident from the foregoing description, certain aspects of my invention are not limited to the particular details of construction of the example illustrated, and I contemplate that various and other modifications and applications of the invention will occur to those skilled in the art. It is therefore my intention that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a dishwasher or the like, a tub adapted to contain articles to be washed, a sprayer for spraying cleansing liquid within the tub and against the walls thereof during washing operations, a source of low pressure air outside the tub, an air duct leading from said source to a side wall of the tub and opening into the tub, and a screen on the wall of the tub covering the opening of the duct into the tub, said screen being of a mesh so fine that when wetted the liquid clings to it to close the interstices through the screen to form a shield blocking the passage of said low pressure air into the tub.

2. In a dishwasher or the like, a tub adapted to contain articles to be washed, a sprayer for circulating cleansing liquid within the tub in a circulating pattern which wets the walls of the tub during washing operations, a source of low pressure air outside the tub, said tub having an air inlet opening in a side wall thereof, an air duct leading from said source to said inlet opening, a screen removably mounted over said opening on said side wall, said screen being of a mesh so fine that when wetted the liquid clings to it to close the interstices through the screen to form a shield blocking the passage of said low pressure air into the tub, and an air vent opening in said tub to allow escape of air therefrom when air is passing through said screen into said tub.

3. In a dishwasher or the like, a tub adapted to contain articles to be washed, a rotary impeller for circulating cleansing liquid within the tub and against the walls thereof during washing operations, a source of low pressure air outside the tub, an air duct leading from said source to a side wall of the tub and opening into said tub, a drain valve for draining water from said tub, and a screen on the wall of the tub covering the opening of the air duct into the tub, said screen being of a mesh so fine that when wetted the liquid clings to it to close the interstices through the screen to form a shield blocking the passage of said low pressure air into the tub.

4. In a dishwasher or the like, a tub adapted

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to contain articles to be washed, an impeller centrally located near the bottom of said tub for circulating cleansing liquid in the tub and against the walls thereof during washing operations, an electrical resistance heater in the tub adjacent the impeller, a source of low pressure air outside the tub, an air duct leading from said source to a side wall of the tub and opening through said wall into said tub, and a screen on the wall of the tub covering the opening of the duct into the tub, said screen being of a mesh so fine that when wetted the liquid clings to it to close the interstices through the screen to form a shield blocking the passage of air into the tub, whereby cleansing liquid will be heated and circulated in said tub during washing operations, and incoming air from said source will be heated and circulated during drying operations.

5. In a dishwasher or the like, a dishholding tub, a rotary impeller for circulating cleansing liquid within said tub, a heater in the tub adjacent the impeller, a source of low pressure air outside the tub, an air duct leading from said source to a side wall of the tub and opening into said tub, a screen on the wall of the tub covering the opening of the duct into the tub, said tub having a vent opening therein leading to outside of the tub, said screen being of a mesh so fine that when wetted the liquid clings to it to close the interstices through the screen to form a shield blocking the passage of air into the tub, whereby in the absence of liquid in the

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tub air will enter the tub through the screen, be circulated by said impeller, heated by said heater, and will escape through said vent opening.

6. In a dishwasher or the like, a dishholding tub, a sprayer for cleansing liquid which sprays liquid over the walls of the tub to wet them during washing of dishes in the tub, a source of low pressure air outside the tub, an air duct leading from said source to a side wall of the tub and opening into the tub, and a screen positioned in the tub over the opening of the passageway into the tub, said screen being formed from material of the order of fourteen mesh wire cloth, the wire having a diameter of the order of 0.020 inch whereby when wetted the liquid clings to the screen to form a shield which obstructs flow of low pressure air from said source through it.

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