March 22, 1966 R. S. BRADEN 3,241,563

FORCED AIR DRYING SYSTEM FOR A DISHWASHER

Filed March 11, 1964 3 Sheets-Sheet 1

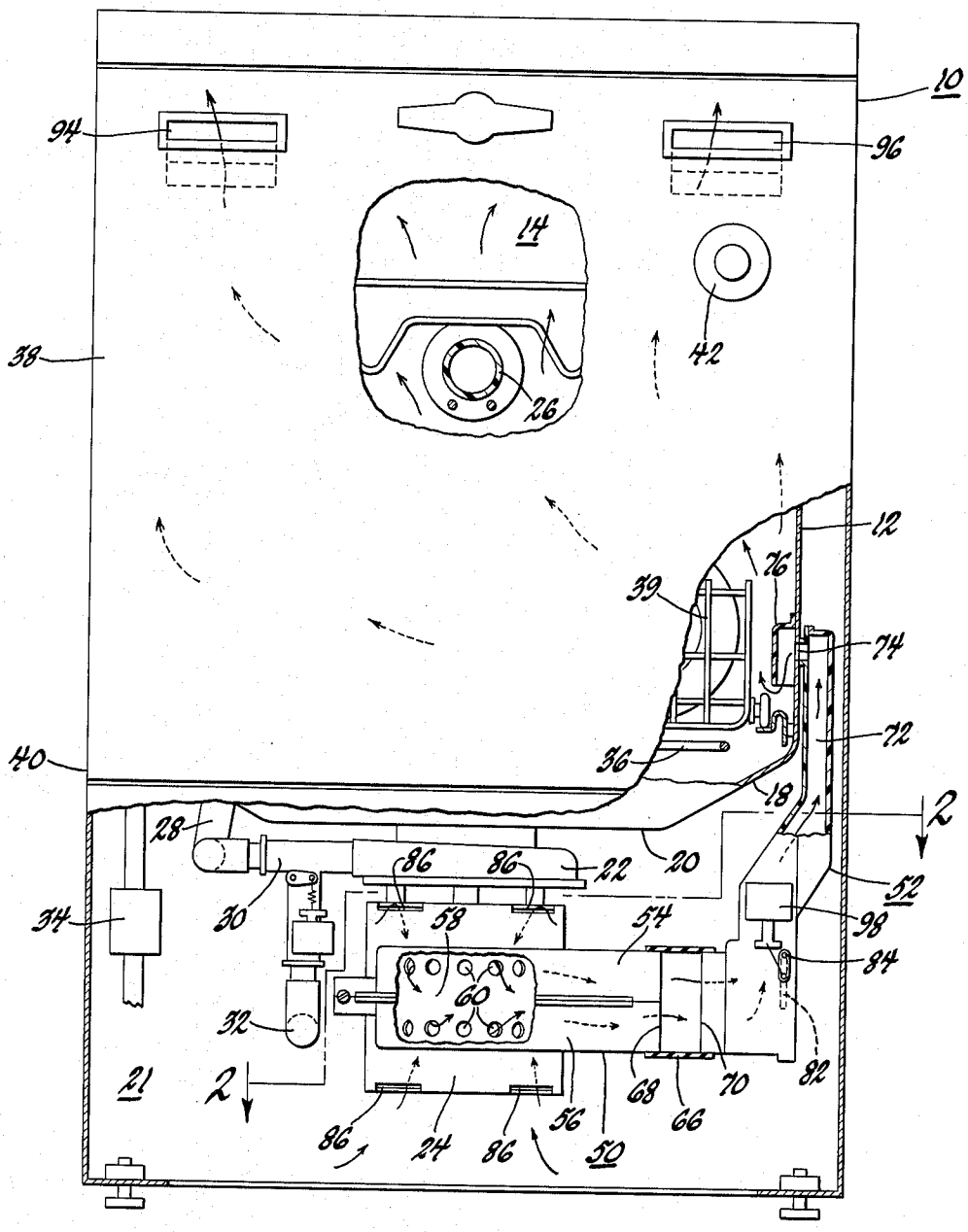

Fig. 1

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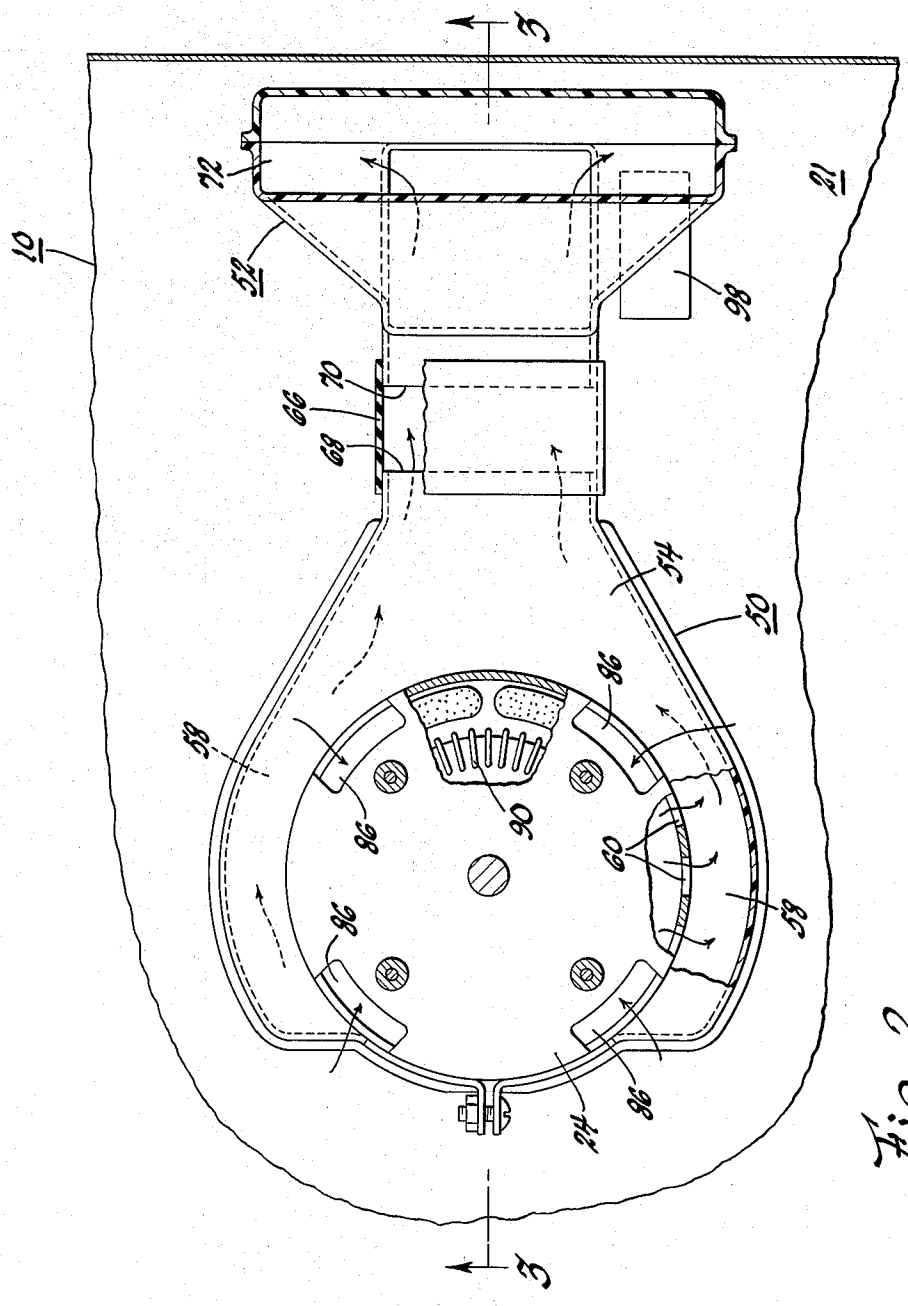

Fig. 2

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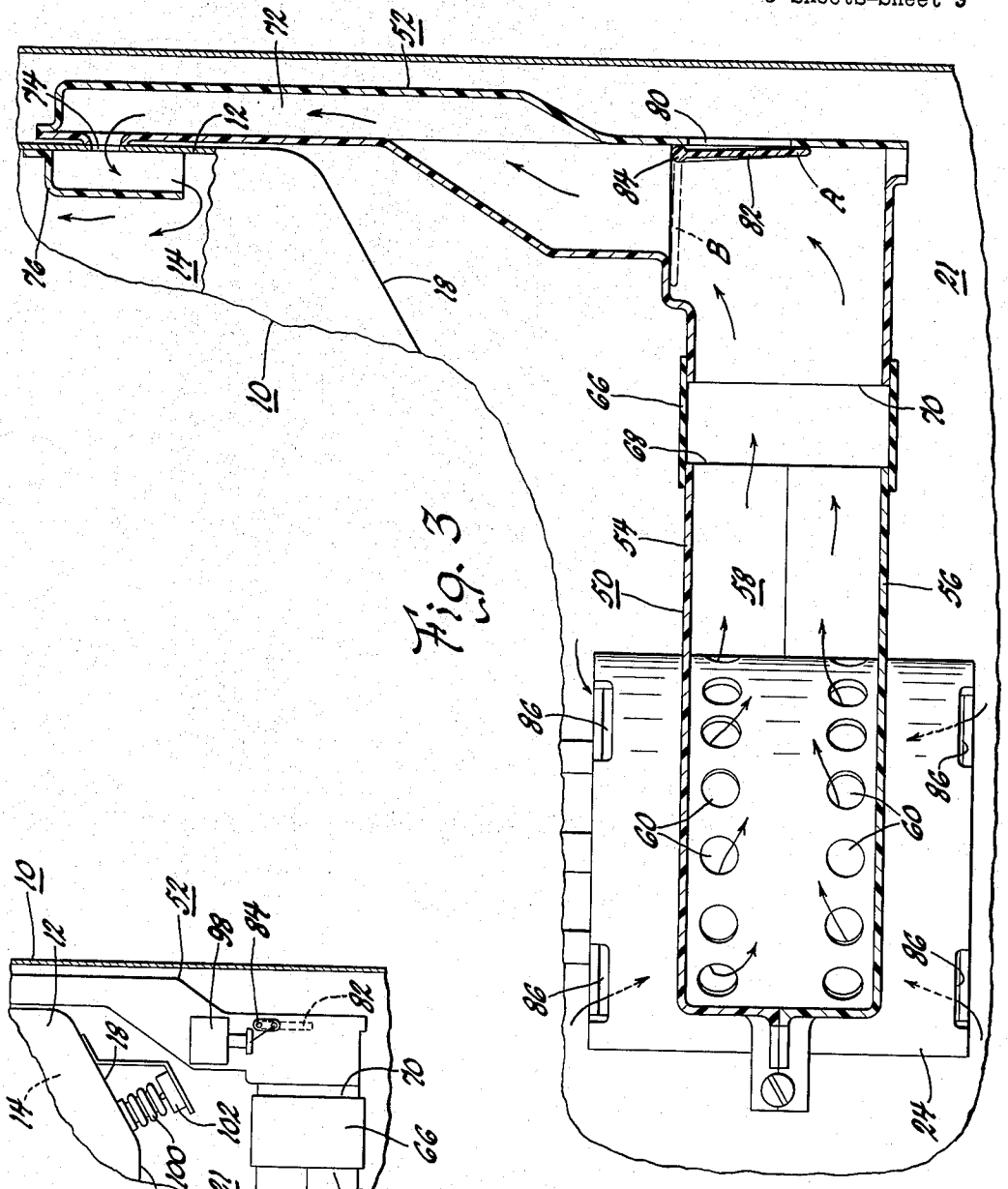

Fig. 3

Fig. 4

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3,241,563

FORCED AIR DRYING SYSTEM FOR A DISHWASHER

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5 Claims. (Cl. 134—57)

This invention relates to a domestic appliance and more particularly to an improved apparatus for drying in a dishwasher using the cooling air of the pump motor for the dishwasher.

Automatic dishwashers are generally provided with a drying cycle following the period during which the dishes are washed and rinsed. This drying cycle is generally accomplished by heating the dishes to sterilize them and to vaporize the moisture droplets therefrom. The prior art has also used a current of air through the dishwashing chamber, heated or otherwise, as an aid in drying the dishes during the drying period. This invention is directed to an improved forced air system for drying dishes or the like in an automatic dishwasher.

Accordingly, it is a general object of this invention to provide a forced air drying system for a dishwasher.

It is another object of this invention to provide in a dishwasher a forced air drying system which utilizes the cooling air from a dishwasher motor, thereby to economize on the heat necessary to perform the drying operation.

It is also an object of this invention to provide a forced air system for an automatic dishwasher which is adapted to exhaust to atmosphere the motor cooling air during the wash and rinse portions of an automatic dishwashing cycle and then to divert the motor cooling air through the dishwashing chamber during the drying portion of the automatic cycle, thereby to dry the dishes with heat from the motor.

A further object of this invention is the provision for such a forced air drying system of an air flow diverter means which is responsive to the dishwasher timer to divert air flow from the atmosphere to the dishwashing chamber at a predetermined time in said automatic cycle.

A still further object of this invention is the provision for such a forced air drying system of an air flow diverter means which is thermally responsive to temperature in the dishwashing chamber, thereby to initiate the flow of forced air through the dishwashing chamber after the dishes have been elevated to a sanitizing temperature by an auxiliary heater.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a front elevational view, with parts broken away, of a dishwasher suitable for use with this invention and provided with one embodiment thereof;

FIGURE 2 is a fragmentary sectional view, partly in elevation, taken along line 2—2 in FIGURE 1;

FIGURE 3 is a fragmentary sectional view, partly in elevation, taken along line 3—3 in FIGURE 2; and

FIGURE 4 is a fragmentary side elevational view similar to FIGURE 1 showing another embodiment of this invention.

In accordance with this invention and with reference to FIGURE 1, a dishwasher **10** is illustrated. The dishwasher **10** is comprised of a casing **12** which defines a dishwashing chamber **14** having a front opening. The

bottom of the dishwashing chamber **14** is closed by a bulkhead or bottom wall **18** which has a depressed sump area **20** in a central portion thereof. The sump leads to a pump **22** which is operated by an electric motor **24**. Within the dishwashing chamber **14**, a rotatably mounted spray tube **26** is positioned and interconnected with the pump **22** by way of a conduit **28**. Interposed in the fluid stream between the spray tube and the pump is a diverter valve **30** which may be selectively energized to direct the output of the pump either to the spray tube **26** or to a drain line **32**. Water may be admitted to the sump **20** by means of a water valve **34**, and an electric heater **36** is included in the sump for sanitizing the dishes at the conclusion of a dishwashing cycle and for aiding in the drying of the dishes in accordance with the teachings of this invention to be set forth more fully hereinafter. The heater **36** is also used to maintain the temperature of the water throughout the dishwashing cycle.

The front opening of the dishwashing chamber is closed by a door **38** which is hingedly mounted at **40** so that the door may be placed in a vertical position as shown for closing the dishwashing chamber and in a horizontally disposed position for loading the dishwasher—a dish supporting rack **39** being slidably removable on the door in its open position for this purpose. A conventional timer **42** is included in the door for selectively and sequentially operating the water valve **34**, the pump motor **24**, the heater **36** and the diverter valve **30** in a conventional dishwashing cycle. For additional details pertaining in particular to the dishwasher construction and control cycle therefor, reference may be had to the patent to Abresch et al. 2,734,520, issued February 14, 1956.

A conventional dishwashing cycle, such as taught in Abresch et al., may include the sequential periods of FLUSHING out the interior of the dishwashing chamber **14**, while the diverter valve **30** is conditioned to direct the water to drain; a FILL period during which time the valve **34** supplies wash water to the chamber **14** with the diverter valve **30** conditioned to direct water from the pump **22** to the spray tube **26**; a WASH period during which time the water is recirculated between the sump and the spray tube by the pump **22**; a DRAIN period during which time the diverter valve **30** is conditioned to direct the water from the sump to the drain **32** with the pump **22** operating; a second FILL period; a RINSE period during which the second fill is circulated to rinse the soiled wash water from the surface of the dishes; a second FLUSHING period followed by a third FILL period and a third RINSE period and a final DRAIN period. The foregoing cycle operations precede the DRYING cycle during which time the moisture droplets deposited on the dishes during the final rinse are vaporized from the surface thereof.

In a dishwasher constructed in accordance with this invention the rate at which the dishes are dried can be increased by introducing air, forced first through the motor for cooling thereof, and then into the dishwashing chamber during all or some portion of the drying cycle. In this manner the heat of the motor is added either exclusively to the drying chamber or in addition to the heat output of the heater **36** which may or may not be energized.

In accordance with the concept of this invention and turning now to FIGURE 1, the dish drying system is shown comprised of a blower housing assembly **50** and a heat duct assembly **52**, both of plastic such as Monsanto Corporation's 410 (ABS). In general, the duct work **50**, **52** conveys the cooling air from the motor **24** to the dishwashing chamber **14**.

More specifically, the blower housing assembly **50** is

comprised of an upper shroud 54 and a lower shroud 56 which snugly circumscribe the outer casing of the motor 24—the shrouds being spaced from the motor casing to form a duct 58 adjacent the motor cooling ports 60 in the motor jacket. A flexible conduit 66 interconnects one end 68 of the blower housing assembly with the inlet end 70 to the heat duct assembly 52 to minimize transmission of motor noise.

The heat duct assembly 52 is comprised of an upstanding duct 72 which communicates with the dishwashing chamber 14 through an opening 74 in the sidewall thereof—an inverted cup-like deflector 76 serving to prevent spray from entering the duct work. With reference to FIGURE 3, an opening 80 is provided in the lower end of the duct for selectively exhausting the cooling air of the motor into the machinery compartment 21 of the dishwasher and from there to atmosphere. A diverter valve or flapper 82 is pivoted at 84 between the solid line position A (FIGURE 3) wherein the air is channeled from the motor to the dishwashing chamber and a phantom line position B wherein the motor cooling air is exhausted into the machinery compartment.

Forced air currents are provided to the dishwashing chamber by the motor 24 which includes a casing having inlets 86 on the top and bottom of its casing as well as the outlet ports 60 around the side thereof. In accordance with conventional practice, an impeller 90 is rotatably mounted within the motor casing for rotation with the motor rotor, thereby to induce currents through the motor via the inlets 86 and the outlets 60 into the blower housing 50. Heat is entrained from the motor components in passing therethrough and this heat is added to the dishwashing chamber 14 whenever the flapper valve 82 is in its A position. Air entering the dishwashing chamber 14 through the deflector 76 exhausts from the dishwashing chamber by means of vents 94, 96 extending through the door 38 of the dishwasher.

In one embodiment the damper 82 may be moved between the positions A and B by means of a solenoid 98 which is selectively energized by the timer 42 at the start of the drying cycle or at some time shortly thereafter.

In another embodiment and with reference to FIGURE 4, the damper 82 may be moved in response to the temperature within the dishwashing chamber 14 by means of a temperature responsive device 100 which actuates a switch 102 in series with the solenoid 98. In this arrangement it is possible to allow time for the temperatures within the dishwashing chamber to increase sufficiently to sanitize the dishes before the motor is energized and the cooling air thereof is diverted through the dishwashing chamber to carry away the vapors from the drying operation and to dry the dishes.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination, casing means defining a vented chamber for washing dishes or the like, means for supplying water to said chamber, means for distributing the water supplied throughout said chamber in a washing cycle, a motor for driving said distributing means, said motor including means for directing an air stream in heat exchange relation therewith for cooling thereof, said last named means including an outer motor casing having a motor cooling inlet port in communication with the atmosphere and a motor cooling outlet port for exhausting the waste heat of the motor and an impeller within the motor casing between said motor cooling inlet port and said motor cooling outlet port for effecting an air stream from said inlet port to said outlet port, and means for drying in said chamber, said drying means including duct means having an inlet in communication with said motor cooling outlet port on the downstream side of said motor for receiving the air stream after it has been heated by the motor and having a first and second outlet, said first outlet being in communication with said chamber, said second outlet being in communication with the atmosphere, and diverter means in said duct means for selectively connecting said inlet to said first outlet for directing the heated air stream through said chamber for drying the dishes or the like with the waste heat of the motor and for connecting said inlet to said second outlet for directing the heated air stream to atmosphere.

2. The combination of claim 1 including drain means operable between a wash position when said diverter means is selectively connecting said inlet to said second outlet and a drain position when said diverter means is selectively connecting said inlet to said first outlet.

3. The combination of claim 2 including timing means in control relationship with said means for supplying water, said drain means, said motor means and said diverter means.

4. In combination, casing means defining a vented chamber for washing dishes or the like, means for supplying water to said chamber, means for distributing the water supplied throughout said chamber in a washing cycle, motor means for driving said distributing means, said motor means including means for directing an air stream in heat exchange relation therewith for cooling thereof, and means for drying in said chamber, said drying means including duct means having an inlet in communication with said air stream on the downstream side of said motor means for receiving the air stream after it has been heated by the motor means and having a first and second outlet, said first outlet being in communication with said chamber, said second outlet being in communication with the atmosphere, diverter means in said duct means for selectively connecting said inlet to said first outlet for directng the heated air stream through said chamber for drying the dishes or the like with the waste heat of the motor means and for connecting said inlet to said second outlet for directing the heated air stream to atmosphere, drain means operable between a wash position when said diverter means is selectively connecting said inlet to said second outlet and a drain position when said diverter means is selectively connecting said inlet to said first outlet, and actuator means in control relationship with said diverter means, said actuator means being responsive to temperatures in said chamber whereby to effect the connection of said inlet to said first outlet after the temperature in said chamber reaches a predetermined value high enough to sanitize said dishes or the like.

5. The combination of claim 4 including heater means operable before said diverter means is controlled to connect said inlet to said first outlet whereby to sanitize said dishes or the like.

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