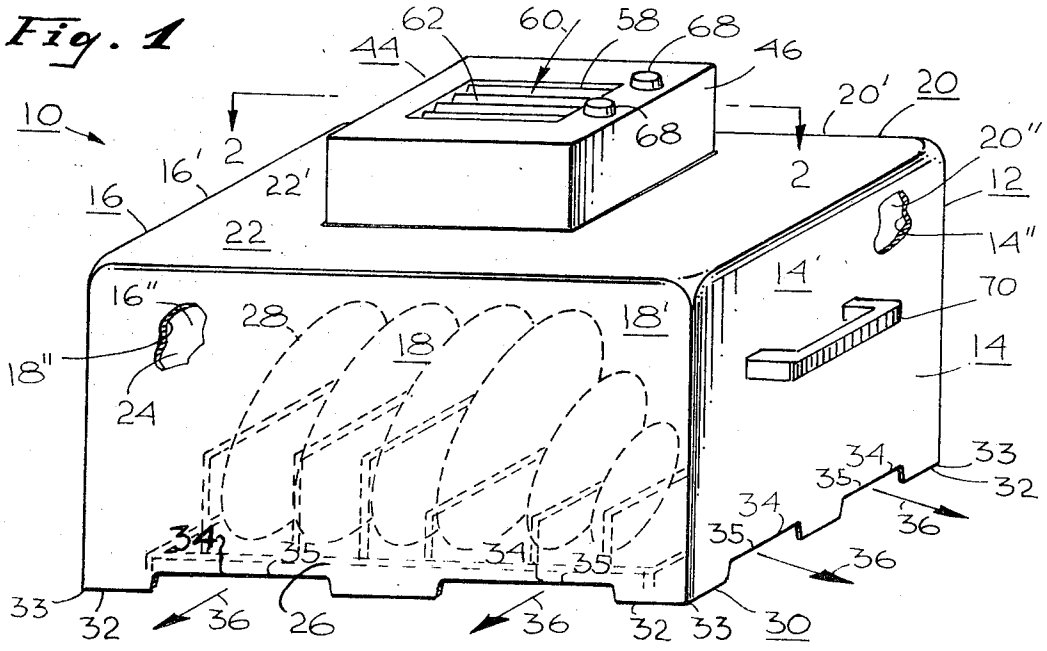
May 26, 1970 B. PAUL 3,513,567

DRYING ARRANGEMENT

Filed June 20, 1968 2 Sheets-Sheet 1

Fig. 1



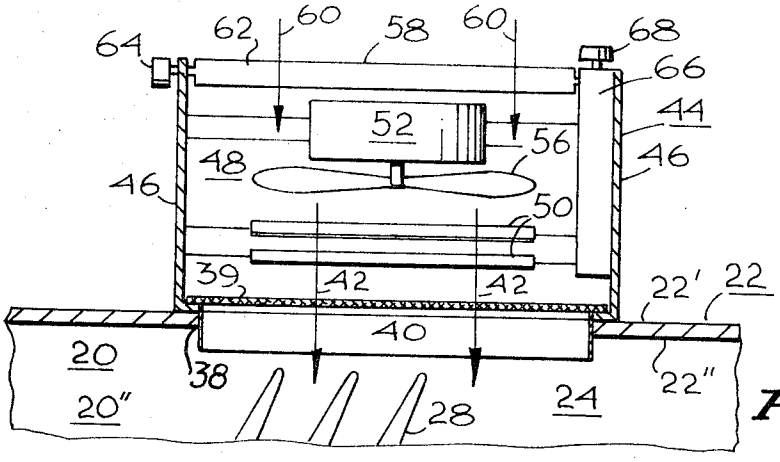


Fig. 2

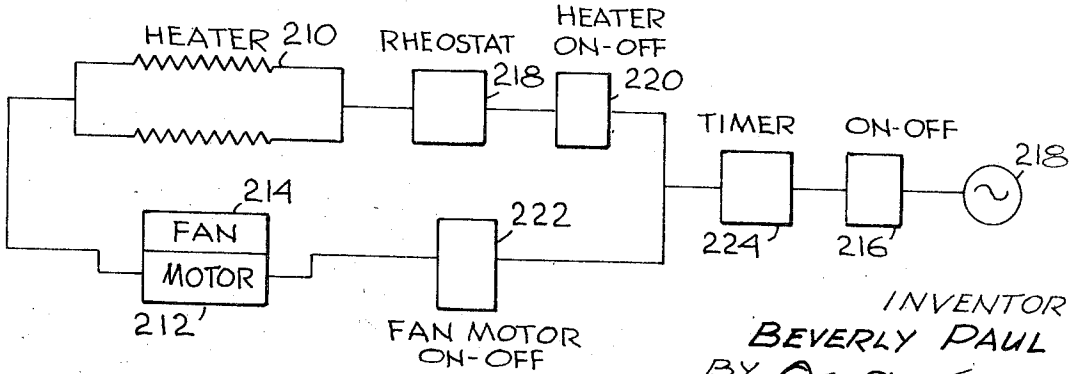


Fig. 5

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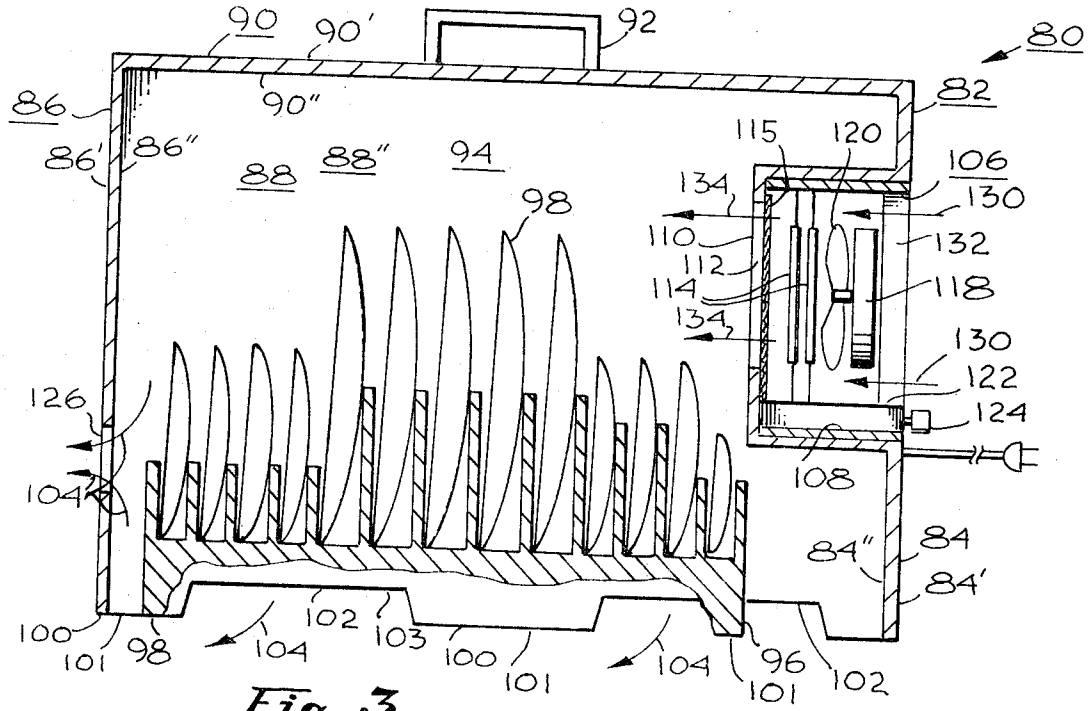


Fig. 3

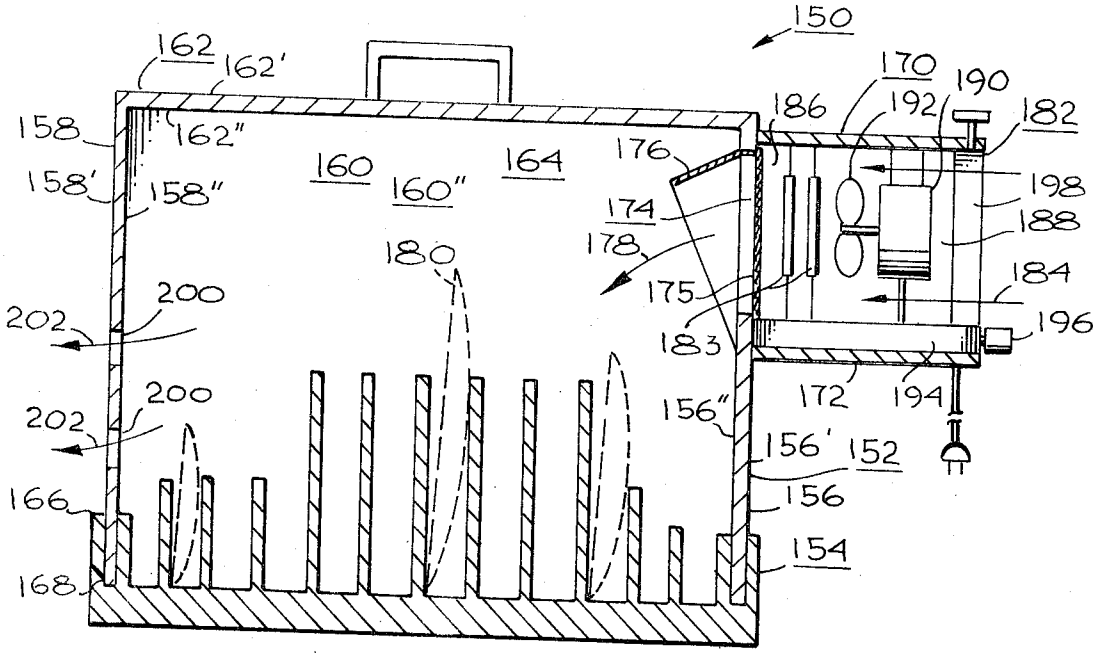


Fig. 4

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3,513,567

DRYING ARRANGEMENT

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Int. Cl. F26b 21/00
U.S. Cl. 34—233 9 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed herein an improved drying arrangement particularly adapted for drying dishes, silverware, pots and pans, etc. As disclosed, there is provided a hood member having side walls, end walls and top, and the hood is positionable over, for example, a dishrack in which the material such as dishes, bowls, silverware, pots and pans, etc., may be placed. The hood member is provided with an electrical heater means and an electrical motor-driven air fan means to draw air over the heater means, through an air inlet means in the hood member and into a drying volume in the interior of the hood member. The air, in passing over the heater means is heated. The heated air then flows over the material to be dried in the dishrack and in so doing increases the rate of evaporation of water from the material to dry rapidly the material. Air outlet passages are appropriately provided to allow the continuous flow of air into and out of the drying volume in the hood member.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to the drying art and, more particularly, to an improved arrangement for drying dishes, silverware, pots, pans, utensils and the like.

Description of the prior art

In most industrial, restaurant, commercial and home applications, it is necessary to dry dishes, plates, bowls, silverware, pots, pans, utensils and the like after they have been utilized and then washed. In industrial and commercial applications such as restaurants, there is often provided complete washing and drying arrangements operating on a large volume basis and, in some instances, on a continuous rather than a batch basis.

In home applications, there has been utilized in the past an automatic dishwasher that incorporates both the dishwashing and then the drying function and operating on a batch basis through a predetermined cycle. While such common home dishwashers may be conveniently installed when a house is being built, often there are many homes and apartments of an older vintage, or so constructed, that installation either on a permanent or a portable basis of such an available dishwasher cannot be made. Persons occupying such premises are, therefore, often left to manual washing and drying of the above-mentioned material.

Since the washing cycle or washing time, when done manually, is comparatively short compared to the drying time, particularly where the drying must be done manually, it has long been desired to provide a comparatively small, portable, easily handled unit that, after the dishes had been washed and stored in an appropriate dishrack for draining, my be placed over the dishrack to provide increased evaporation of the water contained thereon to thereby dry the material in a comparatively short time. Thus, even though some residences and/or industrial or commercial establishments may be provided with automatic dishwashers that incorporate both the washing and drying cycle, there are many instances when in such establishments a comparatively small amount of material must be washed and dried, and it is uneconomical and/or too time-consuming to send the comparatively small amount of material through the complete cycle in the automatic dishwasher. In such instances, it is desirable, then, to provide the above-mentioned drying arrangement whereby the small amounts and/or special amounts of materials may be rapidly dried after being washed. Such instances often occur where, for dietary reasons, such as in kosher homes or restaurants the materials cannot be intermixed with materials utilized for other food products.

Further, most of the residential-type dishwashers that incorporate the complete dishwashing and drying cycle in one unit not only require a connection to a source of electrical energy but also to a water inlet and a water drain. Such units often only provide conventional free convection heating of the air in the unit and free convection of the air over the material contained therein.

Thus, there has long been a need for a comparatively portable dishdrying unit that requires only connection to a source of electrical energy and that will provide comparatively rapid drying of material such as dishes, pots, pans, silverware, utensils and the like.

SUMMARY OF THE INVENTION

Accordingly, it is an object of applicant's invention herein to provide an improved drying arrangement.

It is another object of applicant's invention herein to provide a drying arrangement for the drying of dishes, pots, pans, utensils, silverware and the like.

It is yet another object of applicant's invention herein to provide a drying arrangement in which rapid drying of material placed therein is achieved.

The above and other objects of applicant's invention are achieved, in one embodiment of applicant's invention, by providing a hood member having substantially parallel and oppositely disposed side walls and end walls, and a top. The top is connected to the side walls and end walls to define a drying volume therein. At least one of the side walls, end walls and top is provided with air inlet means, and one other is provided with air outlet means.

An electrical heater means, such as an electrical resistance heater, and an electrical motor-driven air fan means are positioned adjacent to the air inlet means, and the fan means draws air from the external environment through the air inlet means over the heater means through a protective screen and into the drying volume. The heated air is directed to flow through the drying volume and out the air outlet means.

The hood member may be positioned over, for example, a conventional dishrack in which dishes, plates, pots, pans, utensils, silverware, etc. (specified collectively in this patent application as the material to be dried), and the forced convection of the heated air provided by the fan means provides rapid drying of the material.

In other embodiments of applicant's invention, the heater means and the fan means, as well as their appropriate controls, are all coupled to a shell means which is, in turn, coupled to the hood means adjacent to the air inlet means. This modular construction allows convenient removal of all the electrical apparatus in applicant's improved drying arrangement for convenient servicing and the like.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects may be more fully understood when the following detailed description taken together with the accompanying drawing, wherein similar reference characters refer to similar elements throughout and in which:

FIG. 1 illustrates one embodiment of applicant's invention;

FIG. 2 is a sectional view along the line 2—2 of FIG. 1;

FIG. 3 illustrates another embodiment of applicant's invention;

FIG. 4 illustrates another embodiment of applicant's invention; and

FIG. 5 is a block diagram of an electrical circuit useful in the practice of applicant's invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, FIG. 1 illustrates one embodiment of applicant's invention generally designated **10**. As shown in FIG. 1, there is provided a hood member **12** having a pair of substantially parallel, oppositely disposed end walls **14** and **16** and a pair substantially parallel, oppositely disposed side walls **18** and **20** and top means **22** coupled to the end walls **14** and **16** and side walls **18** and **20** to define a drying volume **24**. Each of the end walls **14** and **16**, side walls **18** and **20**, and top **22** have exterior surfaces **14'**, **16'**, **18'**, **20'** and **22'**, respectively, and interior surfaces **14''**, **16''**, **18''**, **20''** and **22''**, respectively. It will be appreciated that the interior surfaces **14''**, **16''**, **18''**, **20''** and **22''** define the drying volume **24**.

The hood member **12** is positionable over, for example, a dishrack **26** which may be loaded with material **28**, such as dishes, plates, bowls, pots, pans, utensils, silverware and the like to be dried. In this embodiment of applicant's invention, the hood member **12** fits completely around and over the dishrack **26** and material **28** contained therein so that the material **28** and dishrack **26** are positioned within the drying volume **24**.

Each of the end walls **14** and **16** and side walls **18** and **20** have bottom edge portions **30**, and a first section **32** of these bottom edge portions **30** define leg means **33** upon which the hood **12** rests when supported over the dishrack **26**.

Second sections **34** of the bottom edge portions **30** comprise cut-away members defining air outlet means **35** through which air from drying volume **24** may leave the drying volume **24** to regions external the hood member **12**, as indicated by the arrows **36**.

As shown more clearly in FIG. 2, the top **22** is provided with a protective screen means **39** adjacent an air inlet means **38** which, in this embodiment of applicant's invention may comprise louvers **40** adapted to direct the flow of air indicated by the arrows **42** into the drying volume **24** in pre-selected directions to pass over the material **28** contained therein. The louvers **40** may be either fixed, as shown in FIG. 2, or movable so that the predetermined direction for the flow of the air, as indicated by the arrows **42**, may be changed as desired.

A shell means **44** having shell walls **46** defining a cavity **48** therein is coupled to the external surface **22'** of the top **22** adjacent the air inlet means **38**. In this embodiment of applicant's invention, the shell means **44** is shown as a rectangular prism. It will be appreciated however, that any desired geometric form may be provided for the shell means **44**.

An electrically energized heater means **50** is coupled to the shell walls **46** and shell means **44** in the cavity **48** and the heater means **50** may, for example, be electrical resistance heaters, or the like. It will be appreciated that the particular heater means utilized in the practice of applicant's invention herein is immaterial to the purpose hereof.

An electrical motor **52** is also coupled to the shell walls **46** of the shell **44** for support within the cavity **48** and the electrical motor **52** drives an air fan **56** that is adapted to draw air through vent means **58** in the shell walls **46** of the shell **44**, as indicated by the arrows **60**, over the electrical heater means **50**, through the screen **39** and air inlet means **38** and into the drying volume **24**. The vent means **58** may, if desired, also be

provided with louvers **62** that, as shown on FIG. 2, are pivotally mounted on the shell walls **46** for rotation by louver control knob **64** to vary both the quantity of air that may be drawn into the cavity **48** as well as the direction thereof.

A control box **66** is also coupled to the shell walls **46** of the shell **44** in the cavity **48** and, as described below, the control box **66** contains the appropriate controls for operation of the electrical heater means **50** and the electrical motor **52** operating the air fan **56**.

In operation, the hood member **12** is positioned over the dishrack **26** containing the material **28** to be dried and, by operation of the appropriate controls **68**, as described below in greater detail, the temperature of the air as indicated by the arrow **46** that passes through the cavity **48**, over the heaters **50** and into the drying volume **24** may be controlled to dry the material **28** as desired.

Thus, it is apparent that in applicant's invention the material **28** to be dried is dried in a comparatively short time since the air, as indicated by the arrows **42**, entering the drying volume **24** passes over the material **28** in forced convection, rather than free convection, and exits from the hood member **12** as indicated by the arrows **36**. The forced convection, of course, drastically increases the rate of evaporation of water from the material **28** to thereby provide a comparatively rapid drying cycle compared to free convective air flow drying.

For convenience, one or more handle means **70** may be provided on the hood member **12** to allow convenient lifting and placing thereof.

It will be appreciated that the louver **62** in the air vent **58** and/or the louvers **40** in the air inlet **38** may be either fixed or movable or may be pre-contoured into a pre-desired shape for direction of the air flow. Further, variations of the size of the opening for air flow into the cavity **48**, as indicated by the arrows **60**, or into the drying volume **24**, as indicated by the arrows **42**, may be provided, for example, by movable louvers to increase or decrease the air flow as desired.

FIG. 3 is a sectional view of another embodiment of applicant's invention generally designated **80**. As shown thereon, the embodiment of applicant's invention designated **80** comprises a hood member **82** that, if desired, may be similar to the hood member **12** described above and is comprised of parallel, oppositely disposed end walls **84** and **86** having exterior surfaces **84'** and **86'**, respectively, and interior surfaces **84''** and **86''**, respectively, a pair of substantially parallel, oppositely disposed side walls of which, in FIG. 3, only side wall **88** is shown, which has an interior surface **88''** and an exterior surface **88'** (not shown), and a top **90** having an interior surface **90''** and an exterior surface **90'**. A handle **92**, in this embodiment of applicant's invention, is coupled to the top **90** to allow convenient lifting in placing of the hood **82**.

The interior surfaces **84''** and **86''** of the end walls **84** and **86**, **88''** of side walls such as **88** and **90''** of top **90**, define a drying volume **94** therebetween. The hood **82** is positionable over a dishrack **96** containing material to be dried **98** and the end walls **84** and **86** and side walls such as side wall **88** have bottom edge portions **98**. A first section **100** of the bottom edge portions **98** are adapted to define leg members **101** for supporting the hood member **82** in position over the dishrack **96**, and second sections **102** defining air outlet passages **103** for the outlet of air from the drying volume **94** as indicated by the arrows **104**.

In this embodiment of applicant's invention, a shell member **106** having shell walls **108** are coupled to the interior surface **84''** of the end wall **84** so as to project within the drying volume **94** and leave the exterior surface **84'** of the end wall **84** substantially planar. Air inlet **110** is in the side wall **84** adjacent to the shell means **106** and, if desired, may be comprised of louvers **112** which, if desired, may be fixed or may be movable as described above for the louvers **40** in the air inlet **38**

of the embodiment shown in FIGS. 1 and 2. A protective screen **115** may, if desired, also be provided.

An electrical heater means **114** is positioned within the cavity **116** defined by the shell walls **108**, as is a motor **118** and air fan **120**. It will be appreciated that the electrical heater **114**, electrical motor **118** and air fan **120** may be similar to the electrical heater **50**, electrical motor **52** and air fan **56** described above. Similarly, a control box **122**, together with control knob **124**, which may be similar to the control box **66** and control knob **68** described above, are provided coupled to the shell wall **108**.

In addition to the air outlets **103** in this embodiment of applicant's invention, there may also be provided, if desired, an additional air outlet **126** in the opposite end wall **86** to allow the exit or air from the dry volume **94** therethrough as indicated by the arrows **104'**.

Operation of this embodiment of applicant's invention is similar to the operation of the embodiment of applicant's invention, as described above in connection with FIGS. 1 and 2 in that after the hood **82** has been positioned over the dishrack **96**, the electrical heater **114** may be energized and the air fan **120** turned on to draw air as indicated by the arrows **130** through the vent **132** in the shell **106**, through the air inlet **112** as indicated by the arrows **134** into the drying volume **94**, over the material to be dried **98** and out the air outlet **102** and, if provided, **126**. The forced convection of the heated air over the material to be dried **98** provides rapid drying thereof.

In the above embodiment of applicant's invention, applicant has described her invention as utilized in a hood arrangement that could be positioned over any desired dishrack, or other holder arrangement for supporting the material to be dried.

It will be appreciated that applicant may also practice her invention in a self-contained arrangement in which a preselected dishrack is incorporated. FIG. 4 illustrates one such embodiment of applicant's invention generally designated **150**. As shown on FIG. 4, there is provided a hood member **152** and a pre-selected dishrack **154**. The hood member **152** may be similar to the hood member **82** or hood member **12** described above as provided with a pair of substantially parallel oppositely disposed end walls **156** and **158** having exterior surfaces **156'** and **158'**, respectively and interior surfaces **156''** and **158''** respectively. The hood member **152** is also provided with a pair of oppositely disposed side wall members of which only side wall member **160** is shown, and the side wall **160** has an interior surface **160''** and an exterior surface **160'** (not shown). A top **162** having an exterior surface **162'** and an interior surface **162''** is coupled to the side walls such as **106** and end walls **156** and **158** to define a drying volume **164** therebetween.

In this embodiment of applicant's invention, the pre-selected dishrack member **154** has a peripheral rim portion **166** in which the bottom edge portions **168** of the side walls such as **160** and end walls **156** and **158** of the hood member **152** are supported.

A shell member **170** is provided with shell walls **172** as coupled to the exterior surface **156'** of the end wall **156** adjacent to the air inlet **174** therein and protective screen **175**. The air inlet **174** in this embodiment of applicant's invention may be provided with pre-formed shaped louvers **176** which, as desired, may be either fixed as shown in FIG. 4 or movable to direct the air flowing therethrough as indicated by the arrow **178** in pre-selected directions towards the dishrack **154** to pass over the material to be dried **180**.

Vent means **182** are provided in the shell walls **172** of the shell means **170** to allow the flow of air as indicated by the arrow **184** therethrough into the volume **186** defined by the shell walls **172**. An electrical heater means **188** and an electrical motor means **190** driving an air fan **192** are coupled in the cavity **186** in the manner similar to that described above, and operation thereof through the control box **194** and control knobs **196** may be similar to that described above. The air vent **182** may be provided with louvers **198** which, as desired, may be either fixed or movable to increase or decrease the amount of air flowing therein as indicated by the arrow **184**.

In this embodiment of applicant's invention, air outlet means as indicated by the air passages **200** in the end wall **158** are provided to allow the exit of air from the drying volume **160**, as indicated by the arrows **202**.

It will be appreciated that many of the features and variations of the embodiment described above may be incorporated with different features than the particular structure indicated. That is, for example, the position of the shell means **106** in the drying volume **94**, as shown in the embodiment illustrated in FIG. 3, could equally well be utilized, for example, in the embodiment **10** shown in FIGS. 1 and 2 by positioning shell means **44** thereof on the interior surface of the top **22**. Similarly, the shell means for supporting the electrical units utilized in the operation of the applicant's invention provides a unique modular construction that allows removal of the entire electrical controls and operating mechanism for service as desired or replacement. However, it will be appreciated that such modular construction need not be provided, but the heater, fan and control may be separately coupled to any desired structure including the structure of the hood member itself.

For convenience, applicant has shown in the various embodiments of her invention illustrated in FIGS. 3 and 4, the shell members connected to an end wall. Such shell members and the air inlet to the drying volume could, as desired, be positioned in a side wall or the top.

FIG. 5 is a block diagram of an electrical circuit useful in the practice of applicant's invention. It will be appreciated that any desired degree of complexity of the electrical circuit may be incorporated. Thus, the circuitry as shown includes an electrical heater **210**, an electric motor **212** driving an air fan **214**. In relatively uncomplex versions of applicant's invention, there may also be included only an on-off switch **216** between the source of electrical energy **218** and the heater **210** and motor **212**. However, if desired, a rheostat **218** to vary the electrical energy flowing to the heaters **210** may be provided to vary the temperature of the air that flows into the drying volume in applicant's invention. Similarly, a separate on-off switch **220** for the heater **210** may be provided so that independent operation of the heater and the fan **214** may be provided. Similarly, a fan motor on-off switch **222** may be provided so that the fan **214** may be operated without operating the heater **210** and, conversely, the heater **210** may be operated without operating the fan **214**. For automatic control, applicant prefers that a timer **224** be provided so that fully automatic operation after turning the main switch **216** on may be accomplished. The circuitry indicated by the block diagram shown in FIG. 5 may be incorporated in any of the embodiments in applicant's invention herein and, it will be appreciated, the various controls such as the rheostat **218**, heater on-off switch **220**, fan motor on-off switch **222**, main on-off switch **216** and timer **224** comprise the controls **226** generally for operation of applicant's invention and each will be provided with the appropriate control knobs for selective operation thereof.

This concludes the description of applicant's invention of an improved dryer arrangement. From the above, it can be seen that applicant has provided a drying arrangement particularly adapted to the drying of pre-washed dishes, plates, pots, pans, utensils and the like that, by utilizing forced convection of heated air, increases the rate of evaporation of the water therefrom to provide fast drying thereof. Those skilled in the art may find many variations and adaptations of applicant's invention, and the following claims are intended to cover all such varia-

tions and adaptations falling within the true scope and spirit of applicant's invention herein.

What is claimed is:

1. A dishdrying arrangement comprising in combination:

a hood member having a pair of oppositely disposed side walls, a pair of oppositely disposed end walls coupled to said side walls, and a top coupled to said pair of side walls and said pair of end walls, and each of said top, said side walls and said end walls, having an exterior surface and an interior surface, and said interior surfaces thereof defining a drying volume therebetween, and said hood member positionable over a dishrack holding material to be dried;

air inlet means in a least one of said pair of side walls, said pair of end walls and said top, and air outlet means in a least one other of said pair of side walls, said pair of end walls and said top;

electrical heater means adjacent said inlet means;

electrical motor-driven air fan means adjacent said heater means for drawing air over said heater means, through said air inlet means and into said drying volume to dry said material in said dishrack;

means for energizing said electrical heater means and said electrical motor-driven air fan means;

control means for controlling operation of said electrical heater means and electrical motor-driven air fan means;

a shell means having shell walls defining a cavity therein, a vent means in said shell walls for allowing flow of air into said cavity; and

said heater means and said fan means coupled to said shell walls for support adjacent said air inlet means; and

at least one of said air inlet means and said vent means comprise louver means for directing air flow therethrough in predetermined directions.

2. The arrangement defined in claim 1 wherein:

said pair of side walls and said pair of end walls each having bottom edge portions, and a first section of said bottom edge portion defining legs for supporting said hood member over said dishrack, and second sections of said bottom edge portion defining said air outlet means.

3. The arrangement defined in claim 1 wherein:

said air inlet means is in said top and said shell means is coupled to said exterior surface of said top.

4. The arrangement defined in claim 1 wherein:

said air inlet means is in said top and said shell is coupled to said interior surface of said top.

5. The arrangement defined in claim 1 wherein:

said air inlet means is in a first of said pair of end walls of said hood member; and

said shell means is coupled to said outside surface of said first of said pair of end walls.

6. The arrangement defined in claim 1 wherein:

said dishrack has walls defining a peripheral rim thereabout;

said pair of side walls and said pair of end walls have bottom edge portions for engagement with said peripheral rim portion of said dishrack for positioning said hood means over said dishrack.

7. The arrangement defined in claim 6 and then further comprising:

said air inlet means is in a first of said pair of end walls;

a shell means coupled to said outside surface of said first of said pair of end walls adjacent to said inlet vent means therein, and said shell means having shell walls defining a cavity therein, and vent means in said shell walls for allowing the flow of air into said cavity;

a screen means coupled to said shell walls adjacent to said air inlet means;

said heater means and said air fan means coupled to said shell walls in said cavity for support adjacent said air inlet means;

said air oulet means in the other of said pair of end walls;

said air inlet means in said first end wall and said vent means in said shell walls comprising louvers for directing air flow therethrough in predeterminted directions; and

said control means comprising:

rheostat means for controlling the temperature of said heater means;

timer means for controlling operation of said electrical heater means and said air fan means; and

main switch means for controlling flow of electrical energy from said means for energizing said heater and said fan means to said electrical heater means and said air fan means.

8. The arrangement defined in claim 1 wherein:

said air inlet means is in a first of said pair of end walls of said hood member; and

said shell means is coupled to said inside surface of said first of said pair of end walls.

9. A dishdrying arrangement comprising, in combination:

a hood member having a pair of oppositely disposed side walls, a pair of oppositely disposed end walls coupled to said side walls, and a top coupled to said pair of side walls and said pair of end walls, and each of said top, said side walls and said end walls having an exterior surface and an interior surface, and said interior surfaces thereof defining a drying volume therebetween, and said hood member positionable over a dishrack holding material to be dried;

air inlet means in at least one of said pair of side walls, said pair of end walls and said top, and air outlet means in at least one other of said pair of side walls, said pair of end walls and said top;

electrical heater means adjacent said inlet means;

electrical motor-driven air fan means adjacent said heater means for drawing air over said heater means, through said air inlet means and into said drying volume to dry said material in said dishrack;

means for energizing said electrical heater means and said electrical motor-driven air fan means; and

control means for controlling operation of said electrical heater means and electrical motor-driven air fan means, and said control means comprising:

rheostat means for controlling the temperature of said electrical heater means;

first switch means for controlling flow of electrical energy from said means by energizing said heater to said electrical means;

second switch means for controlling flow of electrical energy from said means for energizing said fan means for controlling the flow of electrical energy to said air fan means; and

timer means for controlling the cycle of operation of at least one of said electrical heater means and air fan means.

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JOHN J. CAMBY, Primary Examiner

U.S. Cl. X.R.

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