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3,220,229

CLOTHES WASHER AND DRYER

Filed Dec. 13, 1963

4 Sheets-Sheet 2

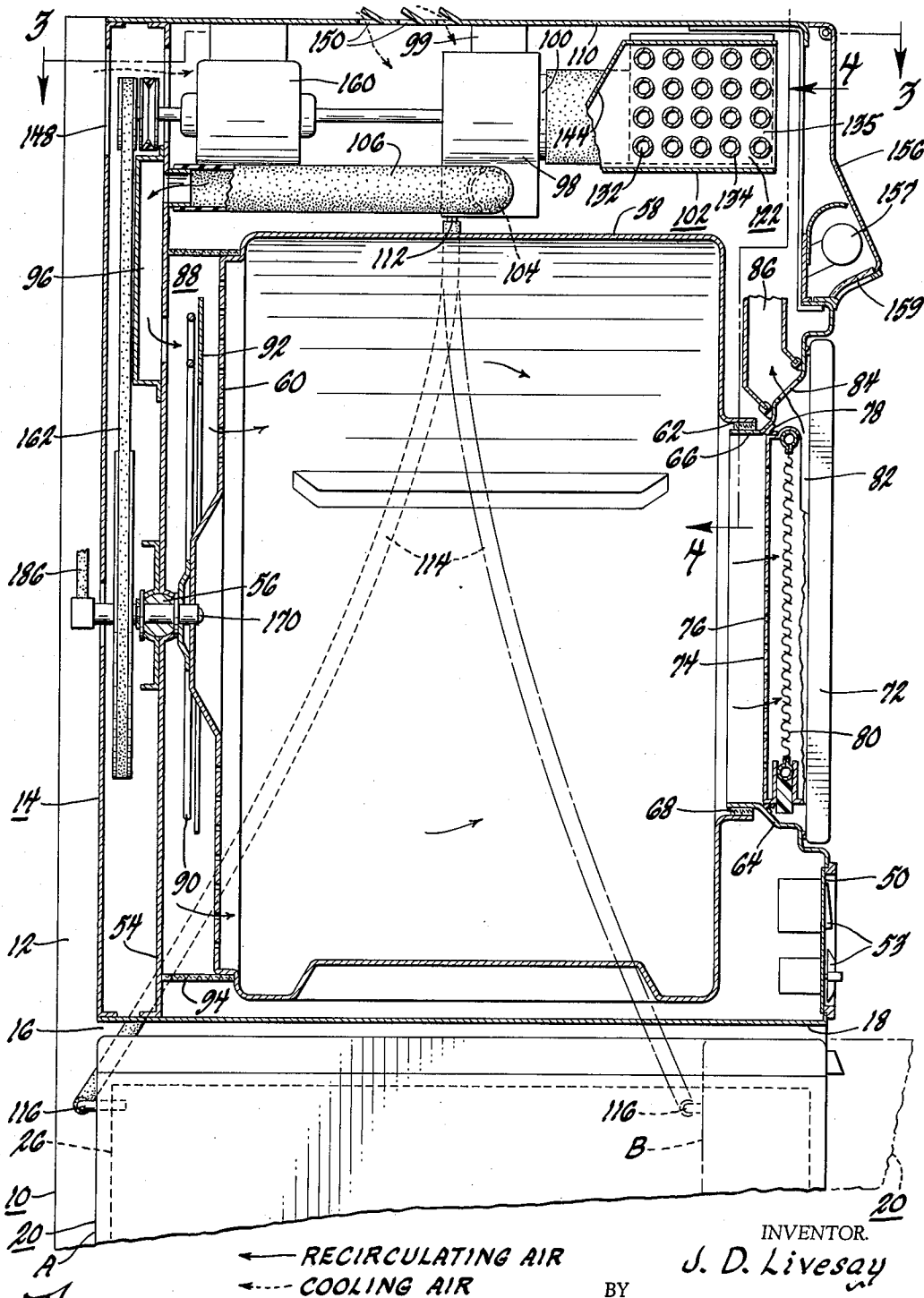


Fig. 2

← RECIRCULATING AIR
 - - - COOLING AIR

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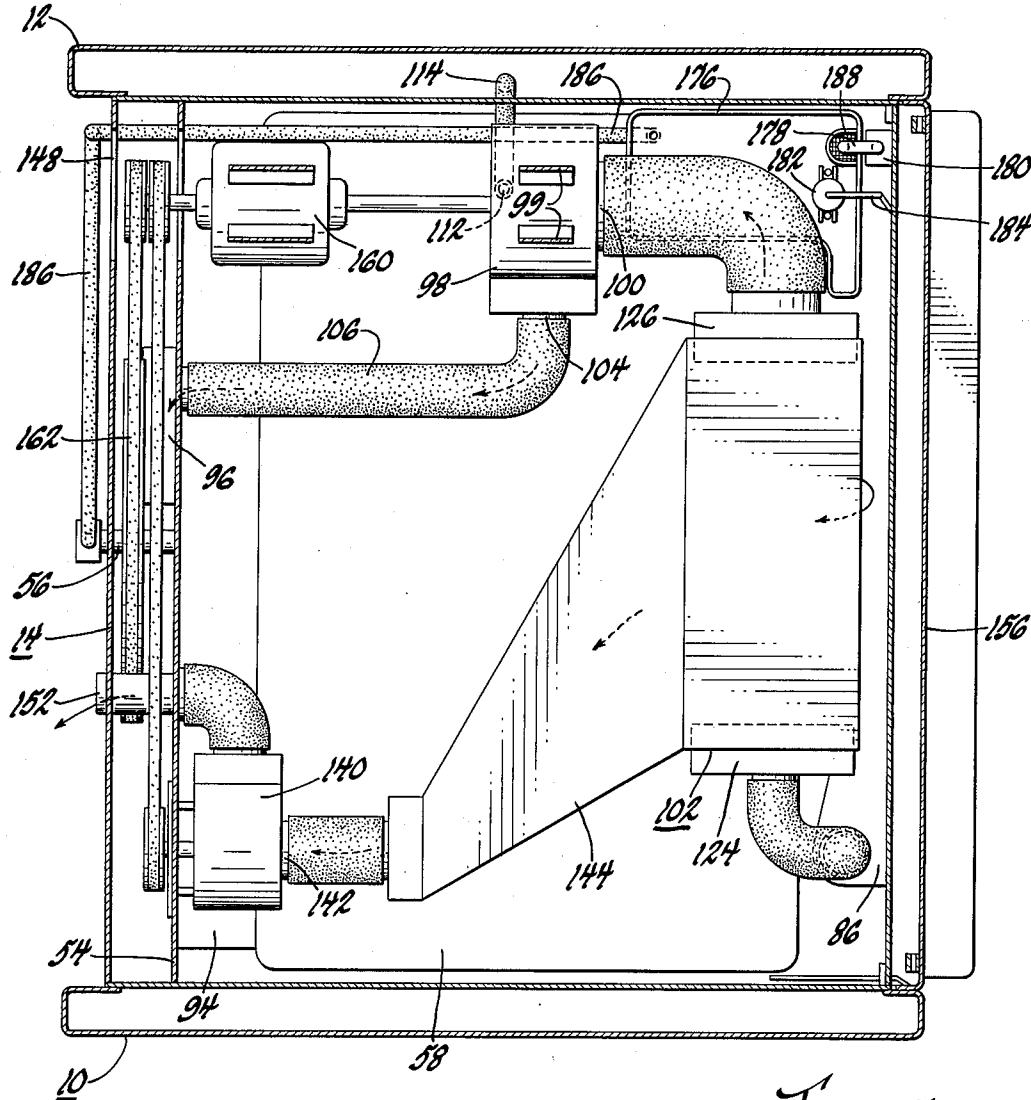


Fig. 3

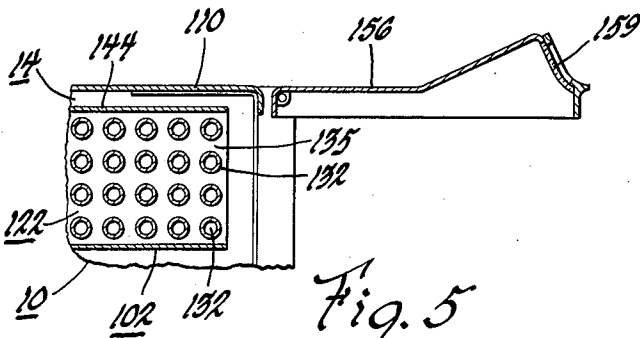


Fig. 5

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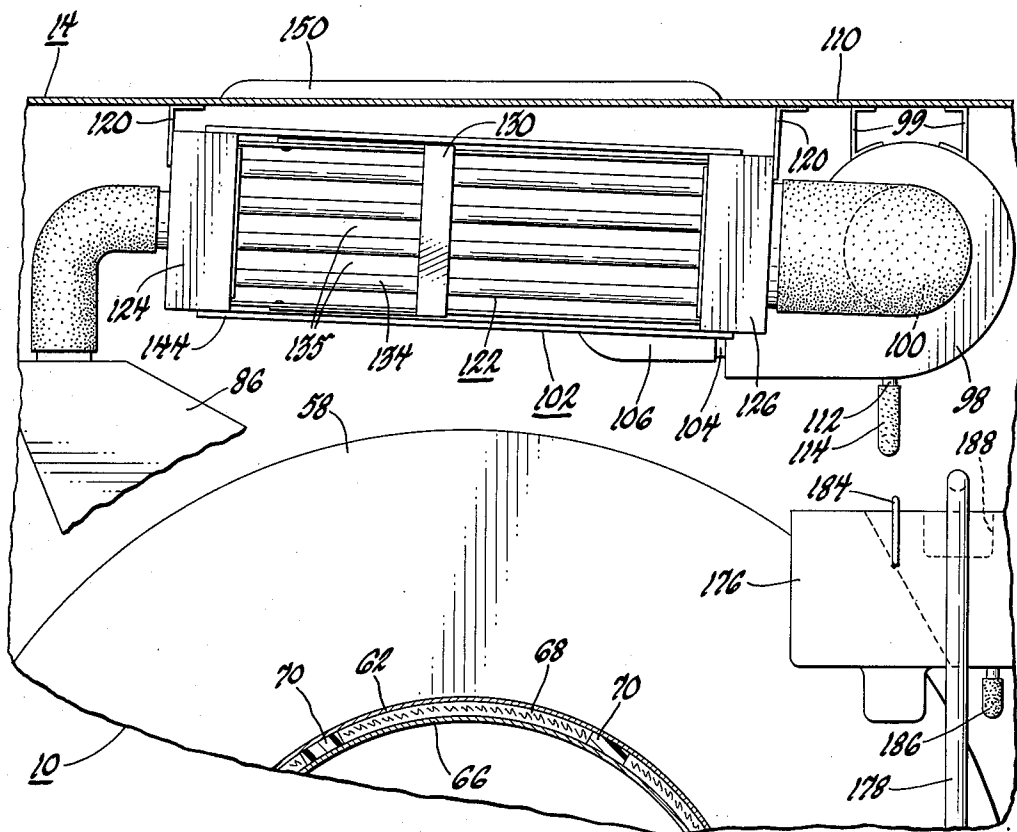


Fig. 4

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CLOTHES WASHER AND DRYER

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7 Claims. (Cl. 68—19)

This invention relates to a domestic appliance and more particularly to an improved combination washer-dryer wherein the dryer is of the recirculating air, moisture condensing type.

One of the objections to separate washers and dryers concerns the floor space that such multiple appliances take up. An objection often heard against the condensing dryer is the requirement that the dryer, in addition to the washer, must also be plumbed to a house drain. This invention is directed to a combination appliance wherein a condensing dryer is stacked on top of a top opening clothes washer, thereby to save floor space and to permit the dryer to drain its condensate through the drain system of the washer.

Accordingly, it is an object of this invention to provide an inverted condenser dryer which is stacked on top of a shiftable clothes washer and adapted for draining condensate through said washer.

Another object of this invention is the provision of a clothes sprinkling system for a combination washer-dryer including an improved water supply arrangement therefor.

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

In the drawings:

FIGURE 1 is a fragmentary front view of a unitary cabinet construction constructed in accordance with this invention and containing a top opening washing machine structure located beneath a front opening drying machine of the moisture condensing type and with parts broken away to show a portion of a clothes sprinkling system;

FIGURE 2 is a fragmentary side sectional view of the drying machine taken along line 2—2 in FIGURE 1;

FIGURE 3 is a top sectional view of the drying machine, partly in elevation, taken along line 3—3 in FIGURE 2;

FIGURE 4 is a fragmentary sectional view, partly in elevation, taken along line 4—4 in FIGURE 2; and

FIGURE 5 is a fragmentary sectional view similar to FIGURE 2 showing cabinet structure means for servicing the condenser.

In accordance with this invention and with reference to FIGURES 1 and 2, a stack-on combination washer-dryer 10 is illustrated. The appliance is comprised of a unitary cabinet member 12 defining an article drying machine or condensing type clothes dryer 14 within the upper portion thereof and defining a compartment 16 therebelow having an open upright side 18 in the front of said cabinet member. The combination washer-dryer 10 is adapted to be connected to a source of domestic water supply and a drain 19.

A clothes washer or article washing machine 20 is disposed within the compartment 16 beneath the dryer and is adapted, as by wheels such as 22, to be shiftable from an operable position A (solid line, FIGURE 2) wherein clothes may be washed to a loading position B (phantom line position, FIGURE 2) wherein clothes may be placed therein for washing.

The clothes washer 20 may be of the type disclosed in the patent to Brucken 3,087,321 issued April 30, 1963, and generally includes a rotatable spin tube 24 positioned

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within a surrounding water container 26. The water container includes a bottom wall or bulkhead 28 from which a drain line 30 leads to a pump 32 for pumping the water from the water container to the remote drain 19 by way of a flexible conduit 34 the conduit 34 being of sufficient length that its outlet end can remain in fixed relationship to the drain as the washing machine 20 shifts in and out of the compartment 16. The agitating and spinning mechanism 36 may be of the type taught in the Brucken patent whereby an agitator 38 is vertically reciprocated when the mechanism 36 is operating in one fashion and whereby the tub 24 is rotated when the mechanism 36 is operating in another fashion. When the tube 24 is rotated, water is centrifuged through ports 40 into the water container 26 from whence it may be pumped to drain through conduits 30 and 34.

A control panel 50 above the opening 18 in the cabinet 12 includes controls 52 for operating the clothes washer in a desired washing cycle and controls 53 for operating the clothes dryer 14.

The clothes or article drying machine 14 is comprised of a support bulkhead 54 in the rear thereof for supporting a spherical bearing and shaft 56 in the central portion thereof. A tumbling drum 58 is mounted on the spherical bearing shaft and includes a perforated rear wall 60 and a front opening 62. Supported on the front of the dryer cabinet is a front port plate 64 having a collar 66 extending into the opening of the tumbling drum for sealingly supporting the front of the tumbling drum at 68 on nylon blocks 70 in the manner taught in the patent to Whyte 2,843,945, issued July 22, 1958. The port plate 64 is recessed from the front of the dryer cabinet to receive an access door 72 which is hingedly mounted on one side thereof to the dryer cabinet and carries a lint collecting housing 74 on the rear side thereof—the lint collecting housing having a perforated rear panel 76 sealed about its periphery at 78 to the port plate 64 for forcing air leaving the tumbling drum through the lint collecting housing. A lint collecting screen 80 is slidably positionable within the lint collecting housing for downward removal and interposed between the perforated plate 76 and a cut-out portion of the housing to form an outlet 82 on the downstream side of the lint collecting screen. Air flow through the housing leads through openings 84 in the port plate to a front duct 86.

A heating plenum 88 at the rear of the tumbling drum 58 includes a heater 90 and reflecting plate 92 and is enclosed at its periphery by a circumambient seal 94. Leading to the heating plenum 88 is a rear duct 96 for returning air to the tumbling drum.

The drying air system (FIGURES 2, 3 and 4) for the condensing dryer is comprised of a drying air blower 98 having an inlet 100 adapted to receive dehumidified air from the front duct 86—a condenser 102 being interposed between the front of the tumbling drum and the blower for removing moisture from the recirculating drying air. The blower 98 has its outlet 104 connected to a supply conduit 106 which connects to the rear duct 96. The blower 98 is carried on brackets 99 affixed to the top wall 110 of the dryer cabinet and includes a condensate drain outlet 112 in a lowermost part of the blower housing connectable by means of a flexible conduit 114 to the rear of the water container 26 as at 116. In general, water condensed from the recirculating drying air by condenser 102 flows by gravity to the condensate outlet 112 and from there empties into the water container of the washer from whence it may be pumped to drain. In this fashion, the condensing dryer may use the plumbing connections of the washer therebelow.

The condenser 102 is also suspended from brackets 120 from the appliance top wall 110 and includes a condensing tube assembly 122 adapted to be nested between an

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inlet header 124 and an outlet header 126 (FIGURE 4). Suitable latch means 130 cooperate to positively position the condensing tube assembly 122 in locked, air sealing relationship with the headers 124, 126. Note that the recirculating or drying air passes through the inside 132 of condensing tubes 134 which are spaced apart to provide a passage 135 for cooling air passing thereover to aid in the condensing of moisture from the recirculating drying air, said tubes being sloped to drain the condensate toward the outlet header 126 and from there into the housing of blower 98.

The cooling air system is best seen in FIGURE 3 and is comprised of a cooling air blower 140 having its inlet 142 connected to a cooling air duct or shroud 144 which connects to one side of the condensing tube assembly 122—the other side thereof being open to atmosphere by way of the voids or unused space in the dryer and openings in the dryer cabinet, such as 148 at the rear thereof and louvers 150 in the top wall 110. Thus, cooling air blower 140 is adapted to draw a steady stream of cooling air through the condenser spaces 135 over the outside of the condensing tubes 134 and to exhaust this cooling air through an exhaust conduit 152 at the rear of the structure.

Both the drying air system and the cooling air system are disposed above the opening to the tumbling drum so that loading the clothes into the dryer is made easier.

A motor 160, carried by the top wall of the appliance, is adapted to drive the impellers in the blowers 98 and 140 as well as to rotate the tumbling drum by means of a belt and pulley arrangement 162 at the rear of the tumbling drum.

The condenser 102 may be generally of the type taught in the patent to Whyte et al. 3,032,887, issued May 8, 1962. An access panel or door 156 is pivotally mounted to the dryer cabinet and adapted for movement to the position in FIGURE 5 for removing the condensing tube assembly 122 for periodic cleaning thereof. This servicing is accomplished by unlatching the lock 130 and slidably removing the condensing tube assembly from between the headers 124 and 126. Note that the inverted nature of the drying air system and cooling air systems above the tumbling drum permits ready access to the condenser for servicing thereof plus a ready means for removing the condensate from the dryer using the drain facilities of the washer therebelow. The door 156, when closed, may also conceal a lamp 157 while providing a glass panel 159 for illuminating the loading area of the dryer.

It is often desirable to provide a sprinkling system for the tumbling drum 58. Thus, a nozzle 170 projects through the drum shaft in the manner taught in the patent to Longenecker 2,958,954, issued November 8, 1960. In accordance with this invention, means are provided to supply the desired amount of water to the sprinkling nozzle simply by pushing a button or actuator 172 on the front of the dryer behind the dryer door 72. An indicating means 174 will register the amount of water to be dispensed to the tumbling drum. To accomplish this operation, an open top reservoir 176 is positioned at one side of the dryer and is adapted to receive water through a water supply conduit 178—the depressing of button 172 energizing a solenoid 180 in the water supply line for opening the water supply valve. A float 182 in the reservoir 176 is connected by a link 184 to the indicating means 174 for informing the operator when the desired amount of water is present in the reservoir. Water supplied to the reservoir will flow by gravity through a flexible conduit 186 to the nozzle 170, spraying therefrom onto the clothes in the tumbling drum. To prevent clogging of the nozzle, a filter 188 is positioned within the reservoir between the supply conduit 178 and the gravity drain conduit 186.

It should now be seen that an improved combination washer-dryer has been provided—an appliance wherein

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an inverted condenser dryer is positioned above a shiftable top loading clothes washer for conserving floor space, for making dryer loading and clothes sprinkling easier and for utilizing the drain system of the washer to remove condensate from the dryer.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination,

- (a) a unitary cabinet member including walls defining an article drying machine within the upper portion thereof and a compartment therebelow having an open upright side,
- (b) said cabinet member adapted to be associated with a source of water supply and a drain,
- (c) an article washing machine member disposed in said compartment beneath said drying machine and movably attached to said unitary cabinet member for movement between an operating position in said compartment and a loading position outside the compartment,
- (d) said washing machine member comprising a box-like structure closing the open upright side of said compartment and having therein a rotatable open top water receiving article washing receptacle and prime mover means operable when said washing machine member is in said operating position for rotating said article washing receptacle,
- (e) said washing machine member having a water container surrounding said article washing receptacle for receiving water centrifuged from said article washing receptacle when said receptacle is rotated,
- (f) said water container having a pump operated by said prime mover means and in water receiving relationship to said water container for pumping said water to said drain,
- (g) said washing machine member being shiftable part way out of said compartment and back therein while said water container is connected to said drain,
- (h) said article drying machine comprising a box-like structure enclosing a rotatable tumbling drum having an access opening in the front thereof for loading articles therein from said article washing machine member and an air inlet opening in the rear thereof,
- (i) means for recirculating heated air through said tumbling drum including a drying air blower having an inlet and an outlet, means connecting said inlet to the access opening of said tumbling drum, means connecting said outlet to the air inlet opening of said tumbling drum, condenser means having one portion in one of said connecting means for condensing moisture from the drying air circulated in heat exchange relationship therewith, and heating means in one of said connecting means for heating said recirculating air,
- (j) and means for circulating cooling air in heat exchange relationship to said condenser means including a cooling air blower having an inlet and an outlet, means including the walls of said cabinet member connecting the inlet of said cooling air blower in heat exchange relationship to another portion of said condenser means for cooling said condenser means, and means connecting the outlet of said cooling air blower to the atmosphere for removing the heat of condensation,
- (k) said drying air blower having a sump portion in gravity flow relationship to said condenser means for receiving the moisture condensed from said recirculating air, and means connecting said sump portion to said water container when said washing machine member is in either said loading position or said operating position for conveying moisture condensed in said condenser means to said water con-

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tainer for disposal from said washing machine member by said pump when said pump is operating to pump said water to drain,

- (l) said cabinet member having a pivotable front panel above said access opening adjacent said condenser means and pivotally movable outwardly and upwardly for exposing said condenser means for servicing thereof.

2. The combination of claim 1 including means for sprinkling in said tumbling drum, said means for sprinkling including a reservoir for containing a quantity of water, means for indicating the quantity of water in said reservoir, means operable for supplying water to said reservoir and actuator means for operating the water supplying means, said means for indicating having a float in said reservoir, an indicator on said cabinet member and link means connecting said float and said indicator.

3. The combination of claim 2 including a door hingedly connected to said cabinet member and movable to a closed position for closing said access opening in said tumbling drum, said door in said closed position concealing the indicator and the actuator means of said means for sprinkling.

4. The combination of claim 1 wherein said means for recirculating heated air and said means for circulating cooling air is above said tumbling drum, whereby to place the access opening of said tumbling drum in closely adjacent relationship to said washing machine member.

5. In combination,

- (a) a unitary cabinet member including walls defining an article drying machine within the upper portion thereof and a compartment therebelow having an open upright side,
- (b) said cabinet member adapted to be associated with a source of water supply and a drain,
- (c) an article washing machine member disposed in said compartment beneath said drying machine and movably attached relative to said unitary cabinet member for shiftable movement between an operating position in said compartment and a loading position outside the compartment,
- (d) said washing machine member comprising a structure at least partially closing the open upright side of said compartment and having therein a rotatable open top water receiving article washing receptacle and prime mover means operable when said washing machine member is in said operating position for rotating said article washing receptacle,
- (e) said washing machine member having a water container in water receiving relationship to said article washing receptacle for receiving water centrifuged from said article washing receptacle when said receptacle is rotated,
- (f) a pump operated by said prime mover means in water receiving relationship to said water container and in water draining relationship to said drain for pumping said water to said drain,
- (g) said washing machine member being shiftable part way out of said compartment and back thereinto while said pump is in water draining relationship to said drain,
- (h) said article drying machine comprising a structure enclosing a rotatable tumbling drum having an access opening in one portion thereof for loading articles thereinto from said article washing machine member and an air inlet opening in another portion thereof,
- (i) means for recirculating heated air through said tumbling drum including a drying air blower, means connecting said drying air blower to the access opening and the air inlet opening of said tumbling drum in a manner to facilitate a flow of drying air therethrough, condenser means having one portion in series drying air flow relationship with said tumbling drum and said drying air blower for condensing

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moisture from the drying air circulated in heat exchange relationship therewith, and heating means in series drying air flow relationship with said tumbling drum and said drying air blower for heating said recirculating air,

- (j) means for circulating cooling air in heat exchange relationship to said condenser means including a cooling air blower, means connecting one side of said cooling air blower in heat exchange relationship to another portion of said condenser means for cooling said condenser means, and means connecting the other side of said cooling air blower to the atmosphere for removing the heat of condensation,

(k) and means forming a sump portion in gravity flow relationship to said condenser means for receiving the moisture condensed from said recirculating air, and means connecting said sump portion to said water container when said washing machine member is in said operating position for conveying moisture condensed in said condenser means to said water container for disposal from said washing machine member by said pump when said pump is operating to pump said water to drain.

6. In combination,

- (a) a unitary cabinet member including walls defining an article drying machine within the upper portion thereof and a compartment therebelow having an open upright side,
- (b) said cabinet member adapted to be associated with a source of water supply and a drain,
- (c) an article washing machine member disposed in said compartment beneath said drying machine and movably attached relative to said unitary cabinet member for shiftable movement between an operating position in said compartment and a loading position outside the compartment,
- (d) said washing machine member comprising a structure at least partially closing the open upright side of said compartment and having therein a rotatable open top water receiving article washing receptacle and prime mover means operable when said washing machine member is in said operating position for rotating said article washing receptacle,
- (e) said washing machine member having a water container in water receiving relationship to said article washing receptacle for receiving water centrifuged from said article washing receptacle when said receptacle is rotated,
- (f) a pump operable with said prime mover means in water receiving relationship to said water container and in water draining relationship to said drain for pumping said water to said drain,
- (g) said washing machine member being shiftable part way out of said compartment and back thereinto while said pump is in water draining relationship to said drain,
- (h) said article drying machine comprising a structure enclosing a rotatable tumbling drum having an access opening in one portion thereof for loading articles thereinto from said article washing machine member and an air opening in another portion thereof,
- (i) means for recirculating heated air through said tumbling drum including a drying air blower, means connecting said drying air blower to the access opening and the air opening of said tumbling drum in a manner to facilitate a flow of drying air therethrough, condenser means having one portion in series drying air flow relationship with said tumbling drum and said drying air blower for condensing moisture from the drying air circulated in heat exchange relationship therewith and another portion in heat exchange relationship with the atmosphere for removing the heat of condensation, and heating means in series drying air flow relationship with said tumbling drum and said drying air blower for heating said recirculating air,

(j) and means forming a sump portion in gravity flow relationship to said condenser means for receiving the moisture condensed from said recirculating air, and means connecting said sump portion to one of said water container or said article washing receptacle 5 when said washing machine member is in said operating position for conveying moisture condensed in said condenser means to said washing machine member for disposal therefrom by said pump when said pump is operating to pump said water to drain.

7. The combination of claim 6 wherein said means for recirculating heated air is above said tumbling drum whereby to place the access opening of said tumbling

drum in closely adjacent relationship to said washing machine member.

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