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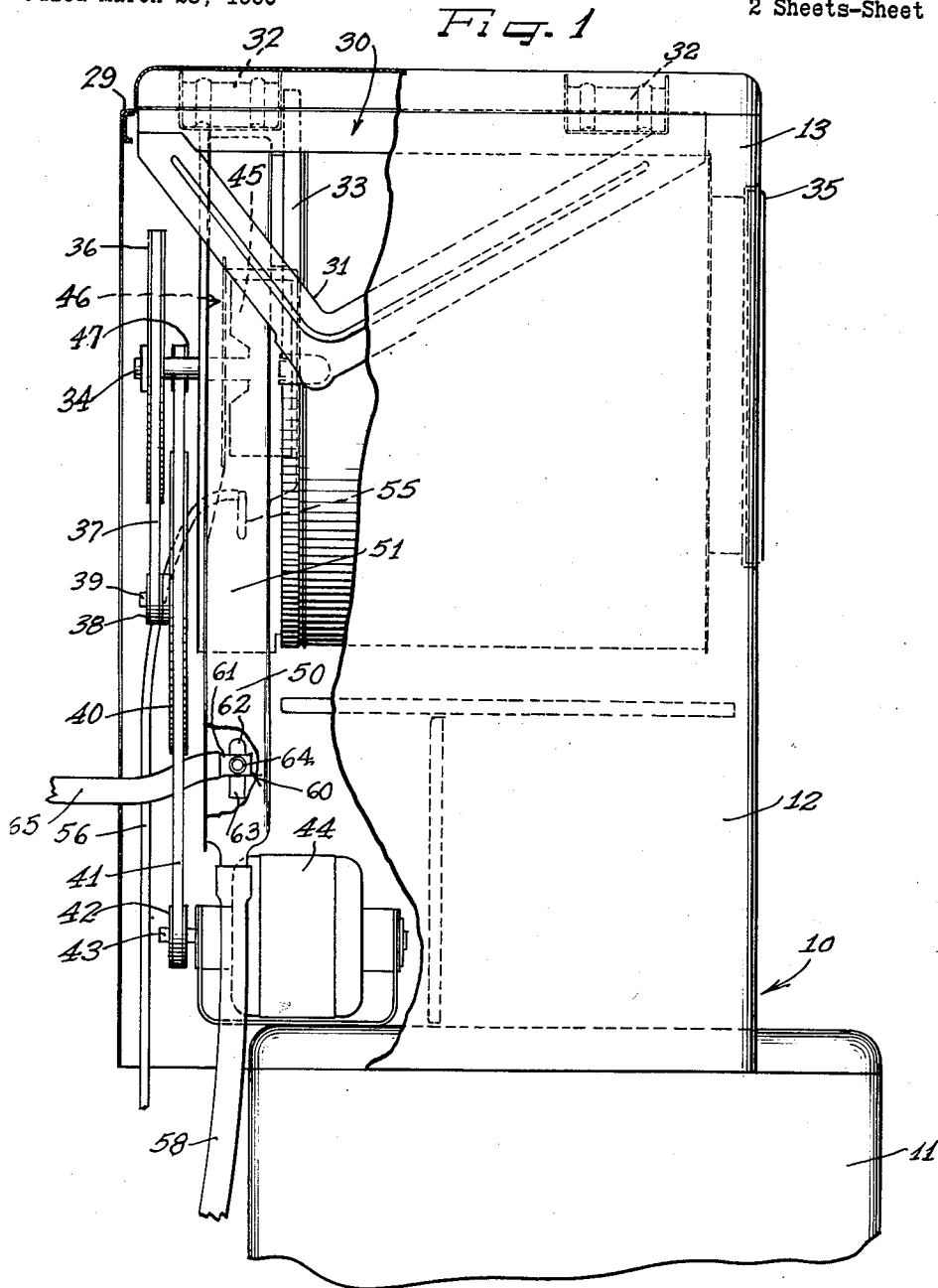
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2,941,389

LAUNDRY MACHINE WITH CONDENSER AND FLUSH SYSTEM THEREFOR

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2 Sheets-Sheet 1



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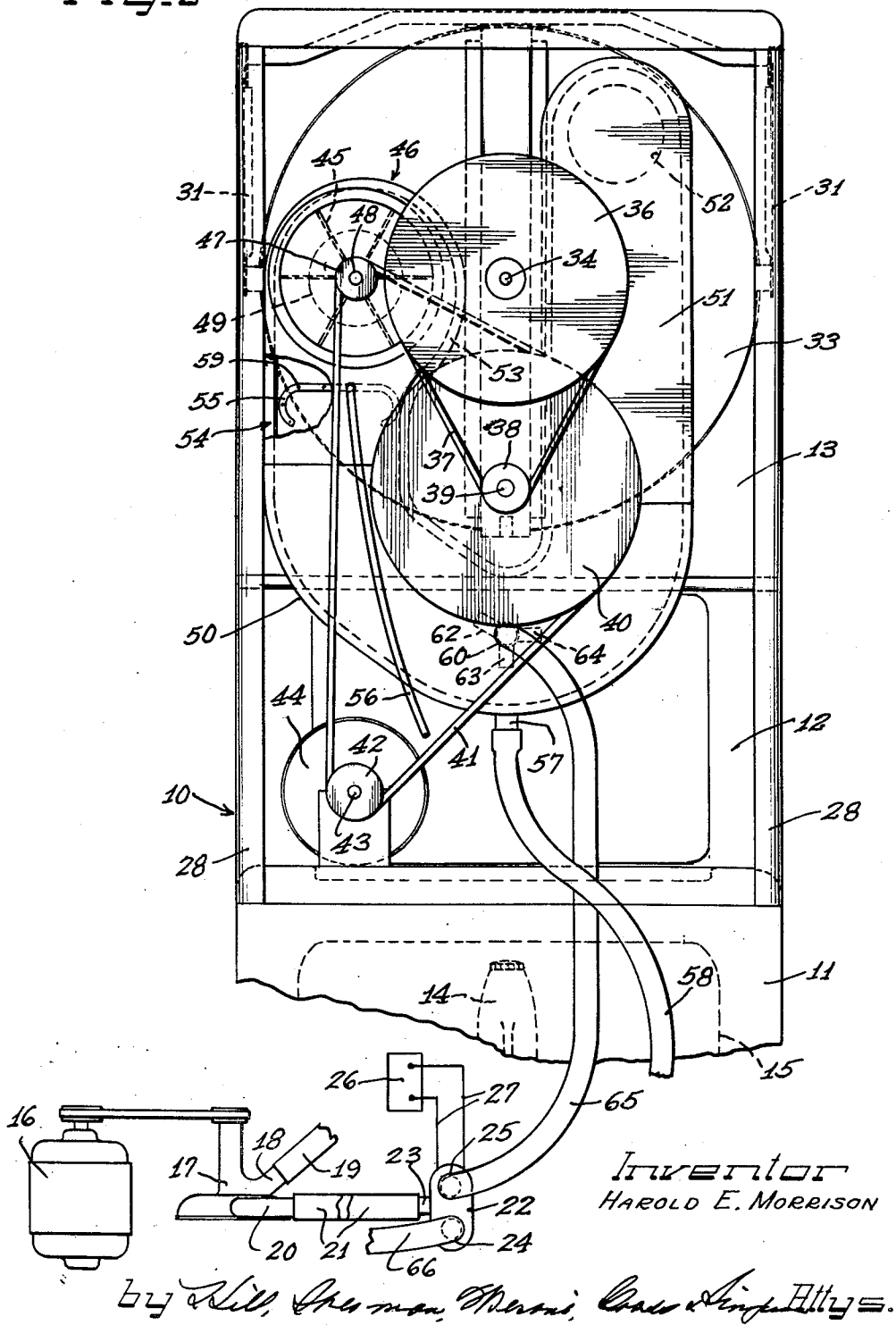
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LAUNDRY MACHINE WITH CONDENSER AND FLUSH SYSTEM THEREFOR

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Fig. 2



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LAUNDRY MACHINE WITH CONDENSER AND FLUSH SYSTEM THEREFOR

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10 Claims. (Cl. 68—20)

The present invention relates to laundry equipment, and more particularly to a laundry machine with a condenser for the dryer and a flushing system therefor to remove lint and the like collected in the condenser and maintain the same clean and uncongested.

While the present invention is described immediately hereinbelow in connection with a combination washer and dryer of the domestic clothes-washing and drying type, it will be readily observed and it is understood that systems and mechanisms embodying the principles of the present invention are not restricted to such combination devices but may be utilized with similar devices not operating in combination nor assembled in combination.

While it is also true that clothes dryers having a substantially closed air-circulating system therefor with a condenser in the air system to wash the lint from the air and substantially clean and dehumidify the air have been known in the art, some of these have experienced the difficulty of wet lint, taken from the air passing through the condenser, accumulating in the condenser to congest the air passages and more importantly clog the water passages such as the water or other coolant drain from the condenser. In addition, lint accumulating on the walls of the condenser causes great difficulty in that it builds up an insulating cake or coating on the wall of the condenser which, in many instances, has a tendency to reduce the effectiveness of the condenser to wash and clean the air and to dehumidify the air through cooling thereof.

It is, therefore, an important object, feature and advantage of the present invention to provide a new and improved condenser structure for laundry equipment with means in the condenser to wash the walls and drain of the condenser to free the same thereof from lint etc. and to maintain the condenser in an efficient operating condition.

This may be effected in accordance with the principles of the present invention by running the drain fluid from the washer through a condenser flushing spray nozzle in the condenser periodically to wash the walls of the condenser and the drain of the condenser substantially free from lint.

Thus, it is another important object and feature of the present invention to provide a new and improved flushing system for a laundry equipment condenser wherein the flushing system has a flushing nozzle in the condenser and is connected to a clothes washer outlet for running the drain fluid from the washer through the condenser nozzle to thereby wash the walls of the condenser and the drain thereof substantially free from lint.

Still another object of the present invention is to provide a new and improved condenser for laundry equipment and to provide a new and improved flush system for the condenser.

Still other objects, features and advantages of the present invention will become readily apparent from the following detailed description of the present invention and an embodiment thereof, from the claims, and from the

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accompanying drawings in which each and every detail shown is fully and completely disclosed with a part of this specification, in which like reference numerals refer to like parts, and in which:

5 Figure 1 is a broken side elevational view of a combination washer and dryer embodying the principles of the present invention and having portions thereof broken away to better illustrate certain details thereof; and

10 Figure 2 is a broken rear elevational view of the combination machine in Figure 1 with the rear cover removed therefrom and with certain parts thereof broken away to better illustrate certain details and with certain other parts thereof shown schematically and diagrammatically for simplicity.

15 As shown on the drawings:

In the combined washer and dryer 10 illustrated in the drawings, the combination mechanism is of the tandem type vertically mounted having a washer compartment 11 over which there is mounted a control and access compartment 12 lying between the washer compartment 11 and a dryer compartment 13. The washer compartment 11 houses a vertical agitator-type washer having a central agitator 14 and a spin extracting basket 15 to operate in coordination in the usual manner of a washer of this type. The washer is further equipped with a drive motor 16 operatively connected to a pump 17 as well as to the washer transmission mechanism. This pump 17 is provided with an inlet 18 having a hose connection 19 to the washer compartment outlet so that all water, whether it be soapy wash water or rinse water, is fed through the washer-outlet hose 19 to the inlet 18 of the pump 17. The pump is provided with an outlet 20 having a hose or other conduit connection 21 to a two-way valve 22 having a single inlet 23 and a pair of outlets 24 and 25 and is electrically controlled through an electrical connection to a control system indicated by the block 26 and the electrical connections 27—27 thereto from the two-way valve.

This two-way valve and the control system therefor may have such form, configuration and circuitry as that disclosed in my joint Patent No. 2,662,384, entitled "Washing Machine Control Mechanism," issued December 15, 1953. That joint patent describes and discloses in detail such a two-way valve and electrical control system therefore as may be utilized herein for the purposes of the present invention.

The dryer compartment 13 houses a dryer mechanism by a framework of structural supports extending upwardly to the top of the dryer unit and including such members as angle members 28—28 and channel members 29 (Figure 1) forming a relatively rigid frame for supporting a suspension frame-work 30 including a pair of side suspending members 31—31 and overhead supporting members 32—32 secured together and to the framework for suspending a dryer drum bulkhead 33 from lateral diametric extremities thereof. This bulkhead 33 carries a center bearing and shaft 34 for a rotatably supported dryer drum into which wet or damp material may be placed through a door 35 in the dryer mechanism. For rotating the dryer drum, the shaft 34 has fixed thereto for rotation therewith a relatively large pulley 36 which is connected through a belt 37 to a relatively small pulley 38 on an idler shaft 39 further carrying a relatively large pulley 40 connected through a belt 41 to a relatively small pulley 42 on the shaft 43 of a dryer drive motor 44. The belt 41 also couples the impeller mechanism or assembly 45 of a fan or blower 46 to the motor 44 by running over a pulley 47 on the blower shaft 48.

This blower fan 46 forms a part of a substantially closed air-circulating system whereby air is taken from the dryer drum through an aperture 49 in the rear wall of the bulkhead and forced successively through a condenser

50 and thence through an air heater duct 51 housing a heater mechanism such as a gas fuel heater or an electric heater or the like from which the hot dry air is forced into the dryer drum and through an inlet aperture 52 in the back wall of the bulkhead 33. The cycle is a continuous one since during the operation of the dryer the fan 46 continuously draws damp, spent, moist, lint-laden air from the dryer drum to force the same through the condenser which is operative to cool, clean, wash and dehumidify the air before the air is thereafter forced through the air heater duct to be heated.

When the air from the dryer drum passes outwardly from the volute-shaped housing 53 of the fan 46 it immediately passes into the substantially horseshoe or upwardly opening U-shaped condenser 50 where it is cleaned, washed, and dehumidified in a manner effective to cool the air, remove a substantial quantity of the moisture therein and to remove the lint therefrom as picked up in passing over the tumbling clothes in the dryer drum. For this purpose, the inlet region 54 of the condenser 50 is provided with a spray nozzle assembly 55 operative to spray the air with a coolant and cleaning fluid such as cold water or the like supplied thereto through an inlet hose connection 56. This cold water spray will so cool the air as to condense a great proportion of the moisture in the air to remove that moisture from the air and will further so wash and clean the air as to remove the lint and the like picked up in the dryer drum from the air. This water, or other coolant cleaning fluid in addition to the condensate, then drains from the condenser 50 through a drain 57 in the bottom or "bight" of the condenser. The drain 57 is connected through a hose or the like 58 to any convenient drain leading to a sewer.

As discussed in the early part of this specification, the spray nozzle assembly 55 is particularly configured to most efficiently spray and wash all of the air passing through the condenser to remove all of the lint and the like therefrom. To this end, the spray nozzle assembly 55 has a tubular construction with arcuate end portions readily adapting the same for connection to the walls of the condenser at the inlet 54 thereto and the tube is provided with apertures 59 therein to spray the water forwardly and rearwardly from the tube within the condenser, the tube being substantially centrally placed at the inlet of the condenser and the spray from the nozzles being directed to so overlap that all air passing into the condenser is washed by the spray from the nozzle outlets 59.

As was also discussed in the early part of this specification, it has been an important problem in this art to keep the condenser 50 clean and free from any lint which may tend to adhere to the walls of the condenser by virtue of the wetted or dampened condition of the lint as the same is washed from the air. For this purpose, the condenser is provided with a flushing nozzle assembly 60 disposed in the bight portion or lowermost region of the condenser. The spray nozzle assembly has an inlet 61 (Figure 1) and, in the embodiment shown, three primary outlets 62, 63 and 64 which are respectively directed to wash the walls of the inlet side of the condenser, the drain 57 from the condenser, and the walls of the outlet side of the condenser, all within the condenser, whenever flushing fluid is supplied to the flushing nozzle 60 through the inlet 61 thereto. When flushing fluid is admitted into the nozzle assembly 60 for flushing the condenser, the flushing fluid will be sprayed on the inside walls of both the inlet side and the outlet side of the condenser and further through the drain of the condenser in sufficient quantity and operatively to wash the condenser walls free from lint and the like which may collect on the condenser walls and in the drain to thereby maintain the condenser operating at its proper and high efficiency level.

In accordance with the principles of the present invention the inlet 61 for the flushing nozzle 60 is connected

through a hose connection 65 to one of the outlets 25 of the two-way valve 22. The other outlet 24 from the two-way valve 22 may have a hose connection 66 for directing fluid outlet therefrom. Thus, in accordance with the principles of this invention, the washer discharge fluid pumped from the washer through the pump 17 is directed through the condenser flushing nozzle to flush the condenser in the manner and for the purposes described. Also, by the employment of a two-way valve and control system such as that disclosed in my hereinabove-identified joint patent, the system may be so controlled that when it is desired to save hot sudsy water or soapy water from the washer, the control system will so operate the two-way valve as to direct the soapy water through the hose 66 and outlet 24 for saving the same in a laundry tub or for removing the same from the laundry tub and redirecting the same into the washer, the outlet 25 being closed during such operation. All drain fluid from the washer in the washer compartment 11, however, is directed through the outlet 25 of the two-way valve 22 and thence through the hose 65 through the flushing nozzle 60 of the condenser whereby the condenser is flushed and the fluid is then drained through the drain hose 58 connected to the drain outlet 57 of the condenser. In this manner, highly economical flushing of the condenser is effected without any increase in water supply for the combined washer and dryer.

As noted hereinbefore, the principles of the present invention are applicable to laundry installations where the washer and dryer are independent units. In such an installation the hose 65 may nevertheless connect the drain outlet 25 of the two-way valve 22 to the flushing nozzle 60 of the condenser or, all fluid discharged from the washer may be directed through the flushing nozzle 60 of the condenser.

From the foregoing it will be readily observed that numerous variations and modifications may be effected without departing from the true spirit and scope of the novel concepts and principles of this invention and, it is therefore intended to cover all such modifications and variations as fall within the true spirit and scope of the novel concepts and principles of this invention.

I claim as my invention:

1. In a laundry mechanism including a washer having a container for washing fluid and a drier having a chamber in which articles are contained during a drying cycle of operation, an outlet conduit leading from said washer container, a two-way valve having an inlet connected to receive fluid from said conduit to receive washing fluid and having a pair of outlets, an air circulating conduit system connected to said drier chamber, a condenser in said air conduit system, means for moving air through said air conduit system, a condensing fluid nozzle in said condenser, means connected to supply liquid coolant to said condensing nozzle to wash lint from air passing through the condenser and to cool and dehumidify the air, a drain outlet in said condenser, a fluid flushing nozzle in said condenser disposed adjacent to the drain outlet and positioned to direct fluid both upstream and downstream of the air flow through the condenser, a fluid conduit connected between one of the outlets of the two-way valve and said flushing nozzle, pump means connected for forcing the fluid through said flushing nozzle from said washer container, a drain conduit connected to the other of said outlets of the two-way valve, and means for selectively controlling the valve to direct washing fluid through the drain conduit or through the flushing nozzle.

2. In combination, a laundry mechanism having a washer with a container for washing fluid and a drier with a drying chamber, a substantially closed air circulating system connected to circulate air through the drying chamber, a condenser in said air system, means for circulating air through said system, a coolant spray means in said condenser to admit the coolant medium into the condenser to wash and dehumidify air passing through

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the condenser, a drain in said condenser, a fluid flushing fitting opening into said condenser in the vicinity of the drain to flush the condenser and wash lint from the condenser, fluid conduit means connected between the washer container and said flushing fitting, and pump means in said fluid conduit means for forcing fluid through said fitting into the condenser whereby washing fluid is used for flushing the condenser.

3. In a laundry machine, a washer with a container for laundry liquid, a drier with a rotating tumbling drum, a substantially closed air circulating system for the drier, a condenser in said air system, a coolant spray nozzle in said condenser to admit coolant medium into the condenser to wash, cool and dehumidify air passing through the condenser, a drain opening from said condenser, a fluid flushing outlet in said condenser to flush the condenser and flushing outlet in said condenser and wash lint from the condenser, a conduit connected to supply liquid to the fluid flushing outlet in the condenser, means connecting said conduit to said washer container to supply washing liquid to the flushing outlet, and a pump means in said conduit forcing liquid through said flushing outlet for forcibly washing lint from the condenser to flow out of said drain opening.

4. In a clothes washing and drying mechanism, a container for fluid for washing clothes, a drying chamber in which the clothes are dried, an air circulating system connected to the drying chamber, means for moving air through the circulating system, a condenser connected in the air circulating system for the drier, means for cooling the air passing through the condenser to condense moisture therefrom, a flushing nozzle in said condenser, a drain opening leading from the washing container, a fluid conduit interconnecting said flushing nozzle and said washing container drain opening, a pump in said fluid conduit for forcing washing fluid through said flushing nozzle to force drain fluid from said washing container through said flushing nozzle to flush said condenser and wash lint therefrom at periodic intervals of operation of the washer and drier, and drain means in the condenser for removing the flushed lint and drain fluid therefrom.

5. In a washer-drier apparatus operable through a washing operation and a drying operation, a casing for retaining washing fluid during said washing operation, a drum for tumbling fabrics during said drying operation, means including spaced walls rearwardly of the drum defining an air conduit communicating with said drum, air translation means positioned between said spaced walls for circulating air through said drum and said air conduit, a heater for evaporating moisture from said fabrics, a condenser nozzle positioned adjacent said air translating means for discharging cooling fluid between said spaced walls to cool and condense moisture evaporated from said fabrics by said heater and discharged from said drum into the region between said spaced walls, a drain outlet in said air conduit, a fluid outlet in said casing, a flushing nozzle positioned adjacent said walls for discharging flushing fluid into the region between said spaced walls, a

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fluid conduit interconnecting said casing fluid outlet and said flushing nozzle, and pump means in said fluid conduit for circulating washing fluid from said casing into the region between said spaced walls during said washing operation to flush said walls free of lint deposits tending to accumulate thereon during said drying operation.

6. The invention set forth in claim 5 in which said air conduit defines a condenser chamber containing said condenser nozzle and a heater chamber containing said heater, said flush nozzle having spray outlets directed into both of said chambers.

7. The invention set forth in claim 5 in which said air conduit is substantially U-shaped with said drain outlet being positioned in the bight of said conduit between said condenser nozzle and said heater.

8. The invention set forth in claim 5 in which said condenser nozzle is of tubular configuration having arcuate end portions attached to said walls of said air conduit adjacent said air translating means.

9. The invention set forth in claim 5 in which a two-way valve having a drain port is connected between said pump means and said flushing nozzle for selective discharge of washing fluid to either said flushing nozzle or to an external suds reservoir.

10. A laundry mechanism for washing and drying articles of clothing comprising a container for washing liquid to be applied to articles of clothing during a washing cycle of operation of the machine, a rotatable drying drum in which said articles are contained during a drying cycle of operation of the machine, a closed air recirculation conduit leading to the drying drum and from the drying drum to circulate drying air, a fan means for circulating air through said recirculation conduit and said drum, means for heating the air circulating through said conduit, a condenser chamber connected in said recirculation conduit whereby air flowing through said conduit will pass through said chamber, means for cooling the air in said condenser chamber whereby moisture will condense out of the air, a flushing nozzle in said condenser chamber for flushing the lint off the surfaces inside the chamber, an outlet from the condenser chamber for draining flushing liquid and lint from the chamber, a liquid conduit connected between said washing liquid container and said nozzle, and a pump for pumping washing liquid from the container after a washing cycle is finished and forcing the liquid through the nozzle to clean the condenser chamber.

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