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• **Molinari, Marco**
46100 Mantova MN (IT)
• **Tosi, Mauro**
37051 Bovolone VR (IT)

(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(72) Inventors:
• **Gastadelli, Lucio**
46037 Roncoferraro MN (IT)

(54) **Condensing unit for washer/dryer**

(57) A condensing unit (C) for a washer/dryer having a tank (T) connected to a drying circuit, that includes a fan (F) suitable to generate an air stream in said circuit and a resistor (R) suitable to heat the air prior to returning it to the tank (T), includes a condensing duct with a flat and elongated cross-section made up of an air channel (A) and a condensing water channel (W) divided by a thermal exchange surface (E), the air stream coming

from the tank (T) flowing in a direction opposite to the stream of water introduced at the top in the water channel (W) through an electrovalve, both the air channel (A) and the water channel (W) being connected to the drain pump of the machine. In this way, there is realized a counter-current heat exchanger that allows to improve the condensing effectiveness with a subsequent decrease of the drying time and lower power consumption.

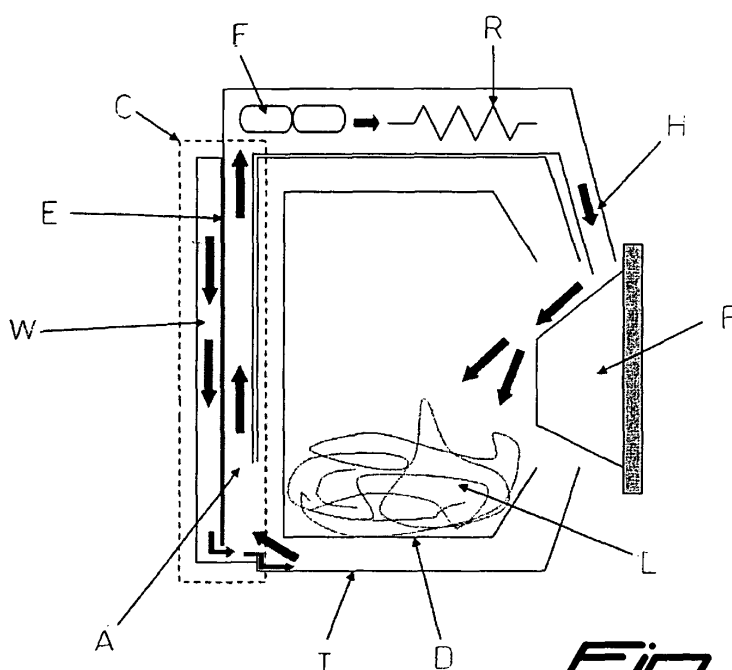


Fig. 1

Description

[0001] The present invention relates to washers/dryers, and in particular to a condensing unit for drying the laundry at the end of the washing cycle.

[0002] It is known that in washers that also perform drying of the washed laundry there is provided a circuit for circulating air between the laundry-containing drum and a condensing unit, where the moisture removed from the laundry is condensated and discharged by means of the drain pump of the machine.

[0003] During the drying phase a fan generates an air stream in the circuit and a resistor heats the air circulating in said circuit. After this initial phase, an electrovalve is opened to admit condensing water into a condensing duct, where the condensing water is kept in suspension by the suction generated by the fan.

[0004] In this way, the vapour sucked in from the tank encounters the suspended water and partially condensates toward the drain pump through a suitable drain pipe. Therefore, the fan receives partially cooled and dried air that is heated again by the resistor and returned to the tank.

[0005] The most serious drawback of this known arrangement is that the moisture present in the air coming from the tank and passing through the condensing duct is only partially involved in the condensing process, due to the laminar flows that prevent most of the air from making contact with the thermal exchange surface.

[0006] This results in a poor condensing effectiveness and a long drying time, with a subsequently high power consumption due to the long operating period of the fan and resistor.

[0007] Therefore the object of the present invention is to provide a condensing unit which overcomes said drawbacks. This object is achieved by means of a condensing unit that realizes a counter-current heat exchanger with a flat and elongated cross-section. Other advantageous features of the present condensing unit are disclosed in the dependent claims.

[0008] The main advantage of this condensing unit is that it greatly increases the thermal exchange surface for the moist air coming from the tank, so as to improve the condensing effectiveness. This results in a decrease of the drying time, with a subsequently lower power consumption.

[0009] Another significant advantage of this arrangement comes from its structural compactness that allows to realize a unit shaped so as to exploit areas of the machine that would otherwise be unused, thus reducing the overall size of the machine.

[0010] These and other advantages and characteristics of the condensing unit according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig.1 is a diagrammatic view showing the drying cir-

cuit of a machine that includes the above-mentioned condensing unit;

Fig.2 is an enlarged partial view showing in detail the cross-section of the condensing duct; and

Fig.3 is a diagrammatic see-through front view of a possible shape of the condensing duct.

[0011] With reference to fig.1, there is seen that a washer/dryer includes a tank T, closed by a door P, that houses a rotating drum D containing the laundry L to be dried. The drying circuit conventionally includes a fan F and a resistor R to heat the air prior to returning it to tank T through a suitable duct H.

[0012] The novel aspect of the present invention consists of the condensing unit C, that includes a condensing duct made up of an air channel A and a water channel W divided by a thermal exchange surface E. More specifically, the stream of moist air, coming from tank T under the action of fan F, flows in a direction opposite to the stream of condensing water, introduced at the top of channel W through an electrovalve (not shown), and the separation of the two streams is performed by means of the dividing wall E that acts as a heat exchanger where moisture condensates.

[0013] The moisture condensated on wall E flows downward by gravity along channel A and is discharged by the drain pump (not shown), together with the condensing water coming from channel W.

[0014] In the detail of fig.2 there is seen that the cross-section of the condensing duct is flat and elongated, with a large exchange surface E between channel W that has a very small height and channel A, that is sufficiently low and wide to allow all the air flowing therein to make contact with surface E.

[0015] The front view of fig.3 shows a condensing duct that is horseshoe-shaped so that it can be arranged in the rear portion of the machine around the mechanism that rotates drum D, typically a pulley driven by a motor through a belt, or directly a motor. In the illustrated embodiment there are provided two air inlets N, located at the ends of channel A, and a single intermediate air outlet X toward fan F, while in channel W there are preferably provided a plurality of deviating baffles B to slow down and widen the gravitational downflow of the water introduced at the top.

[0016] It is clear that the above-described and illustrated embodiment of the condensing unit according to the invention is just an example susceptible of various modifications. In particular, the exact shape of channels A and W can be somewhat changed as long as there is retained a wide exchange surface E therebetween.

Claims

1. A condensing unit (C) for a washer/dryer having a tank (T) connected to a drying circuit that includes a fan (F) suitable to generate an air stream in said cir-

cuit and a resistor (R) suitable to heat said air prior to returning it to said tank (T), **characterized in that** it includes a condensing duct with a flat and elongated cross-section made up of an air channel (A), connected to the tank (T), and a condensing water channel (W) divided by a thermal exchange surface (E), the air stream coming from the tank (T) flowing in said air channel (A) in a direction opposite to the stream of water introduced at the top of said condensing water channel (W) through an electrovalve, both the air channel (A) and the condensing water channel (W) being connected to the drain pump of the machine.

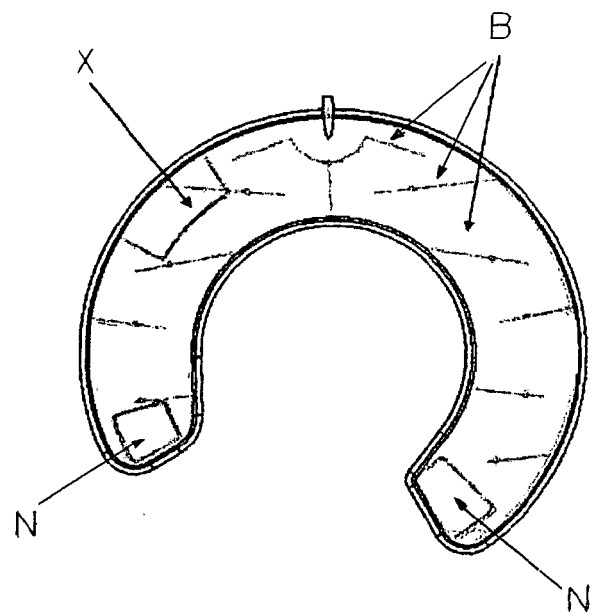
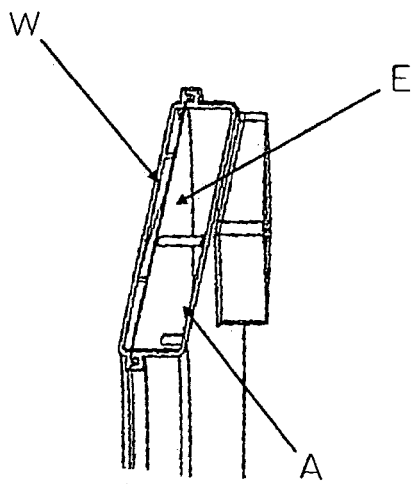
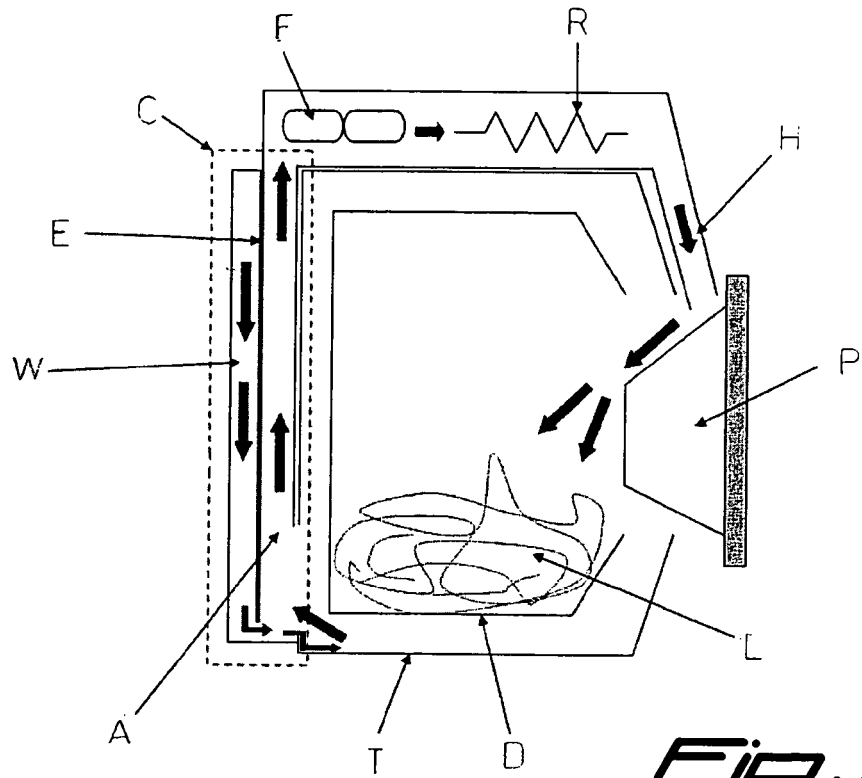
2. A condensing unit (C) for a washer/dryer according to claim 1, **characterized in that** the condensing duct is horseshoe-shaped so that it can be arranged in the rear portion of the machine around the mechanism that rotates the machine drum (D).
3. A condensing unit (C) for a washer/dryer according to claim 2, **characterized in that** two air inlets (N) are located at the ends of the air channel (A), and a single air outlet (X) toward the fan (F) is located at an intermediate position.
4. A condensing unit (C) for a washer/dryer according to claim 2 or 3, **characterized in that** in the condensing water channel (W) there are provided a plurality of deviating baffles (B) suitable to slow down and widen the gravitational downflow of the water introduced at the top.
5. Washer/dryer **characterized in that** it includes a condensing unit according to one of the preceding claims.

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 September 2006	Examiner Lodato, Alessandra
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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