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(54) **LAUNDRY WASHING AND DRYING MACHINE WITH AIR-COOLED CONDENSER**

WASCHMASCHINE UND TROCKNER MIT LUFTGEKÜHLTEM KONDENSATOR

MACHINE À LAVER ET À SÉCHER LE LINGE DOTÉE D'UN CONDENSATEUR REFROIDI À L'AIR

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Description

[0001] The present invention relates to a laundry washing and drying machine comprising an air-cooled condenser according to the preamble of claim 1. A similar washer-dryer machine is shown in EP 2 039 819 A1.

[0002] In laundry washing and drying machines, air-cooled condensers are widely used, that realize the condensation process by using the outer environment air in the drying process after the washing step. Humid air that comes from over the laundry and passes through the processing air channel is condensed in the condenser cooled by means of the outer environment air, thus the air that is dried by being dehumidified is sent again onto the laundry through the processing air channel. Fibers and lint from the laundry fluttering during the drying process accumulate on the condenser. If not cleaned, fibers and lint clog the air passage lines in the condenser and adversely affect the efficiency of the condenser. The condenser and the air channels connected thereto are washed by means of a water spraying device connected to the water mains by means of a valve in order to cleanse them of fibers and lint. The condenser is generally washed at the end of the drying process, since, during the drying of the laundry, most of the fibers and lint adhere onto the condenser towards the end of the drying cycle. A small amount of water such as 3 - 4 liters is used for washing the condenser especially in order to reduce the water consumption; however, when the pressure of water coming from water mains is low, the condenser cannot be properly cleansed of the fibers and lint with a small amount of water with low pressure.

[0003] In the European Patent Application No. EP2169107, a spraying device is described, providing the condenser in a laundry dryer to be washed and thus cleaned of fiber and lint at the end of the drying process.

[0004] The aim of the present invention is the realization of a laundry washing and drying machine comprising an air-cooled condenser that is effectively cleansed of the fibers and lint adhering thereon.

[0005] The laundry washing and drying machine realized in order to attain the aim of the present invention, explicated in the first claim. It comprises a detergent dispenser wherein the chemical cleaning agents are placed, an air-cooled condenser that condenses the processing air and a first valve connected to the water supply (the water mains), providing the water taken from the mains for washing to be delivered to the detergent dispenser and the tub and a second valve again connected to the water supply, that delivers water onto the condenser, providing the fibers and lint adhering onto the condenser to be removed at the end of the drying process.

[0006] The control unit may open the second valve while water is being taken from the water supply at the beginning of the laundry washing program and thus some of the water required for the laundry washing program is filled into the tub after washing the air ventilation duct and the condenser.

[0007] In a possible embodiment of the present invention, the control unit may keep the first valve open for a predetermined period, for example until 5 liters of water is sent in order to flush the cleaning agents in the detergent dispenser and opens the second valve after closing the first valve.

[0008] In another possible embodiment of the present invention, the control unit may open the first valve and the second valve at the same time during the water intake from the water supply, closes the first valve after the cleaning agents in the detergent dispenser are flushed and closes the second valve after the tub is filled with the required amount of water.

[0009] Preferably, the control unit provides that approximately 10 % of the water needed for the washing of the laundry is filled into the tub from the first valve and through the detergent dispenser, and approximately 90 % from the second valve and through the air ventilation duct - the condenser.

[0010] In the laundry washing and drying machine of the present invention, the water taken from the water supply for laundry washing is passed through the condenser, thus providing the fibers and lint adhering onto the condenser to be cleansed with plenty of water even if the mains pressure is low; and an additional condenser washing program is not needed to be applied for cleaning the condenser.

[0011] An example of the laundry washing and drying machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where: Figure 1 - is the schematic view of a laundry washing and drying machine.

[0012] The elements illustrated in the figures are numbered as follows:

1. Laundry washing and drying machine
2. Drum
3. Tub
4. Detergent dispenser
5. Air circulation duct
6. Fan
7. Condenser
8. Outer air line
9. Heater
10. Control unit
11. First valve
12. Second valve

[0013] The laundry washing and drying machine 1 shown in Fig. 1 comprises a drum 2 wherein the laundry is placed, a tub 3 wherein the drum 2 moves, a detergent dispenser 4 wherein the chemical cleaning agents to be used in the laundry washing process are placed, an air ventilation duct 5 wherein the processing air circulation providing the laundry to be dried at the drying process after the washing process is realized, a fan 6 providing the circulation of the processing air, an air-cooled condenser 7 condensing the processing air, an outer air line 8 that delivers the cooling air received from the outer environment to the condenser 7, providing the cooling of the condenser 7, a heater 9 placed into the air ventilation duct 5, heating the dehumidified processing air coming from the condenser 7 and a control unit 10 controlling the washing-drying programs. In the laundry washing and drying machine 1, the laundry washing program and the laundry drying program are respectively applied.

[0014] The laundry washing and drying machine 1 furthermore comprises a first valve 11 providing water to be taken from the water supply S at the beginning of the laundry washing program and to be sent to the tub 3 through the detergent dispenser 4 and a second valve 12 providing water to be taken from the water supply S to be sent to the air ventilation duct 5 and the condenser 7 in order that laundry fibers and lint that are carried with the processing air and that adhere to the air ventilation duct 5 and the condenser 7 are removed.

[0015] The laundry washing and drying machine 1 comprises the control unit 10 that may open the second valve 12 during the water intake from the water supply S at the beginning of the laundry washing program, thereby providing some of the water first to wash the air ventilation duct 5 and the condenser 7 and then, secondly, to be filled into the tub 3.

[0016] In the laundry washing and drying machine 1, during the water intake at the beginning of the laundry washing program, the second valve 12 may be opened by the control unit 10 and consequently wash water passes through the air ventilation duct 5 and the condenser 7 and then is filled into the tub 3. Thus, fibers and lint adhered onto the condenser 7 during the previous washing-drying program are provided to be cleansed with plenty of water.

[0017] In a possible embodiment, while water is being taken from the water supply S at the beginning of the laundry washing program, the control unit 10 may keep the first valve 11 open for a predetermined period recorded in its memory for the cleaning agents in the detergent dispenser 4 to be flushed and after closing the first valve 11, opens the second valve 12, thus providing the remainder of the water required for the washing of the laundry to be filled into the tub 3 by following the second valve 12 - air ventilation duct 5 - condenser 7 path. By opening the two valves 11, 12 respectively, the pressure of the water flushing the detergent dispenser 4 by means of the first valve 11 and the pressure of the water cleansing the condenser 7 of fibers and lint by means of the second

valve 12 are prevented from decreasing.

[0018] In another possible embodiment, the control unit 10 may open the first valve 11 and the second valve 12 at the same time while water is being taken from the water supply S at the beginning of the laundry washing program and keeps the first valve 11 open until the agents in the detergent dispenser 4 are flushed and the second valve 12 open until the amount of water required for the washing of the laundry is filled into the tub 3. In this embodiment, during the water intake from the water mains, at first both valves 11, 12 are kept open, thereby decreasing the time required for water to fill the tub 3.

[0019] The control unit 10 regulates the opening/closing durations of the first valve 11 and the second valve 12, thereby providing 10 % of the water required for the laundry washing program to be filled into the tub 3 through the first valve 11 - the detergent dispenser 4 and 90 % thereof through the second valve 12 - the air ventilation duct 5 - the condenser 7.

[0020] In the laundry washing and drying machine 1, a separate condenser 7 washing process is not applied for cleansing the air ventilation duct 5 and the condenser 7 of fibers and lint adhering thereon. Fibers and lint adhering onto the condenser 7 are washed away with plenty of water during the water intake at the beginning of the laundry washing program. Even if the pressure of the water supplied from the water mains is low, a successful condenser 7 cleaning is provided and total water consumption is decreased.

Claims

1. A laundry washing and drying machine (1) for applying a laundry washing program and a laundry drying program, and said laundry washing and drying machine (1) **comprising** a drum (2) wherein the laundry is placed, a tub (3) wherein the drum (2) moves, a detergent dispenser (4), an air ventilation duct (5) wherein the processing air circulation providing the laundry to be dried is realized, an air-cooled condenser (7) condensing the processing air, a control unit (10), a first valve (11) providing water to be taken from the water supply (S) at the beginning of the laundry washing program and to be sent to the tub (3) through the detergent dispenser (4) and a second valve (12) providing exclusively water to be taken from the water supply (S) to be sent to the air ventilation duct (5) and the condenser (7) in order that laundry fibers and lint that are carried with the processing air and that adhere to the air ventilation duct (5) and the condenser (7) are removed, **characterized in that** the control unit (10) is configured to provide for opening the second valve (12) during the water intake from the water supply (S) at the beginning of the laundry washing program, thereby providing some of the water first to wash the air ventilation duct (5) and the condenser (7) and then, sec-

only, to be filled into the tub (3).

2. The laundry washing and drying machine (1) as in Claim 1, **characterized in that** the control unit (10) is configured to provide for keeping the first valve (11) open until the cleaning agents in the detergent dispenser (4) are flushed and for opening the second valve (12) after closing the first valve (11).
3. The laundry washing and drying machine (1) as in Claim 1, **characterized in that** the control unit (10) is configured to provide for opening the first valve (11) and the second valve (12) at the same time and for keeping the first valve (11) open until the agents in the detergent dispenser (4) are flushed and the second valve (12) open until the amount of water required for the washing of the laundry is filled into the tub (3).
4. The laundry washing and drying machine (1) as in any one of the above claims, **characterized in that** the control unit (10) is configured to provide 10 % of the water required for the laundry washing to be filled into the tub (3) through the first valve (11) - the detergent dispenser (4) and 90 % thereof through the second valve (12) - the air ventilation duct (5) - the condenser (7).

Patentansprüche

1. Wasch- und Trockenmaschine (1) zum Anwenden eines Wäschewaschprogramms und eines Wäschetrocknungsprogramms und der Wasch- und Trockenmaschine (1) **umfassend** einen Trommel (2), in der die Wäsche angeordnet ist, eine Wanne (3), in der sich die Trommel (2) bewegt, einen Reinigungsmittelspender (4), einen Belüftungskanal (5), in dem die die Wäsche trocknende Prozessluftumwälzung realisiert ist, ein luftgekühlter Kondensator (7), der die Prozessluft kondensiert, eine Steuereinheit (10), ein erstes Ventil (11), das die Wasseraufnahme aus der Wasserversorgung (S) zu Beginn des Waschprogramms und die Wasserabgabe zur Wanne (3) durch den Reinigungsmittelspender (4) vorsieht, und ein zweites Ventil (12), das ausschließlich die Wasseraufnahme aus der Wasserversorgung (S) entnommen wird, um in den Belüftungskanal (5) und den Kondensator (7) zu transportieren, damit Wäschefasern und Flusen, die mit der Prozessluft befördert werden und die an dem Belüftungskanal (5) und der Kondensator (7) haften, entfernt werden **dadurch gekennzeichnet, dass** die Steuereinheit (10) so konfiguriert ist, dass sie die Öffnung des zweiten Ventils (12) während der Wasseraufnahme aus der Wasserversorgung (S) zu Beginn des Waschprogramms vorsieht, wodurch ein Teil des Wassers zuerst den Belüftungskanal (5) und den Kondensator

(7) spült und dann, zweitens, in die Wanne (3) gefüllt wird.

2. Wasch- und Trockenmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Steuereinheit (10) konfiguriert ist, um das erste Ventil (11) offen zu halten, bis die die Mittel in dem Reinigungsmittelspender (4) gespült sind und das zweite Ventil (12) zu öffnen, nach dem das erste Ventil (11) geschlossen wird.
3. Wasch- und Trockenmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Steuereinheit (10) konfiguriert ist, um das erste Ventil (11) und das zweite Ventil (12) gleichzeitig zu öffnen und das erste Ventil (11) offen zu halten, bis die Mittel in dem Reinigungsmittelspender (4) gespült sind und das zweite Ventil (12) offen zu halten, bis die zum Waschen der Wäsche benötigte Wassermenge in die Wanne (3) gefüllt ist.
4. Wasch- und Trockenmaschine (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Steuereinheit (10) so konfiguriert ist, dass sie 10% des Wassers, das für das Wäschewaschen benötigt wird, durch das erste Ventil (11) - den Reinigungsmittelspender (4) in die Wanne (3) und 90% davon durch das zweite Ventil (12) - den Belüftungskanal (5) - in den Kondensator (7) einfüllt.

Revendications

1. Machine à laver et à sécher le linge (1) pour appliquer un programme de lavage du linge et un programme de séchage du linge, et ladite machine à laver et à sécher le linge (1) **comportant** un tambour (2) dans lequel le linge est placé, une cuve (3) dans laquelle le tambour (2) déplace, un distributeur de détergent (4), un conduit de ventilation d'air (5) dans lequel la circulation d'air de traitement fournissant le linge à sécher est réalisée, un condenseur refroidi par air (7) se condensant l'air de traitement, une unité de commande (10), une première soupape (11) fournissant de l'eau à prélever de l'alimentation en eau (S) au début du programme de lavage du linge et à envoyer à la cuve (3) à travers le distributeur de détergent (4) et une seconde soupape (12) en fournissant exclusivement de l'eau à prélever sur l'alimentation en eau (S) à envoyer au conduit de ventilation d'air (5) et au condenseur (7) afin d'enlever les fibres de blanchisserie et les peluches qui sont transportées avec l'air de traitement et qui adhèrent au conduit de ventilation d'air (5) et au condenseur (7) sont retirés, **caractérisé en ce que** l'unité de commande (10) est configurée pour permettre l'ouverture de la seconde soupape (12) pendant la prise d'eau depuis l'alimentation en eau (S) au début du programme de

lavage de linge, fournissant ainsi une partie de l'eau en premier lieu pour laver le conduit de ventilation d'air (5) et le condenseur (7), puis en second lieu pour remplir la cuve (3).

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2. Machine à laver et à sécher le linge (1) selon la revendication 1, **caractérisé en ce que** l'unité de commande (10) est conçue pour maintenir ouverte la première soupape (11) jusqu'à ce que les agents de nettoyage dans le distributeur de détergent (4) soient rincés et pour ouvrir la seconde soupape (12) après avoir fermé la première soupape (11). 10
3. Machine à laver et à sécher le linge (1) selon la revendication 1, **caractérisé en ce que** l'unité de commande (10) est configurée pour ouvrir simultanément la première soupape (11) et la seconde soupape (12) et pour maintenir la première soupape (11) ouverte jusqu'à ce que les agents dans le distributeur de détergent (4) sont rincés et la seconde soupape (12) ouverte jusqu'à ce que la quantité d'eau nécessaire au lavage du linge soit remplie dans la cuve (3). 15 20
4. Machine à laver et à sécher le linge (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'unité de commande (10) est configurée pour fournir 10% de l'eau nécessaire au lavage du linge à remplir dans la cuve (3) par la première soupape (11) - le distributeur de détergent (4) et 90% par la seconde soupape (12) - le conduit de ventilation d'air (5) - le condenseur (7). 25 30

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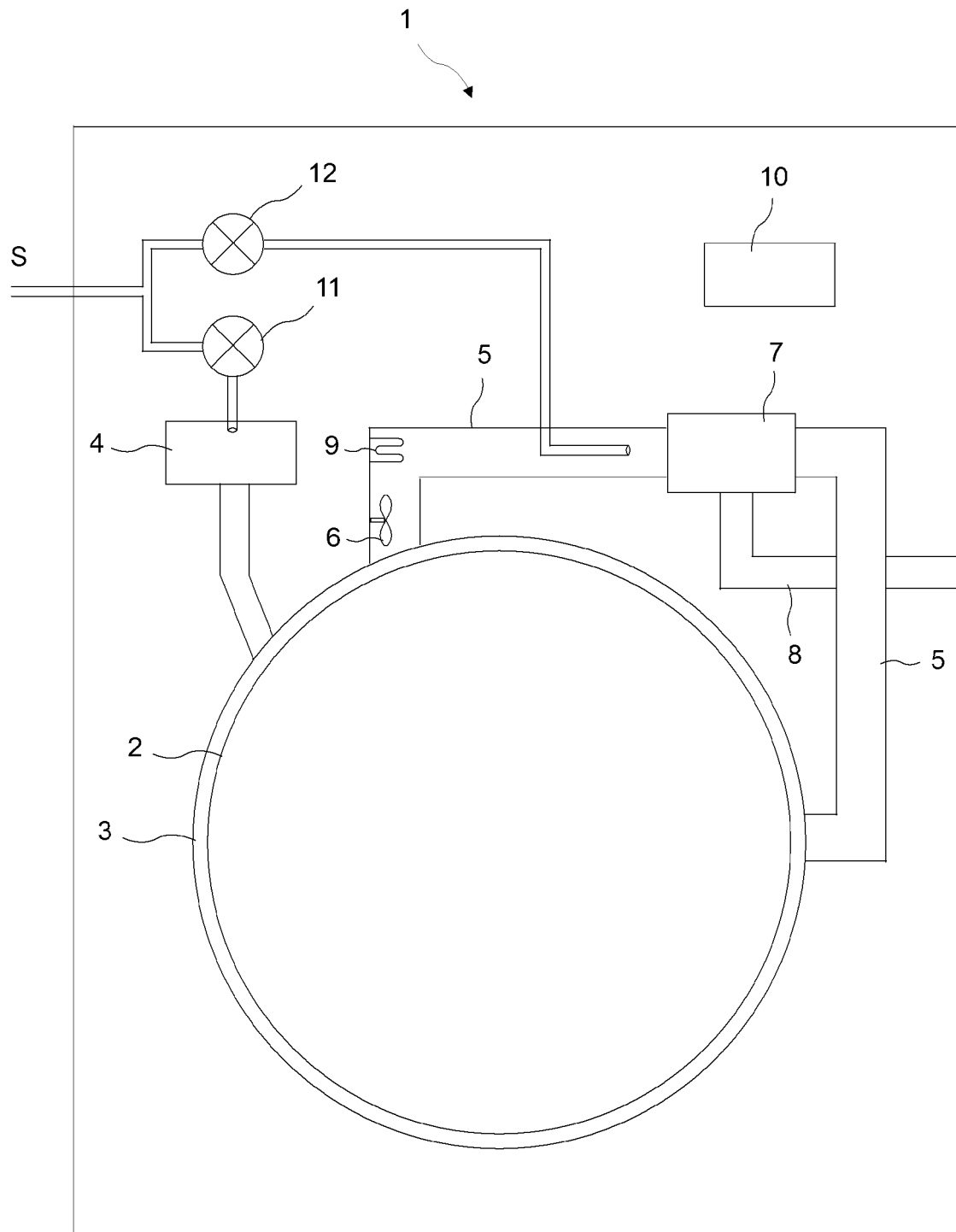
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Figure 1



REFERENCES CITED IN THE DESCRIPTION

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