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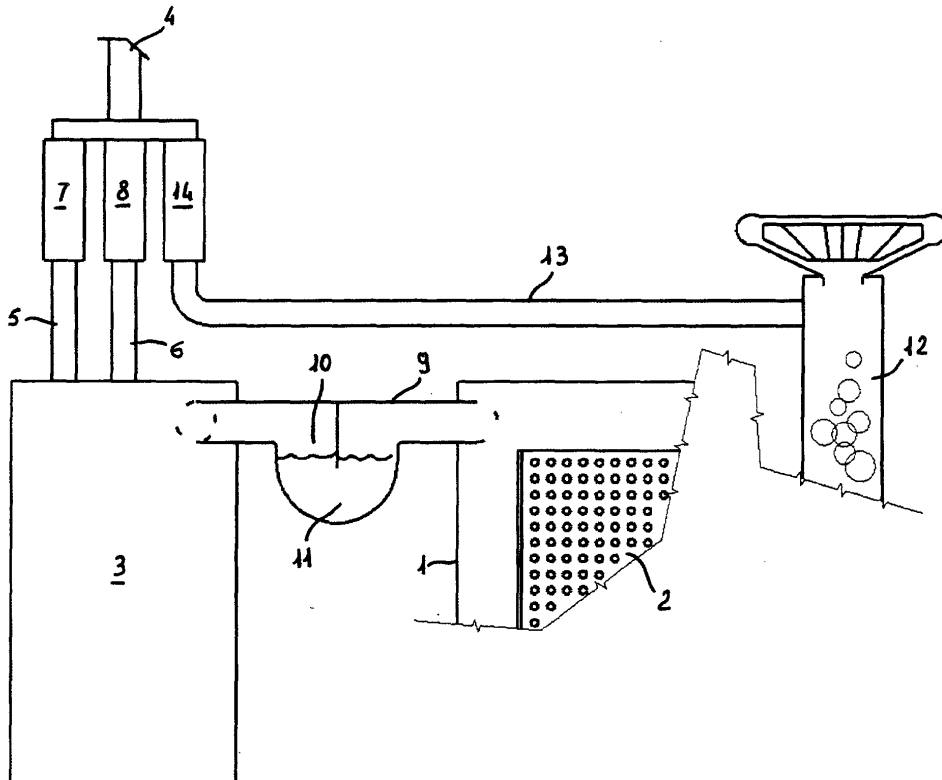
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(54) **Combined clothes washing and drying machine**

(57) The washing and drying machine has a water supply circuit comprising a pipe (5; 6) with an electromagnetic valve (7; 8), a washing product container and dispenser (3), and a conduit (9) with a siphon (10) that normally fills up with residual water. The electromagnet-

ic valve is opened temporarily, both before and during the clothes drying phase, in order to fill up, ie. re-fill the siphon (10) with a calibrated amount of water, so as to ensure that said siphon is appropriately filled to prevent moist air from leaking outside, ie. into the surrounding ambient through said washing product container (3).



Description

[0001] The present invention refers to a combined automatic machine adapted to wash and/or dry clothes.

[0002] Such combined machines, which are generally known under the term of washer-driers in the art, are largely known to mainly comprise a tub adapted to contain, usually inside a rotating drum, clothes that can be washed, rinsed, spin-extracted and/or dried thanks to the provision of appropriate water-handling circuits, as well as a drying circuit by means of which heated air that becomes progressively laden with the moisture subtracted from the clothes contained in the tub is caused to circulate through or in correspondence of condenser means for the condensation of said moisture.

[0003] In particular, the above cited water-handling circuits comprise a container of washing and/or rinsing products, which may for instance be in the form of a pull-out drawer, or the like, and is arranged so as to be able to be supplied from one or more nozzles with water adapted to flush off said washing and/or rinsing products and convey them into the tub through a siphon arrangement.

[0004] Residual water collects on the bottom of said siphon so as to cut off the communication existing between the tub and said washing product container, thereby preventing, for instance during the clothes drying phase, the moisture-laden hot air that is present in the tub from leaking into the outside ambient through the same product container.

[0005] On the other hand, during the operation of the machine it may quite easily occur that the level of the residual water in the siphon decreases to such an extent as to cause the siphon itself to practically become ineffective against the above cited undesired leakage of moisture-laden hot air, with the various problems and drawbacks that this may imply, as all those skilled in the art are well aware of.

[0006] Such an undesired occurrence of the siphon emptying out may for instance be brought about by water losses caused by the oscillations of the machine during a spin-extraction phase of the clothes washing cycle and/or by the evaporation of the residual water contained in the siphon owing to the heating which the same water is exposed to during certain operation phases of the machine, in particular during the clothes drying process.

[0007] It therefore is a purpose of the present invention to provide a combined clothes washing and drying machine, in which, even in the presence of critical operating conditions and without any need for substantial structural modifications, the possibility for moisture-laden air to be undesirably vented from the tub into the outside ambient, in particular through the washing and rinsing product container, is completely eliminated.

[0008] According to the present invention, these and further aims are reached in a combined clothes washing and drying machine having the characteristics as recited

in the appended claims.

[0009] Anyway, features and advantages of the present invention will be more readily understood from the description that is given below by way of non-limiting example with reference to the single accompanying drawing, which is a schematical view of the main operating component parts of the machine according to a preferred embodiment thereof.

[0010] With reference to the above mentioned Figure, the combined clothes washing and drying machine mainly comprises, duly arranged within an outer casing (not shown), a washing tub 1 housing a clothes-containing drum 2 that is adapted to rotate at different revolution speeds to carry out a sequence of washing, rinsing, spin-extracting, drying and similar phases of an operating cycle of the machine.

[0011] The machine further comprises a container 3 for holding and dispensing washing and/or rinsing products and aids, which may for instance of the pull-out drawer-like type comprising a plurality of differentiated compartments (not shown for reasons of greater simplicity).

[0012] In a per se known manner, the container 3 is capable of being selectively supplied with the water flowing in from the mains 4 via pipes 5 and 6 that are provided with respective controlled electromagnetic valves 7, 8, or the like.

[0013] For instance, the pipe 5 is adapted to deliver washing water that flushes off and conveys into the tub 1 a corresponding washing product filled in an appropriate compartment of the container 3, whereas the pipe 6 is adapted to supply rinsing water that flushes off and conveys into the tub 1 a corresponding rinsing aid, such as a fabric softener, filled in another compartment of the same container.

[0014] In any case, the water from the mains that is in this way supplied to the container 3 flows into the tub 1 via a conduit 9, which has at least a siphon-shaped portion 10, in which residual water 11 is able to collect so as to normally form a hydraulic hindrance which prevents the moisture-laden air that is present in the tub 1 during certain operating phases (in particular during the traditional clothes drying phase) from leaking into the outside ambient through the conduit 9 and the container 3.

[0015] For carrying out the above mentioned clothes drying process, the machine is preferably provided with a condenser 12, towards which the moisture released by the clothes contained in the tub 1 is actually conveyed through a per se known (and not shown) forced-flow hot-air circuit.

[0016] In this way, the moisture is capable of condensing on said condenser 12, which to this purpose is adapted to be cooled with water flowing in from the mains 4 via a pipe 13 provided with a controlled-type electromagnetic valve 14 or similar device.

[0017] The machine of course comprises a programme sequence control unit, of a per se known type

and, therefore, not shown, which is adapted to control the various operating component parts thereof.

[0018] According to a feature of the present invention, such a programme sequence control unit is set in such a manner as to enable, preferably just before the beginning of the afore mentioned clothes drying phase, at least one of the electromagnetic valves 7, 8 to be temporarily opened so as to let into the siphon 10, via the corresponding pipe 5, 6 and the container 3, a calibrated amount of water ensuring the substantial filling up of the same siphon even in the case that the latter would have at least partially emptied owing to the oscillations of the machine generated during a preceding spin-extraction phase of the rotating drum 2.

[0019] In alternative thereto, or even in addition thereto, at least one of the electromagnetic valves 7, 8 is opened temporarily during the clothes drying phase to let into the siphon 10, via the corresponding pipe 5, 6 and the container 3, a calibrated amount of water ensuring the substantial filling up of the same siphon even in the case that the latter would have at least partially emptied owing to thermal evaporation of the residual water 11.

[0020] In an embodiment of the present invention, said temporary opening of the electromagnetic valves 7 and/or 8 can be caused to occur repeatedly during the clothes drying phase, eg. periodically every 20 minutes.

[0021] By way of example, if the electromagnetic valves 7, 8 have a flow rate of 8 litres/minute, each one of the above mentioned temporary openings may have a duration of approx. 0.5 seconds, which practically implies a substantially negligible water usage.

[0022] In any case, any possible excess amount of water that is in this manner let into the siphon 10 is conveyed into the tub 1 via the conduit 9, anyway in such small amounts and at such reduced flow rates as to exclude any possibility for the clothes in the tub to be really wetted by it.

[0023] Furthermore, the above mentioned temporary water inflows occur when no products or aids are present in the container 3 and this advantageously prevents any scaling problem from showing up in the water supply and carrying circuit 3-10.

[0024] Conclusively, the machine according to the present invention, which may be of a fully traditional type and only requires a simple and particular setting of the programme sequence control unit thereof, ensures that the clothes drying phase can effectively be performed without any possibility for the moisture-laden hot air that is present in the tub 1 to leak into the outside ambient by flowing back through the conduit 9 and the container 3.

for washing, rinsing, spin-extracting and drying the clothes contained in a tub (1) adapted to be supplied from the mains through a water supply and handling circuit comprising at least a pipe (5; 6) provided with controlled valve means (7; 8), a washing and rinsing product container (3) and a conduit (9) provided with at least a siphon arrangement (10) adapted to normally fill up with residual water, **characterized in that** at least one of said valve means (7; 8) is adapted to be opened temporarily, before and/or during said clothes drying phase, in order to let into the siphon arrangement (10) a calibrated amount of water, so as to ensure that said siphon (10) is substantially filled up to prevent moist air from leaking outside through said washing product container (3).

2. Combined clothes washing and drying machine according to claim 1, **characterized in that** said valve means (7; 8) are adapted to be temporarily opened in a repeated manner during said clothes drying phase.
3. Combined clothes washing and drying machine according to claim 2, **characterized in that** during said clothes drying phase said valve means (7; 8) are adapted to be temporarily opened at periodical intervals.

Claims

1. Combined clothes washing and drying machine adapted to perform a sequence of process phases

