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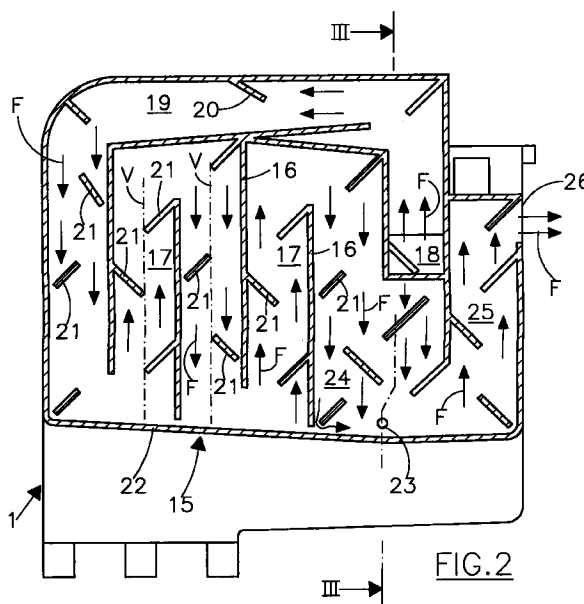
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(54) Device for limitation of steam released from a washing machine

(57) The invention relates to a device for the limitation of steam released from a washing machine. The device consists of a sequence of adjacent vertical chambers (17), separated by vertical parallel baffles (16) alternately interrupted at the upper or lower ends for the reciprocal alternate communication between adjacent chambers and provided with intermediate deflecting walls (21) for the partial conversion of the steam into condensation water. The adjacent chambers (17) define a labyrinth path with sequential chambers (17) with an alternately rising and descending vertical steam flow from a steam inlet aperture (11) communicating with the washing drum of the machine to an expansion chamber (24) provided with an upper steam outlet hole (26) and with a lower hole (23) wherein condensation water is conveyed for return into the drum.



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Description

The present invention relates to a device for limitation of the steam released from a washing machine.

The production and sale of built-in electrical household appliances are currently enjoying steady growth thanks to the manufacture of technologically advanced products which integrate the functions of the electrical appliance with the geometrical and design requirements of the relevant décor.

Built-in electrical household appliances are in any case required to operate in conditions of maximum safety, particularly in the case of washing machines and dishwashers.

For the latter it is important to limit the release of the steam produced inside the washing drum, which may cause serious damage to the surrounding furniture.

There are currently various systems for containing steam, some of which are also very complex, such as the use of transverse currents of cold air or cold flows in a countercurrent. These systems are also adopted in combination with condensation batteries, motor fans or solenoid valves for feeding the cold flow.

These known systems, albeit effective, involve a somewhat high cost of application and management in relation to the function required.

The object of the present invention is that of providing a device for limiting the steam released from a washing machine, which is particularly simple and with a restricted effect on the overall cost of the machine.

In accordance with the invention, this object is achieved with a device characterised in that it is composed of a sequence of adjacent vertical chambers, separated by parallel vertical baffles alternately interrupted at the upper or lower ends for alternate reciprocal communication between the adjacent chambers and provided with intermediate deflecting walls for the partial conversion of the steam into condensation water, said adjacent chambers defining a labyrinth path with sequential chambers with an alternately rising and descending vertical flow of steam from a steam inlet aperture communicating with the washing drum of the machine to an expansion chamber provided with an upper steam outlet hole and a lower hole wherein condensation water is conveyed for return into the drum.

In the device according to the invention most of the steam released from the washing drum is condensed into water, thanks to its impact with the deflecting walls encountered along the path via the sequence of adjacent chambers, and then returns into the drum via the return hole for the condensation water, while only a small part of the initial steam is disposed of outside and which cannot cause damage to the surrounding furniture.

This is moreover a very simple and inexpensive device which can be used for particularly practical and economical functions, in addition to having small overall dimensions.

In particular, in accordance with a preferred embod-

iment of the present invention, provision is made to place the steam limitation device as a simple constructional extension of the single-block body which already forms part of many washing machines and dishwashers and combines the known functions of air break and container of regeneration water for the washing water decalcifying resins, as well as that of collection and disposal of the steam produced in the washing drum and entering through an appropriate inlet hole.

More specifically, a usual single-block body of the aforementioned type is laterally flanked by and welded to an additional body made in accordance with the present invention and communicating with the first via a window formed for this purpose in a side wall of the single-block body and forming the inlet aperture of the steam limitation device. Suitable means are also provided to prevent the direct flow of steam towards the usual aperture for disposal of the steam via the single-block body.

Again in accordance with a preferred embodiment of the device according to the invention, the baffles for separation of the adjacent chambers and the deflecting walls provided in the chambers themselves are even half made in one piece with the single-block body and the other half in one piece with the additional body.

In this way, already having a single-block body which can be used for the usual applications not requiring limitation of steam, it is possible to complete the body itself with the steam limitation device by flanking and welding to the single-block body an additional complementary body which substantially acts as an optional part for built-in machines.

It should be noted that the adjacent arrangement of the two bodies, one of which contains the regeneration water, allows the low temperature of the latter to be exploited for faster cooling and more effective condensation of the steam.

These and other features of the present invention, together with the advantages which derive therefrom, will be made clearer from the following detailed description of said preferred embodiment, illustrated by way of a non-limiting example in the accompanying drawings, in which:

Fig. 1 shows a working assembly with air break, regeneration water container and steam limitation device according to the invention, which is sectioned vertically at the air break and regeneration water container, more specifically along line I-I in Fig. 3;

Fig. 2 shows said working assembly sectioned vertically at the steam limitation device, more specifically along line II-II of Fig. 3;

Fig. 3 shows said working assembly in a transverse section along lines III-III of Figures 1 and 2;

Fig. 4 shows a sectioned view similar to Fig. 3 but with the working assembly separated into two of its component bodies.

The drawings show a working assembly which performs the functions of air break, regeneration water container and steam limitation device according to the invention.

The first two functions are performed by a first part of said working assembly, which consists of a single-block body 1 of a box-shaped type, made in a plastic material, which is equipped with an air break device 2 and a container 3 for regeneration water fed by the air break device, for example of the type illustrated in the prior Italian utility model application no. MI94U000285 filed on 19 April 1994 in the name of the same Applicant. 4 in Fig. 1 denotes an inlet for clean water coming from a conventional feed solenoid valve (not shown), 5 denotes an outlet for the clean water which has passed beyond the air break device and 6 denotes an outlet for the regeneration water, intended for a suitable decalcifying resin device (also not shown).

Appropriate transverse walls 7, 8 and 9 separate the aforementioned regeneration water container from an area 10 for disposal of the washing steam, which receives the steam from a steam inlet 11, in turn communicating with the interior of the washing drum of a washing machine, via a narrow passage 12 defined between walls 8 and 9 (Fig. 1), and conveys it towards an upper outlet aperture 13, partially converting it into condensation water through the impact with oblique transverse deflectors 14.

The function of steam limitation device is performed however, in combination with the single-block body 1, by an additional semi-box body 15, which is made separately (Fig. 4) and then flanked by laterally and welded to the single-block body 1 (Fig. 3).

As shown in Fig. 2, the additional body 15 is provided with internally projecting transverse half-walls 16a which, by coupling with corresponding complementary half-walls 16b, projecting laterally from the single-block body 1, form a plurality of vertical separator baffles 16 between laterally adjacent vertical chambers 17 of a sequence of chambers, alternately communicating at the top and at the bottom, which define a labyrinth path with sequential chambers (17) with an alternately rising and descending vertical flow of steam.

The steam, which enters through the inlet 11 of Fig. 1, in fact passes (arrows F) from the single-block body 1 to the space formed between the two bodies 1 and 15 through a communication window 18 and then, after a section of horizontal rectilinear path 19 with small oblique deflecting walls 20 (half formed in turn as external projections of the body 1 and half as internal projections of the body 15), reaches the labyrinth path formed by the chambers 17, in turn provided with oblique deflecting walls 21, vertically staggered one in relation to the other but with internal edges substantially on the same vertical axis V (Fig. 2), obtained by juxtaposing internal projections of the body 15 on external complementary projections of the body 1. The aforementioned deflecting walls have the task of converting most of the steam in transit into condensation water, which is col-

lected by the back wall 22 of the labyrinth path and conveyed by the same (appropriately tilted as shown in Fig. 2) towards a small transverse hole 23, which causes it to return into the steam inlet 11 and from here into the washing drum. For this purpose, as shown in Fig. 2, the vertical baffles 16 are all slightly distanced from the back wall 22. The deflecting walls 21 of the descending steam flow chambers 17 have in turn their external edges slightly distanced from the adjacent vertical walls to prevent stagnation of condensation and instead encourage outflow thereof towards the back wall 22.

The labyrinth path defined by the sequence of adjacent chambers 17 ends with an expansion chamber 24, where the small condensation return hole 23 is formed and which communicates via a final vertical path section 25 with an outlet hole 26 for the residual steam.

It should be noted that, in order to force the steam coming from the drum to flow through the limitation device described above and prevent its anomalous conveying towards the upper aperture 13, the narrow passage 12 between the walls 8 and 9 of the body 1 is flooded straightaway by the condensation water, which immediately closes the aforementioned passage and prevents the undesirable anomalous conveying of the steam.

A similar flooding is foreseen below the small hole 23 whose diameter is chosen as fairly small in order to prevent infiltrations of dirty water from the washing drum.

Claims

1. Device for limitation of steam released from a washing machine, characterised in that it is composed of a sequence of adjacent vertical chambers (17), separated by parallel vertical baffles (16) alternately interrupted at the upper or lower ends for reciprocal alternate communication between the adjacent chambers and provided with intermediate deflecting walls (21) for the partial conversion of the steam into condensation water, said adjacent chambers (17) defining a labyrinth path with sequential chambers (17) with an alternately rising and descending vertical flow of steam from a steam inlet aperture (11) communicating with the washing drum of the machine to an expansion chamber (24) provided with an upper steam outlet hole (26) and a lower hole (23) wherein condensation water is conveyed for return into the drum.
2. Device according to claim 1, characterised in that said labyrinth path is formed in a box-shaped space provided with an oblique back wall (22), distanced from the lower ends of said separator baffles (16), which conveys the condensation water towards said lower hole (23) of the expansion chamber (24).
3. Device according to claim 1, characterised in that the deflecting walls (21) of the chambers (17) with

descending steam flow have an external edge distanced from the adjacent wall or vertical separator baffle (16).

4. Device according to claim 1, characterised in that said deflecting walls (21) are vertically staggered one in relation to the other and have internal edges substantially on one same vertical axis (V). 5
5. Device according to claim 1, characterised in that it is made in the form of an additional body (15) laterally flanked by and welded to a single-block body (1) containing an air break device and a container of regeneration water for resins for decalcifying the washing water, said single-block body (1) being provided with an inlet hole (11) for the steam produced in the washing drum of the machine and said labyrinth path communicating with said inlet hole through a communication window (18) formed between the two aforementioned bodies (1, 15). 10 15 20
6. Device according to claim 5, characterised in that said separator baffles (16) and said deflecting walls (21) are half formed by external projections of the single-block body (1) and half by complementary internal projections of the additional body (15). 25

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