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(54) HOUSEHOLD WASHING APPLIANCE WITH STEAM GENERATING MEANS FOR EXTERNAL USE

(57) The invention relates to a household washing appliance, such as a washing machine (1), a washing/drying machine, a dishwasher or the like, equipped with a steam generator (15) which is used for the steps of washing and drying the load, such as laundry and crockery; the household appliance is also equipped with an external takeoff that allows connecting the steam generator to the outside, so that the produced steam can also be used for other household activities, such as ironing, cleaning, disinfecting, and the like.

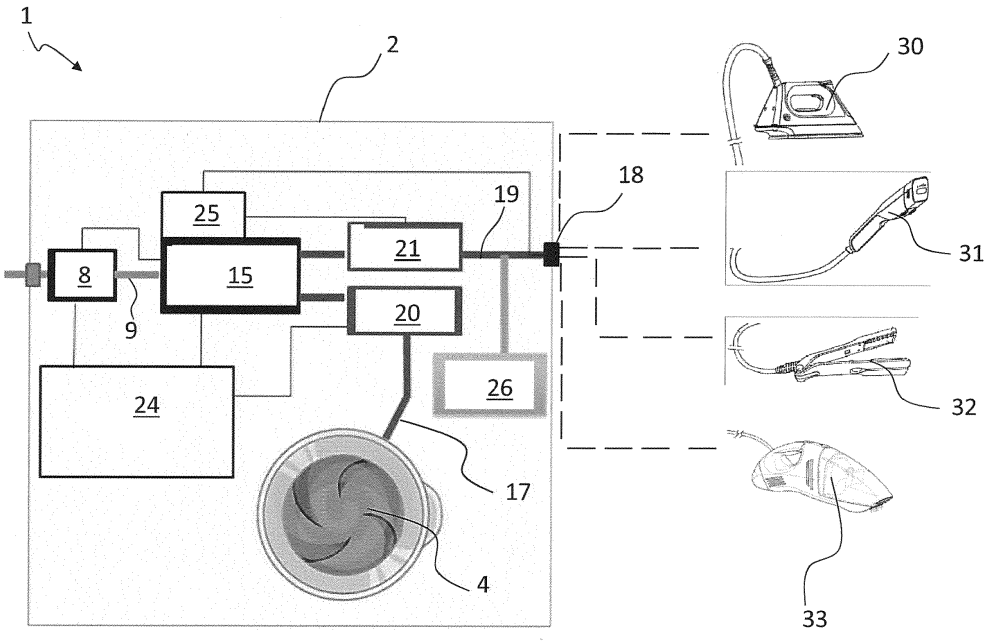

Fig. 2

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Description

[0001] The present invention relates, in a general aspect thereof, to a household washing appliance, such as a washing machine, a washing/drying machine, a dishwasher or the like, equipped with means for steam generation.

[0002] Before proceeding further it should be pointed out that, although in the following description and in the appended claims reference will be made mainly to a washing machine as a household appliance according to the invention, this should not however be understood as a limiting factor, since the description will also apply to the other above-mentioned household washing appliances, with possible slight adaptations just in case.

[0003] As is known, increasing importance is being given in modern household appliances to the use of steam during some steps of the operating cycle; for example, this is the case of washing machines, which include a laundry hygienization cycle that uses a jet of steam, which may be sprayed starting from relatively low temperatures (approx. 30 °C). Machines also exist which include entire laundry washing cycles that utilize steam instead of water; usually these cycles are intended for delicate items, and are characterized in that they remove wrinkles from fabrics, caused by the laundry spinning or drying operations.

[0004] For this reason, steam is also used in clothes dryers and washing/drying machines.

[0005] In general, in the above-mentioned household appliances steam is produced by a suitable generator; the latter essentially comprises a water collection tank, which is heated by a resistor arranged inside (or outside) the tank itself.

[0006] The generator is in fluidic communication with the wash chamber or tub, so that steam can be supplied into the latter; to this end, many solutions are known for putting the generator in communication with the wash chamber, depending on the type of washing appliance, on the size of the appliance itself and/or the size of the generator, etc. Thus, for example, there are cases where the generator is directly housed in the tub and essentially consists of a water collection well, wherein water is heated by the resistor; the well may be located either at the bottom or at the rear of the tub.

[0007] Some examples of implementation of this type of solution are described in European patent application EP 2 604 738.

[0008] According to other possible solutions, the generator is arranged outside the wash chamber and put in communication therewith by means of a steam supply collector or duct; in these cases, the generator usually comprises a vessel connected to the wash chamber, as described in European patent applications published under reference numbers EP 2 230 348 and EP 2 578 735.

[0009] Regardless of the type of solution adopted, it must be pointed out that in household washing appliances the steam generator only works for a short time fraction of the operating cycle; in fact, the steps using water in a washing machine are still prevalent, since those using steam are only useful in some particular and limited circumstances, like those described above for hygienizing and removing wrinkles from washed laundry.

[0010] It follows that the increased complexity, and hence higher costs, of the household appliance, caused by the presence of steam generating means, are not always compensated for by the advantages that can be obtained from the use of steam.

[0011] A technical problem must still be solved in this respect, i.e. to increase the performance of the above-described household washing appliances known in the art, so as to better exploit the steam generating means with which they are equipped.

[0012] The idea that solves this problem is to use the steam generating means of the household washing appliance also for other purposes; in particular, the idea is to use the steam produced by the household washing appliance also for external use, in addition to internal use.

[0013] The features of the invention will be specifically set out in the claims appended to this description; such features and the effects thereof will become more apparent from the following description of a possible embodiment of the invention shown in the annexed drawings, wherein:

- Fig. 1 is a schematic representation of a washing machine according to the invention;
- Fig. 2 is a schematic representation of the washing machine of Fig. 1 together with the means that generate steam also available for external use.

[0014] It must be pointed out that the drawings and this description only consider those elements which are necessary or useful for understanding the invention, whereas reference should be made to what is well known in the art for further details. Therefore, in light of this foreword, in the above-listed drawings reference numeral 1 designates as a whole a washing machine according to the invention, which comprises an external cabinet structure 2, containing a wash chamber or tub 3 that houses a drum 4 adapted to contain the laundry to be washed (not shown in the drawing). The drum 4 can rotate about a substantially horizontal axis, in particular by means of a motor 5 and the associated transmission means 6, which in this case consists of a belt.

[0015] It is nevertheless worth mentioning that, for the purposes of the present invention, the drum 3 may also be of the type that rotates about a substantially vertical axis.

[0016] The washing machine 1 comprises means for supplying wash liquid from the water mains to the tub 3, which comprise at least one valve 8 and an inlet duct 9 extending from the valve 8 to the wash tub 3.

[0017] The wash liquid is then drained from the washing machine 1 through draining means for draining the tub 3, which include a pump 10 and a drain duct 11 lead-

ing out of the machine.

[0018] The washing machine is also provided with steam generating means, more visible in Figure 2, wherein reference numeral 15 designates a steam generator; the latter is housed outside the tub 3 and comprises a vessel that houses a heating resistor 15' (drawn with a dashed line because it is per se known).

[0019] Upstream, the steam generator 15 is connected to the water supply mains by means of a duct 16 extending from the valve 8, which in this case is a three-way electrovalve; downstream, the steam generator 15 is connected to the wash chamber 3 and to an external steam socket 18, respectively, by means of ducts 17, 19.

[0020] Advantageously, along these ducts valves 20 and 21 are provided; the latter, just like the electrovalve 8, is controlled by a control mainboard 24, which adjusts the general operation of the washing machine in accordance with the various programs contained therein.

[0021] Also the steam generator 15, which includes the heating resistor, is operationally connected to the general electronic control board 24, whereas the output valve 21 and the external steam socket 18 are connected to a control panel 25 of the washing machine for external steam distribution. The control panel 25 has a user interface that comprises, for example, push-buttons or knobs, indicator lights or a display, which interface allows adjusting the steam flow, as will be described below.

[0022] In accordance with the embodiment shown in the drawings, the washing machine comprises also an essence diffuser 26 connected to the steam duct 19; the diffuser allows diffusing the essences contained therein into the steam flow.

[0023] As far as the laundry wash cycles are concerned, the washing machine 1 operates as known in the art; therefore, there will be steps in which detergents will be added, rinse steps and or water change steps, spin steps, and steps in which steam will be introduced into the wash chamber 3.

[0024] This operation of the washing machine is controlled by the general board 24, which stores the various programs that can be chosen by the user through an interface like the one mentioned above.

[0025] For further details about washing machines including steps or entire cycles using steam, reference should be made to the known technical literature.

[0026] It only needs to be pointed out herein that in the washing machine 1, when steam is to be supplied into the wash chamber 3, the valve 21 associated with the duct 19 of the external steam socket 18 is closed: in this manner, all the steam produced by the generator 15 will be directed into the wash chamber 3.

[0027] In addition to this, the washing machine 1 can distribute steam for external use; for this purpose, the operation of the washing machine is switched, and all or a part of the steam produced by the generator will no longer be delivered into the wash chamber 3, but will be conveyed towards the external steam socket 18.

[0028] The latter is a male or female connector, per se known, to be engaged with matching connectors of connection hoses of household appliances that utilize steam to operate.

[0029] Figure 2 schematically shows an iron 30, a brush 31 for wrinkle removal, a hair straightener 32, a household appliance 33 for cleaning floors, tiles and other surfaces in general.

[0030] Of course, these are just some of the appliances that may be used together with the washing machine of the invention.

[0031] When a user wants to use one of these appliances, he/she will connect it to the steam socket 18 of the washing machine; for this purpose, each one of these appliances is equipped with a hose (only a portion of which is shown in Figure 2) ending with a plug to be coupled to the socket 18.

[0032] Afterwards, the user will start the steam generator from the control panel 25 and its user interface; the control panel 25 will then command the valve 21 to open and, at least for a preset time period, the valves 8 and 20 to close.

[0033] In this way, the steam generator 15 will be able to produce steam until a pressure suitable for the desired application will be achieved.

[0034] In fact, the steam pressure must be such as to reach the appliance 30-33 connected to the washing machine and provide a jet with a steam flow rate which is appropriate for the intended purpose. Preferably, the steam flow rate and pressure can be adjusted and set by the user from the control panel 25.

[0035] Thus, for example, a certain steam flow rate can be set for ironing laundry with the iron 30, whereas for cleaning floors, tiles and other surfaces it will be advisable to use a different flow rate and a steam jet with higher pressure. Similar considerations apply to the brush 31 for wrinkle removal or to the hair straightener 32, or to any other steam appliance connected to the washing machine.

[0036] In this frame, it should be noted that steam pressure variations can be obtained in the household appliance of the invention thanks to the fact that the steam circuit, including the generator 15, can be pressurized for external use. In fact, by closing the valve 20 that delivers steam into the wash chamber 3, the steam output valve 21 and the mains water intake valve 8, the generator 15 will be isolated from the external environment at atmospheric pressure.

[0037] Therefore, when heat is supplied to the water contained in the generator by means of the electric resistor 15', the pressure of the produced steam will increase accordingly, since the generator 15 will have been isolated from the outside environment, thus de facto behaving as a pressurized vessel.

[0038] Of course, the pressure value reached by the steam will still be limited to a few tens of millibars, and will be maintained for short time intervals; the heating resistor 15' will provide the heat necessary for generating the steam flow rate required by the user.

[0039] Therefore, it preferably features an on-off operation, allowing the generation of a certain quantity of steam, which will accumulate into the generator 15 at a preset pressure level; when this level is reached, the resistor 15' will be turned off by the control panel 25.

[0040] When steam is required for external use, e.g. for the iron, the output valve 21 will open, thereby allowing the steam to flow towards the socket 18, to which the hose of the appliance 30-33 in use is connected.

[0041] In this context, it must be pointed out that the output valve 21 preferably also performs the function of adjusting the steam output pressure, adapting it to the requested application; to this end, the valve 21 is configured as or associated with a pressure reducer, as known in the art.

[0042] It is clear that, as the steam is used by the user, the pressure in the generator 15 will decrease; therefore, in this condition the resistor 15' will be turned on again, thereby providing the heat necessary for obtaining again the steam temperature and pressure conditions required by the application.

[0043] For this purpose, the washing machine 1 is equipped with means for detecting the temperature and the pressure of the steam; such means are preferably thermocouples and pressure sensors, connected to the control panel 25 that controls the operation of the generator 15, as previously explained.

[0044] The diffuser 26 allows diffusing substances contained therein into the steam flow being conveyed towards the socket 18; the substances, which as aforesaid may be essence-based liquids or disinfectants or the like, are drawn into the steam flow by Venturi effect, and are conveyed into the appliance 30-33 connected to the socket 18.

[0045] From the above description it can be easily understood how the washing machine 1 considered herein can solve the technical problem addressed by the invention.

[0046] In fact, as already explained, the steam generator 15 is now used for producing steam not only for the operating cycles of the washing machine, but also for external applications.

[0047] In this way, it can be exploited also when the washing machine 1 is not in use for washing laundry: therefore, the washing machine is enriched with new functions, de facto becoming a new household washing appliance also useful for other household jobs.

[0048] In addition to the example taken into account herein, further variants of the invention are of course possible. As a matter of fact, although this example represents a simple embodiment of the invention, more complex variants can be implemented which may, for example, include a larger number of steam socket 18 than the only one available in the case shown in the drawings.

[0049] In such a case, there will also be multiple steam ducts connected to the generator 15, or there will be multiple steam generators.

[0050] This latter solution allows, among other things, independent supply of steam to both the wash chamber 3 and the external socket 18, so that external appliances 30-33 can also be used when the washing machine is in operation: for example, there may be two (or more) steam generators 15 like the one described above, arranged in parallel and connected to both the wash chamber 3 and one or more external steam socket 18.

[0051] Of course, in all of these variants also the control board 24 of the washing machine and the control panel 25 of the steam generator(s) 15 will be different from those schematically described herein with reference to the example taken into consideration.

[0052] All of these variants will still fall within the scope of the following claims.

Claims

1. Household washing appliance, comprising a washing chamber (3) in which a load to be washed is to be arranged, means (8, 9) for supplying water from the external distribution mains to the wash chamber (3), steam generating means (15) that can be put in fluid communication with the washing chamber in order to convey steam thereinto, **characterized in that** the steam generating means (15) can be put in fluid communication with the outside environment, so that the steam can also be used outside the household washing appliance.

2. Household appliance according to claim 1, wherein the steam generating means (15) can be put in fluid communication with the means (8, 9) for supplying water to the washing chamber (3), in order to convey water towards the steam generating means (15).

3. Household appliance according to claims 1 or 2, comprising steam intercepting means, which are active between the steam generating means (15) and, respectively, the washing chamber (3) and the outside environment, so as to isolate the generating means (15) from the outside environment and obtain steam at a higher pressure than atmospheric pressure.

4. Household appliance according to any one of the preceding claims, comprising a steam socket (18) in fluid communication with the steam generating means (18), for connection to an appliance (30, 31, 32, 33) using the steam generated by the steam generating means (15).

5. Household appliance according to any one of the preceding claims, comprising means (26) for diffusing substances into the steam.

6. Household appliance according to any one of the preceding claims, wherein the means for supplying

mains water to the steam generator (15) comprise a three-way valve.

7. Household appliance according to any one of the preceding claims, comprising means (25) for controlling the steam generator (15) having a user interface, thus allowing a user to set the operation of the steam generator (15) for the use of an appliance (30-33) to be connected to the steam socket (18).

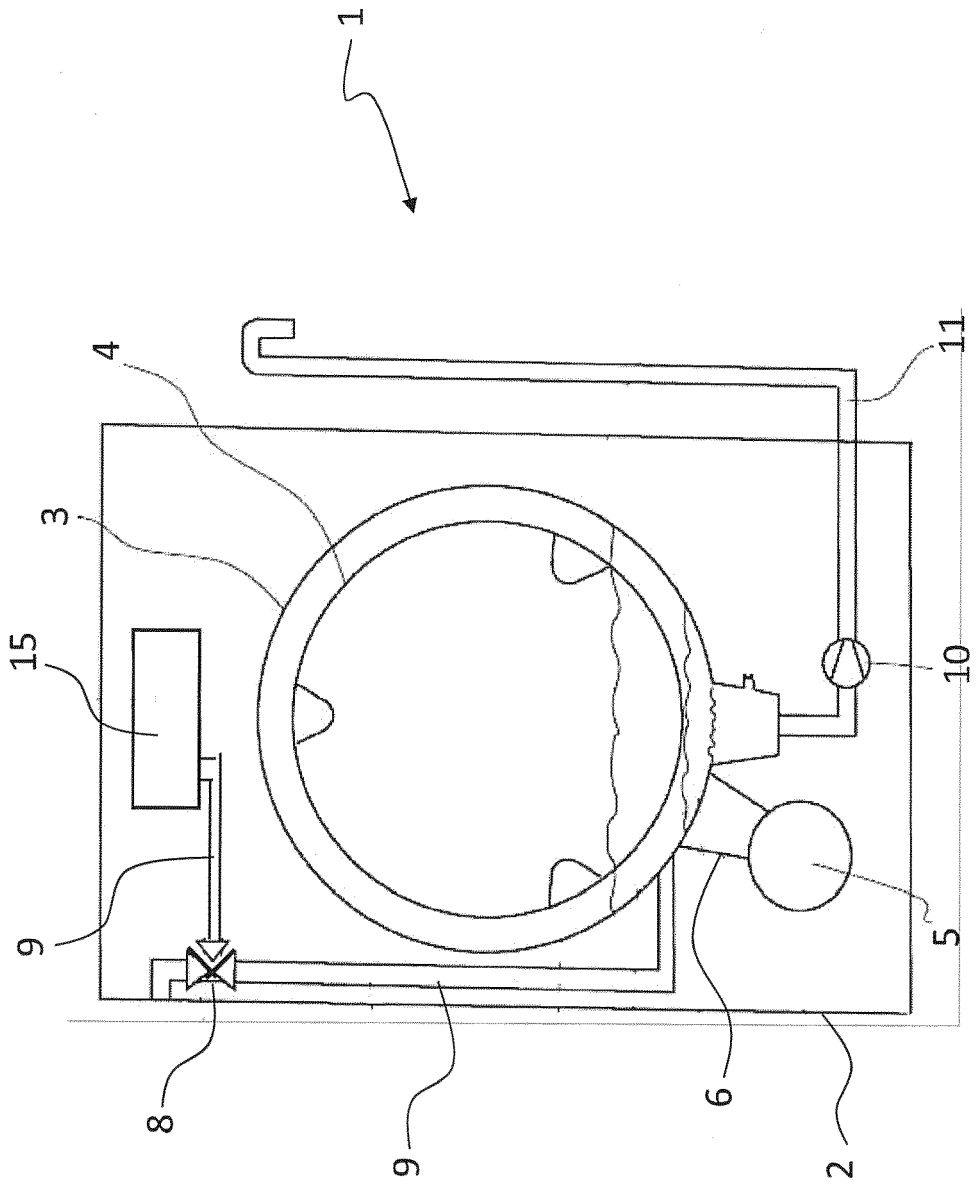

Fig. 1

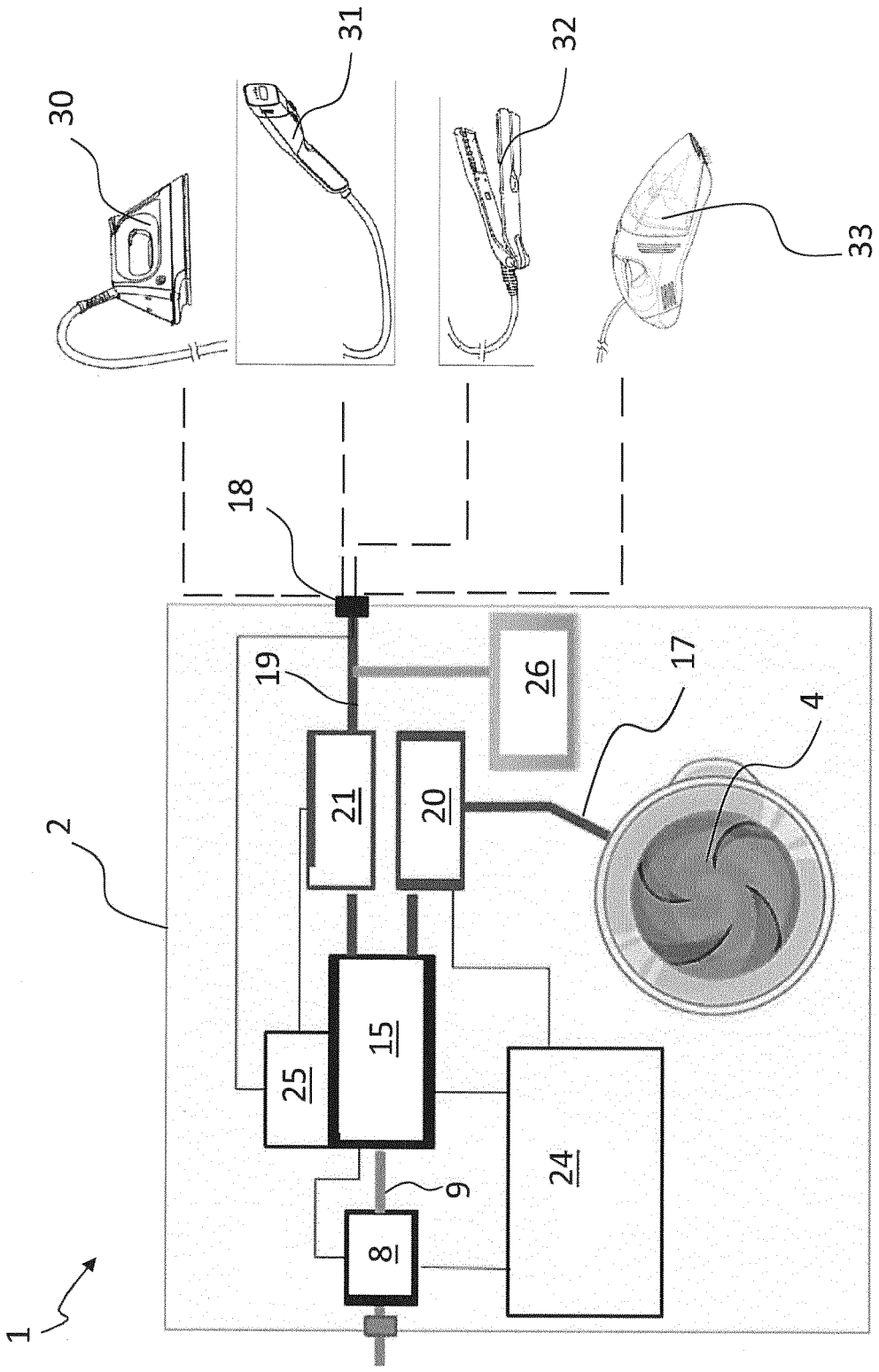

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 2150

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TECHNICAL FIELDS SEARCHED (IPC)
D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 September 2015	Diaz y Diaz-Caneja

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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