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Description

The present invention relates to a coffee machine having the characterizing features of the preamble to Claim 1 and a method for cleaning a coffee machine having the characterizing features of the preamble to Claim 8.

Coffee machines with a milk module, in particular fully automatic coffee machines, are already known. Such a milk module permits the addition of milk of different kinds, for example in frothed form and also as cold or hot milk, to the coffee beverage produced by the machine. For this purpose, in coffee machines that are known from the prior art, milk is drawn by means of a suction tube from a milk storage container and, as a rule, is fed to a so-called frothing device with a suitable dispensing unit.

A problem always associated with coffee machines with a milk module is the cleaning of the milk-carrying components thereof. This is because milk spoils very quickly, resulting in the growth of harmful bacteria. In particular in the case of fully automatic coffee machines, it is desirable in this respect for the cleaning of the milk module or the milk-carrying components thereof to proceed almost fully automatically.

This is not the case in those fully automatic coffee machines, in which the milk-carrying components are cleaned with chemical detergents. A user who wishes to undertake cleaning of the milk module is required, on every occasion prior to initiating a suitable cleaning programme of the fully automatic coffee machine, to have ready a separate vessel, into which he must pour liquid detergent for the particular cleaning operating mode.

The operator is required, as a rule, to arrange this vessel at the position of the milk storage container. He must then suspend the milk suction tube, which is suspended in the storage container in the standard operating mode of the automatic machine in order to be able to draw the milk therefrom, in the cleaning container from now on. The cleaning fluid is then drawn through the suction

tube in the same way as is otherwise the case with the milk in the regular operating mode, for instance by switching on or utilizing a suitable milk pump.

A self-cleaning frothing device is known from EP 1 656 863. This can also be part of a coffee machine. For the purpose of cleaning the milk-carrying components, the unit has a reservoir of detergent as well as a reservoir of milk. The two reservoirs are arranged in a double container. In the normal operating mode, the milk inlet of the frothing device is in communication with the milk reservoir. In the cleaning operating mode, the milk inlet is in communication with the detergent reservoir. For this purpose the frothing device is moved back and forth between the two reservoirs.

On the basis of the prior art mentioned by way of introduction, it is desirable to propose a coffee machine of the kind mentioned by way of introduction, in which the cleaning of the milk module is capable of being automated as far as possible. Furthermore, the object of the present invention is to propose a method by which a coffee machine of this kind can be cleaned.

This object is accomplished by a coffee machine having the characterizing features of Claim 1 as well as a method having the characterizing features of Claim 8.

A coffee machine according to the invention, preferably a fully automatic coffee machine, and specifically the cleaning device of the same, has its own detergent reservoir, from which the detergent is withdrawn automatically during the cleaning operating mode.

The detergent reservoir in this case is a component of the coffee machine that is also connected to the coffee machine, preferably to its housing, outside the cleaning operating mode of the cleaning device. The detergent reservoir in this case is preferably arranged in the interior of the housing of the coffee machine.

Advantageously, it is accordingly no longer necessary according to the invention for a user to position a vessel with detergent manually underneath a milk suction tube of the milk module on every occasion in preparation for the respective cleaning operating mode of the milk module. Rather, all that is now required is for the detergent to be poured into the detergent reservoir externally and independently of the actual cleaning operating mode. Depending on the size of the reservoir, a user can then initiate the cleaning operating mode for the coffee machine on a number of occasions. In contrast to the prior art, the addition of detergent from the outside for each individual cleaning operating mode is thus no longer necessary.

Expediently, by its nature, the reservoir is sufficiently large for the coffee machine to be able to perform a complete cleaning cycle frequently and on repeated occasions, that is to say for it to be deployed repeatedly in the cleaning operating mode, and for it to perform the appropriate cleaning programme without the need to top up the detergent.

The detergent reservoir is preferably formed by a storage container, in which in particular the liquid detergent is stored or kept, for instance as a concentrate or as a ready-to-use solution. It is also conceivable to use cleaning tablets or cleaning powder. It naturally also lies within the scope of the invention to add water to the detergent in each case or to mix it with water.

The detergent according to the invention is a milk cleaner that is familiar from the prior art, which has the ability thoroughly to clean the milk-carrying components of the coffee machine or of the milk module. The cleaners in question are preferably chemical special cleaners. Such special cleaners usually act as a disinfectant and have the ability optimally to remove the milk fats and/or the milk tartar that are present in the milk-carrying components, in particular in the lines of the milk module. The special cleaners are frequently alkaline cleaners.

Coffee machines or fully automatic coffee machines for the most part possess a hot water generator and/or steam generator. According to the invention, this hot

water generator and/or steam generator, at least in the cleaning operating mode of the cleaning device, is connected (in a liquid-conducting manner) directly or indirectly to the at least one milk-carrying component, so that in particular hot water originating from the hot water generator and/or steam generator can be conducted through the milk-carrying component during the cleaning operating mode.

An indirect connection (in a liquid-conducting manner) of a hot water generator and/or steam generator to the milk-carrying component is achieved in the context of the present invention, for example, if an intermediate container, which is filled by the hot water generator and/or steam generator, is arranged between the hot water generator and/or steam generator and the milk-carrying component. An intermediate container of this kind has the function in this case of providing intermediate storage for the water originating from the hot water generator and/or steam generator. The water that is placed in intermediate storage in this way is (only) then conducted further, if this is desired for reasons of system control or as part of the programme sequence of the cleaning programme for the coffee machine.

By the direct/indirect connection of the hot water generator and/or steam generator to the milk-carrying component, it is possible, for example with the hot water generator and/or steam generator, to bring water to a high temperature allowing disinfection of the at least one milk-carrying component, and then to flush or to clean the milk module with this hot water. In other words, the water heated by the generator is conducted through the milk-carrying component.

As far as the milk-carrying component(s) is/are concerned, at least the milk line which is routed from the storage container in which the milk to be drawn from the milk module is stored or kept to a frothing device of the milk module is cleaned according to the invention.

It is proposed, furthermore, according to the invention, that lines are arranged respectively downstream of the detergent reservoir, preferably the detergent

storage container, and downstream of the hot water generator and/or steam generator, via which lines the detergent or the water are able to flow, and which lines discharge downstream directly or indirectly into a common line, or are connected thereto, via which common line the detergent, preferably mixed with water, or preferably hot water, and in particular water that is not mixed with detergent, can be conducted selectively in the direction of the milk-carrying component during the cleaning operating mode.

Accordingly, as a result of this, either the detergent, where appropriate mixed with water, or, in particular, clear water or at least water that has not been displaced with detergent preferably originating from the hot water generator and/or steam generator, can be conducted selectively through the milk-carrying component.

The mixing of the detergent with water is desirable in particular, although not exclusively, if the detergent is present as a concentrate, which in any case should/must first be mixed with water, before it should/can be conducted through the at least one milk-carrying component.

The mixing of the detergent with hot water may be desirable in addition, in order to bring the detergent up to a higher temperature and, by so doing, to improve its effectiveness as part of the subsequent corresponding cleaning process.

If such mixing or mixture formation is desired, the coffee machine or the cleaning device expediently has a mixing body exhibiting a mixing chamber, in which the detergent on the one hand and the water on the other hand are mixed with one another. The respective detergent line and the corresponding water line, which in each case lead to the common line downstream of the detergent reservoir or the hot water generator and/or steam generator, or which in each case are connected thereto, are in each case simply connected to one another by means of a Y-piece or a T-piece. In this case, the mixing body would be the Y-piece or the T-piece.

The design of the coffee machine according to the invention described above makes it possible to perform various individual cleaning processes one after the other within the cleaning operating mode or within a complete sequence of a suitable cleaning programme of the coffee machine.

A cleaning process can be envisaged, for example, in which the detergent, in particular mixed with hot water, is conducted through at least one milk-carrying component in order to pre-clean it effectively and to a large extent with the detergent or with the mixture.

A further cleaning process, which in particular follows on from the aforementioned process, can be envisaged, in which hot water that has been heated by the hot water generator and/or the steam generator, and in particular has not been mixed with detergent, is conducted through the milk-carrying components in order to achieve subsequent disinfection of the milk-carrying component.

Provision can be made, finally, after the passage of the hot water, to conduct cold or non-heated water, and in particular water that has not been mixed with detergent, through the milk-carrying component in order to remove hot residual water and/or in order to cool the at least one milk-carrying component. The non-heated water or the cold water usually originates from a central water supply, to which the coffee machine is connected, or from a central water container of the coffee machine. It is, of course, conceivable in this context for the cold water, when the hot water generator and/or steam generator is switched off, to be conducted through it before it arrives at the milk-carrying component.

In a further configuration of the invention, it is proposed to flush the milk-carrying component initially, in particular with cold water that has not been mixed with detergent, before the cleaning process in which the detergent or the detergent mixture is conducted through the milk-carrying component, as well as before the cleaning process, in which in particular the hot water that has not been mixed with detergent is routed through it.

As far as the water which is conducted through the milk-carrying component is concerned, this water preferably originates from the intermediate container, which has been filled beforehand either in particular with cold water that has not been mixed with detergent or in particular with hot water that has not been mixed with detergent, and in particular with hot water originating from the hot water generator and/or steam generator of the coffee machine.

The coffee machine, and specifically its milk module, expediently has a milk container connection that is connected directly or indirectly via a milk line to the frothing device for frothing the milk. The milk container connection in this case is arranged at the opposite end of the milk connection line to the frothing device. The milk container connection can preferably be a suitable quick-action coupling part, to which a milk storage container equipped with a corresponding mating piece can be releasably attached.

For the cleaning operating mode, provision is made in a particularly preferred embodiment of the invention for the milk container connection to be capable of being releasably attached to a cleaning connection of the cleaning device, to which, in the cleaning operating mode, in particular the detergent originating from the detergent container, where appropriate mixed with water, or the water originating in particular from the hot water generator and/or steam generator, and in particular water that has not been mixed with detergent or the water from the intermediate container can be conducted.

The quick-action coupling part of the milk container connection can, for releasable attachment to the cleaning connection, be connected to a suitable quick-action coupling part of the cleaning connection, interacting therewith, or can be capable of connection thereto.

In other words it is necessary, in this embodiment for cleaning of the at least one milk-carrying component, for a user to attach the cleaning connection to the milk container connection. After making this connection, the water originating in particular from the hot water generator and/or steam generator, in particular wa-

ter that has not been mixed with detergent, and/or the detergent originating from the detergent container, where appropriate mixed with the water, can be conducted through the at least one milk-carrying component.

It is envisaged that the cleaning operating mode of the coffee machine or the respective cleaning programme, in particular after manual operation of a suitable operating element of the coffee machine by an operator, is preferably only released or capable of being released provided that at least the following two conditions are cumulatively met:

a) A suitable wastewater container is arranged underneath a dispensing device of the coffee machine, in particular underneath the discharge outlet of the frothing device thereof, and

b) A connection must be made in a liquid-conducting manner between the cleaning connection of the coffee machine on the one hand, to which, in the cleaning operating mode in particular, detergent originating from a detergent storage container, in particular mixed with water, is conducted or in particular water that has not been mixed with detergent, preferably water originating from the hot water generator and/or steam generator, and a milk storage container connection of the coffee machine on the other hand.

According to the invention it is envisaged, in particular having regard for safety considerations, that the coffee machine will check automatically whether these aforementioned conditions have been met. Proposed in each case for this purpose is at least one sensor, which automatically detects whether the wastewater container is arranged underneath the dispensing device and/or whether the conducting connection between the cleaning connection and the milk storage container connection has been made.

In other words, an operator is required, on the one hand, to make the aforementioned connection, and, on the other hand, to place the wastewater container underneath the dispensing device, before the in other respects fully automatic cleaning is possible. Only then will the actual cleaning processes be carried out.

Hazardous operating errors are avoided advantageously in this way. The user who starts up the cleaning operating mode is effectively prevented from coming into contact with hot water or with the detergent that generally causes skin irritations, since the detergent and/or the hot water, after passing through the milk-carrying components, flow from the dispensing device into the wastewater container.

A so-called reed contact switch, for example, can be used as a sensor, with which it is possible to detect that the wastewater container has been positioned beneath the dispensing device. The wastewater container must interact with this reed contact switch in a suitable manner, for example by having suitable magnets, which interact with the reed contact switch. The most varied embodiments of suitable sensors are conceivable.

In a similar manner, it is possible to interrogate via one or a plurality of suitable sensors whether the cleaning connection has been connected to the milk connection.

To the extent that both a detergent container and also the intermediate water container are being used, it is advisable to detect the filling level of one or both containers directly or indirectly. Indirect detection can be performed, for example, by the arrangement of a flow meter downstream of the detergent container and/or downstream of the intermediate container, in particular in the above-mentioned common line. The throughflow rate of the detergent, where appropriate that of the detergent mixed with water, and/or of the water originating from the intermediate container, and in particular the water that has not been mixed with detergent, can be measured with the flow meter in the course of the cleaning operating mode. Conclusions about the respective actual filling levels can be drawn from the throughflow rate, for instance with the help of the information in respect of the initial filling level of the one or more containers.

The use of various other, direct filling level measurement methods or devices, which are familiar from the prior art, is naturally also possible.

A coffee machine according to the invention naturally has a control device, which is configured in a suitable manner to implement or to control one, several or all of the above-mentioned functions of the cleaning operating mode of the machine or the cleaning device.

It is proposed advantageously in a further configuration of the invention, as part of the cleaning operating mode, to fill the hot water generator and/or the steam generator repeatedly with water, and in particular with water which is then conducted into the intermediate container. These repeated filling processes of the hot water generator and/or the steam generator ensure advantageously that this is descaled, or that heavy scaling is prevented.

In addition a detergent and/or a descaling agent may be added expediently to the water before, during or after one or more of the filling processes of the hot water generator and/or steam generator. In other words, the hot water generator and/or steam generator may be flushed with water, to which a detergent and/or a descaling agent is added.

Further characterizing features of the present invention can be appreciated from the accompanying patent claims, from the following description of a preferred illustrative embodiment as well as from the accompanying drawing. In the drawing:

Fig. 1 depicts a representation in principle of a coffee machine according to the invention, which is operated with the cleaning method according to the invention.

Fig. 1 depicts the components of a milk module 10 of a coffee machine according to the invention, specifically in the present case being a so-called fully automatic coffee machine. The design of such fully automatic coffee machines is familiar in principle, so that there is no need to depict this in the present case.

With the milk module 10 of the fully automatic coffee machine according to the invention, milk can be supplied to a coffee beverage produced by the automatic machine or mixed with it. As a rule, the milk is also processed by the milk module 10 for this purpose in a particular manner, for example heated and/or frothed.

The milk module 10 has a frothing device 12 for this purpose, by means of which milk can be heated and/or frothed in a manner that is known per se. The milk is supplied to the frothing device 12 by being pumped by means of a milk pump 30 from a milk storage container 20 along a milk line 18 to the frothing device 12. It can then be dispensed, in either a prepared or an unprepared state, via the discharge outlet 22 of the frothing device 12.

In order to dispense frothed milk, air is supplied to the frothing device 12 as required via a line 16 after opening a shut-off valve 14 arranged in the line 16. The frothing device is configured so as to be self-priming for this purpose in a familiar manner by making use of the Venturi principle. As an alternative, the air could also be supplied by means of a compressed air source.

The milk supplied via the milk line 18 can be frothed in the frothing device 12 with the help of the air in a manner that is familiar per se and can be discharged from the frothing device 12 via a discharge outlet 22 into a vessel arranged under the discharge outlet 22, for example into a cup (not depicted here).

For the purpose of heating the milk froth and the milk, the frothing device 12 is additionally connected via a line 24 as well as a suitable shut-off valve 26 to a hot water generator and/or steam generator 28. The hot water generator and/or steam generator 28 routes hot water vapour to the frothing device 12 in a manner that is likewise familiar per se, in order to heat the milk froth or the milk.

For the simultaneous frothing and heating of the milk that is supplied via the milk line 18, hot water vapour is accordingly supplied to the frothing device 12 simultaneously via the line 24 as well as air via the line 16.

If, on the other hand, unfrothed hot milk is to be dispensed, only the hot water vapour is supplied (via the line 24). This heats the supplied milk.

Finally, if only cold or non-heated, unfrothed milk is to be dispensed, it is then sufficient to conduct the supplied milk from the discharge outlet 22 without further preparation.

As far as the hot water generator and/or steam generator 28 is concerned, the unit concerned in the present case is a unit that is already familiar in fully automatic coffee machines, for instance a boiler or the like. An instantaneous water heater can also be used, of course.

The milk storage container 20 exhibits an upwardly open interior space contained by suitable side walls 21, in which the milk to be supplied to the frothing device 12 is stored. An outlet opening 32 is arranged in one of the side walls 21 in the vicinity of the floor 23 of the milk storage container 20. A quick-action coupling part of a quick-action coupling 34 is secured to the outlet opening 32. A corresponding milk container connection 35 is secured in turn at the free end of the milk line 18, specifically in relation to the direction of flow of the milk to be drawn in upstream of a non-return valve 36. The milk container connection 35 in this case has a suitable, mating piece with the quick-action coupling part of the milk storage container 20 that is likewise configured as a quick-action coupling part.

For the connection of the milk storage container 20 to the milk line 18 or to the milk container connection 35, the two quick-action coupling parts of the quick-action coupling 34 are plugged together or are connected to one another in a suitable manner. The quick-action coupling 34 is depicted in Fig. 1 in its assembled state.

The non-return valve 36 finally ensures in particular (in the sense of drip protection) that, after separating the milk storage container 20 from the milk line 18 or from the milk container connection 35 (by releasing both of the quick-action

coupling parts of the quick-action coupling 34), any residual milk that is still present in the milk line 18 is not able to flow out of its open milk line end or the corresponding open quick-action coupling part.

A cleaning device 38 with which the milk-carrying components of the milk module 10, in particular the milk connection 35, the non-return valve 36, the milk line 18, the milk pump 30 and the frothing device 12, can be cleaned, is particularly important. The cleaning device 38 in the present case is part of a higher-order cleaning device of the automatic coffee machine, with which all of the components of the automatic machine which require to be cleaned can be cleaned.

The cleaning device 38 in this case comprises a detergent reservoir 40, specifically a cleaning container. A suitable chemical milk cleaner, in the present case a liquid chemical milk cleaner, is stored in the cleaning container.

The cleaning device 38 further comprises an intermediate container 42, which can be filled with water via lines 44, 45 and alternatively via a line 46.

On the one hand, cold or non-heated water can be conducted via the lines 44, 45, with the valve 48 opened appropriately, from a central water supply into the intermediate container 42. The reference designation 50 is used in this case to designate a suitable connection piece, which can be connected to a central water source (not depicted here), such as a conventional water supply.

The line 46, on the other hand, terminates with the interconnection of a shut-off valve 52 at its end facing away from the intermediate container 42 on the hot water generator and/or steam generator 28. Accordingly, the intermediate container 42 can be filled with hot water originating from the hot water generator and/or steam generator 28 via the line 46, when the valve 52 is open.

The hot water generator and/or steam generator 28 itself can be supplied with water from the central water supply 50 with the shut-off valve 54 arranged in the

line 44 open. A suitable non-return valve 56 ensures that an unwanted return flow to the water supply is excluded.

Furthermore, the hot water generator and/or steam generator 28 is connected via a line 58 in a manner known per se to a device 60, which, via a distributor 62, connects the hot water generator and/or steam generator 28 to an anti-vacuum valve 64 as well as to a pressure relief valve 66. The latter in this case are positioned in lines 68, 70 exiting from the distributor 62. Also arranged in the device 60 is a manometer 72 for monitoring the pressure, as well as a waste-water container 74, which is positioned underneath the lines 68, 70. Finally, the device 60 has a pressure switch 75, with the help of which the steam pressure in the hot water generator and/or steam generator 28 is regulated. In a manner known per se, the device 60 ensures that an excessive overpressure or excessive underpressure is avoided in the hot water generator and/or steam generator 28.

The steam generator 28 is furthermore connected to the air line 16 via a branch line 76, which exits from the line 46. A shut-off valve 77 is arranged in addition in the line 76. The purpose of the connection to the air line 16 is to flush the air line 16 additionally, if necessary, with hot steam or hot water originating from the hot water generator and/or steam generator 28, in order to be able to remove milk or milk residues which may have penetrated unintentionally into the air line 16 via the frothing device 12, in particular into the section of the milk line 16 adjoining the milk frothing device 12.

The detergent container 40 and the intermediate container 42 are connected, in each case via outgoing lines 78, 80, in a liquid-conducting manner to corresponding container outlets in the respective floor or wall region having a common line 86, into which the lines 78, 80 discharge downstream in each case, or to which the lines 78, 80 are connected via a T-piece 81.

Shut-off valves 82, 84 are likewise arranged in the lines 78, 80.

The common line 86 runs with the interconnection of a flow meter 88 as far as a cleaning connection 90, which exhibits a quick-action coupling part mating with the quick-action coupling 34. The quick-action coupling part of the cleaning connection 90 corresponds to the quick-action coupling part of the milk storage container 20. It is accordingly configured in such a way that it can be connected to the corresponding quick-action coupling part of the milk container connection 35 of the milk line 18. In relation to the direction of the outflow of the milk cleaner or of the water from the container 40 or from the container 42 a non-return valve 92 is also integrated in the line 86 upstream of the quick-action coupling part, by means of which valve liquid flows in the direction of the containers 40, 42 are prevented.

The cleaning of the milk module 10 in the present case takes place in the context of a higher-order cleaning programme or cleaning method, which also includes the already familiar cleaning of the other components that require cleaning, in particular the components of the automatic machine which carry the coffee beverage. It can also be envisaged, however, to clean only the milk module 10. The cleaning method is as follows.

According to one preferred embodiment of the invention, it is proposed that the fully automatic coffee machine detects that cleaning of the automatic machine needs to be carried out autonomously by means of suitable sensor technology. As an alternative or in addition, provision can also be made in principle for the cleaning of the entire fully automatic coffee machine or, where appropriate, of the milk module 10 alone, to be initiated by an operator first of all actively selecting the cleaning function or an equivalent cleaning programme via a suitable output device and/or input device, as soon as he needs to perform cleaning.

According to the preferred embodiment, once the fully automatic coffee machine has detected that cleaning of the automatic machine is necessary, this is indicated on the input device and/or output device of the automatic machine, for instance a display screen, in particular a touch screen of the automatic ma-

chine. In the event that the automatic machine has a milk module 10, as is the case here, the automatic machine or the control of the same will detect this.

The operator is then requested to perform at least one or a plurality of measures. These measures are indicated to him, at least in part, preferably on-screen.

If, in the course of the cleaning of the fully automatic coffee machine, the operator also desires cleaning of the milk module 10, the operator must separate the milk container 20 from the milk container connection 35 of the milk line 18. For this purpose, he separates the corresponding quick-action coupling parts of the quick-action coupling 34 from one another. The quick-action coupling part of the milk container connection 35 of the milk line 18 is then connected to the corresponding mating piece, i.e. to the corresponding quick-action coupling part of the cleaning connection 90.

As a result, the milk line 18 is thus connected to the cleaning connection 90. The putting together or joining of the quick-action coupling parts automatically causes a suitable connection switch 93 to be actuated or switched. As a result of this, the control system of the fully automatic coffee machine or the control system of the cleaning device 38 thereof detects that the milk line 18 is connected to the cleaning connection 90.

Furthermore, the operator must place a wastewater container (not depicted here) underneath the dispensing device of the automatic coffee machine, in particular underneath the discharge outlet 22 of the frothing device 12. A wastewater container having dimensions that are sufficient to enable it to be positioned underneath the entire dispensing device of the fully automatic coffee machine, including the coffee beverage outlet, can be utilized advantageously in addition thereto.

By means of a suitable sensor, specifically a suitable reed contact switch, the control system of the fully automatic coffee machine detects that the wastewater container has been positioned accordingly underneath the discharge outlet 22.

After detection of the wastewater container, the operator is notified automatically on a display screen that the cleaning of the automatic machine, and in the present case also of the milk module 10 of the automatic machine, will start on condition that he actuates a specific input element, for instance a specific field on a touch screen. After actuating the input element, the further cleaning of the automatic machine, and in particular of the milk module 10, takes place fully automatically.

Only the cleaning of the milk module 10 is discussed below, since the cleaning processes for the other components of fully automatic coffee machines that require cleaning are already familiar.

The hot water generator and/or steam generator 28 is pre-flushed initially according to the invention, since, with the valve 54 open, cold water via the central water supply 50 is filled into it via the line 44. Shortly beforehand, parallel therewith or subsequently thereto, the valve 48 arranged in the line 45 opens, so that the intermediate container 42 is also filled with cold water.

Subsequently thereto, with the valve 84 open, the cold water from the intermediate container 42 is flushed by the milk pump 30, which starts to operate at this time at the latest, through the milk-carrying components 35, 36, 18, 30 and 12 in a first cleaning process and flows out of the discharge outlet 22 into the wastewater container (not illustrated here). The purpose of this pre-flushing of the components 35, 36, 18, 30, 12 with cold water is to remove the first coarse milk residues from the milk-carrying components 35, 36, 18, 30, 12.

A certain quantity of hot water or hot water vapour is already present in the hot water generator and/or steam generator 28 at the start of the cleaning operating mode, that is to say at the time of the previously described filling of the same with the cold water. This hot water or the water vapour derives from the previous standard operating mode of the fully automatic coffee machine, in which water or water vapour is made available in the hot water generator and/or steam generator 28, as a rule at a temperature of ca. 120 °C and at a pressure

of ca. 1.4 bar. The cold water that is introduced additionally into the hot water generator and/or steam generator 28 now causes the water or the water vapour to be cooled to a temperature which ensures that the water can be conducted from the hot water generator and/or steam generator 28 in liquid form. The cold water supply is preferably controlled for this purpose in such a way that corresponding mixed water has a temperature of not more than 100 °C, but at least 70 °C.

The hot water is then filled, in the course of the first cleaning process described above, with the valve 52 open, via the line 46 into the container 42 that has been emptied in the meantime.

In a subsequent second cleaning process, it is now proposed to flush the milk-carrying components 35, 36, 18, 30, 12 with the milk cleaner that is present in the container 40 as a concentrate. Both shut-off valves 82 and 84 are opened for this purpose, so that at the point of connection of the lines 78, 80 (T-piece 81) the milk cleaner concentrate is mixed with the hot water flowing from the intermediate container 42. This naturally takes place once more with the milk pump 30 operating, which draws or pumps the fluids concerned from the containers 40, 42.

In parallel or at staggered intervals, the hot water generator and/or steam generator 28 will already have been refilled with cold water, which it heats once more. This repeated filling of the hot water generator and/or steam generator 28 with water (with subsequent removal of the water) cleans the same or prevents scaling thereof.

Provision can also be made in principle for the water in the hot water generator and/or steam generator 28 to have its own detergent added automatically from a suitable detergent reservoir, where appropriate the cleaning container 40, in order to clean the hot water generator and/or steam generator 28 particularly effectively.

In a subsequent cleaning process, the hot water from the hot water generator and/or steam generator 28, which is displaced if appropriate with the aforementioned detergent, is conducted into the intermediate container 42. With the shut-off valve 84 open, the milk-carrying components 35, 36, 18, 30, 12 are then flushed by the hot water, which in turn flows into the wastewater container (not depicted here). The temperature of the water in this case is so high that the milk-carrying components 35, 36, 18, 30, 12 are disinfected.

At the same time, or at staggered intervals, the intermediate container 42 is refilled with water, on this occasion once again with cold water from the central water supply. In a further cleaning process, the milk-carrying components 35, 36, 18, 30, 12 are then flushed with the cold water from the intermediate container 42, which once again likewise flows ultimately into the wastewater container (not depicted here). This secondary flushing of the milk-carrying components 35, 36, 18, 30, 12 with cold water serves the purpose of cooling these components, so that, in the event of the subsequent resumption of the standard operating mode of the fully automatic coffee machine, milk is prevented from burning onto the components that have been heated by the previous flushing with hot water and from accumulating thereon.

As will be appreciated by a person skilled in the art, it is entirely possible for some of the aforementioned individual cleaning processes to be carried out in each case on repeated occasions, to be omitted and/or to be performed in a different order. It is further conceivable to use a milk cleaner that is already ready for use, instead of the milk cleaner concentrate, so that mixing with water is not necessary.

The milk cleaner in this case could be conveyed through the hot water generator and/or steam generator 28, for example, so that the cleaner is heated by this and is then conducted in its hot state through the milk-carrying components 35, 36, 18, 30, 12.

The control system of the fully automatic coffee machine is able, by means of the flow meter 88, to determine the respective filling levels of the containers 40, 42 and, in particular, to establish whether the container 40 needs to be topped up with a milk cleaner.

As soon as all the cleaning cycles have been completed, the user of the fully automatic coffee machine is requested by the on-screen menu of the fully automatic coffee machine to separate the connection of the milk container connection 35 and the cleaning connection 90 once again and to reconnect the milk container 20 to the milk suction tube 18. In addition, the user is requested to remove the wastewater container (not depicted here) from under the discharge outlet 22. The fully automatic coffee machine can then pass into its standard operating mode.

A further, not explicitly depicted characterizing feature of the invention is a slanted floor 94 in the milk container 20, which among other things ensures that the milk inside the container 20 is conducted optimally in the direction of the milk connection 34. It is envisaged in this case that the filling level of the milk storage container 34 will be detected automatically by a suitable sensor that is not depicted here. Such a sensor is preferably a light barrier, of which the beam of light is absorbed by the milk stored therein in the case of a full container, but is reflected by the slanted floor 94 of the milk storage container 20 in the case of an empty milk storage container 20. For this purpose, the upper surface of the slanted floor 94 or the slanted floor 94 must be formed from a suitable material reflecting a beam of light, for example a metal.

List of Reference Designations:

10	milk module
12	frothing device
14	valve
16	line
18	milk line

20	milk storage container
21	side wall
22	discharge outlet
23	floor
24	line
26	valve
28	hot water generator and/or steam generator
30	milk pump
32	opening
34	quick-action coupling
35	milk container connection
36	non-return valve
38	cleaning device
40	detergent container
42	intermediate container
44	line
45	line
46	line
48	valve
50	connection piece
52	valve
54	valve
56	valve
58	line
60	device
62	distributor
64	anti-vacuum valve
66	pressure relief valve
68	line
70	line
72	manometer
74	wastewater container
76	branch line

77	valve
78	line
80	line
81	T-piece
82	valve
84	valve
86	line
88	flow meter
90	cleaning connection
92	valve
93	connection switch
94	slanted floor

Patentkrav

1. Kaffemaskine, især kaffefuldautomat med et mælkemodul (10), hvorved der kan fremstilles opskummet mælk, og med en rengøringsindretning (38), hvormed de en eller flere, fortrinsvis samtlige mælkeførende komponenter (35, 36, 18, 30, 12) i mælkemodulet (10) kan rengøres, hvorved kaffemaskinen er indrettet til under rengøringsindretningens (38) rengøringsdrift at lede et rengøringsmiddel, nemlig et mælkerensemiddel, igennem den mindst ene mælkeførende komponent (35, 36, 18, 30, 12), hvorved kaffemaskinen, nemlig kaffemaskinens rengøringsindretning (38), råder over et passende rengøringsmiddelreservoir (40), hvorfra rengøringsmidlet automatisk udtages under rengøringsdriften, hvorved den mindst ene mælkeførende komponent, hvorigennem rengøringsmidlet ledes under rengøringsdriften, er en mælkeledning (18), som er indrettet til at kunne føre fra en forrådsbeholder, hvori mælk, som skal suges fra mælkemodulet, lejres, til en opskumningsindretning i mælkemodulet, og hvorved kaffemaskinen er forsynet med en varmtvands- og/eller dampfremstiller (28), **kendetegnet ved,** at varmtvands- og/eller dampfremstilleren (28) er væskeledende forbundet indirekte eller direkte med mælkeledningen under rengøringsindretningens (38) rengøringsdrift, således at kaffemaskinen er indrettet til at lede varmt vand, som stammer fra varmtvands- og/eller dampfremstilleren (28), igennem mælkeledningen under rengøringsdriften, og at der nedstrøms i forhold til rengøringsmiddelreservoiret (40) er anbragt en rengøringsmiddelledning (28) og nedstrøms i forhold til varmtvands- og/eller dampfremstilleren (28) er anbragt en vandledning (80), hvorigennem rengøringsmiddel henholdsvis det varme vand hver for sig kan strømme, og som hver for sig er forbundet væskeledende indirekte eller direkte med en fælles ledning (86), hvorigennem under rengøringsdriften valgfrit rengøringsmidlet eller varmt vand, som stammer fra varmtvands- og/eller dampfremstilleren (28), eller en blanding af rengøringsmiddel og det varme vand kan ledes i retning af mælkeledningen.

2. Kaffemaskine ifølge krav 1, **kendetegnet ved,** at rengøringsmiddelreservoiret (40) er en til kaffemaskinen hørende komponent, som også uden for rengøringsindretningens (38) rengøringsdrift er forbundet med kaffemaskinen, især

anbragt i det indre af kaffemaskinens hus, fortrinsvis en forrådsbeholder, hvori der kan lagres flydende rengøringsmiddel.

3. Kaffemaskine ifølge et eller flere af de foregående krav, **kendetegnet ved,** at kaffemaskinen har midler, hvormed der kan erkendes om der under en udleveringsindretning (22) i kaffemaskinen, især en udleveringsindretning for, især opskummet, mælk, er placeret en spildevandsbeholder, især midler, som mindst omfatter en føler, især en med Reed-kontaktomskifter, som samvirker med en på passende måde tildannet spildevandsbeholder.

4. Kaffemaskine ifølge et eller flere af de foregående krav, **kendetegnet ved,** at kaffemaskinen, nemlig dennes mælkemodul (10), råder over en mælkebeholdertilslutning (35), som er forbundet væskeledende indirekte eller direkte med en opskumningsindretning (12) til opskumningen af mælken, en passende lynkoblingsdel, hvortil en med et passende modstykke udstyret mælkeforrådsbeholder (20) er løsbart fastgørlig.

5. Kaffemaskine ifølge krav 4, **kendetegnet ved,** at mælkebeholdertilslutningen (35) er indrettet til væskeledende og udløseligt at kunne forbindes med en rengøringstilslutning (90) til rengøringsindretningen (38), som under rengøringsdrift er indrettet til at kunne tilføre det især fra rengøringsbeholderen (40) stammende rengøringsmiddel og/eller især fra varmtvands- og/eller dampfremstilleren (28) og/eller mellembeholderen (42) stammende vand.

6. Kaffemaskine ifølge krav 5, **kendetegnet ved,** at mælkebeholdertilslutningens (35) lynkoblingsdel til udløselig væskeledende forbindelse med rengøringstilslutningen (90) forbindes væskeledende eller er væskeledende forbindelig med en passende med denne samvirkende lynkoblingsdel i rengøringstilslutningen (90).

7. Kaffemaskine ifølge et eller flere af de foregående krav, **kendetegnet ved,** at der nedstrøms i forhold til rengøringsmiddelbeholderen (40) og/eller nedstrøms i forhold til mellembeholderen (42) er anbragt en gennemstrømningsmå-

ler (88), hvormed under rengøringsdriften gennemstrømningen af rengøringsmidlet og/eller det fra mellembeholderen (42) stammende vand er målelig.

8. Fremgangsmåde til rengøring af en kaffemaskine, især en kaffemaskine ifølge et eller flere af de foregående krav 1 - 7, hvormed en eller flere fortrinsvis samtlige mælkeførende komponenter (35, 36, 18, 30, 12) i et mælkemodul (10) i kaffemaskinen rengøres, idet der under rengøringsindretningens (38) rengøringsdrift ledes et rengøringsmiddel, nemlig et mælkerensemiddel igennem den mindst ene mælkeførende komponent (35, 36, 18, 30, 12), hvorved rengøringsmidlet automatisk udtages fra et passende rengøringsmiddelreservoir (40) i kaffemaskinen, **kendetegnet ved,** at under rengøringsdriften foregår der mindst to separate rengøringsprocesser, hvorved under en første rengøringsproces rengøringsmidlet, især blandet med fortrinsvis varmt vand, ledes mindst igennem en mælkeledning, som er indrettet til at kunne føres fra en forrådsbeholder, i hvilken mælk, der skal ansuges af mælkemodulet, er lejret, til en opskumningsindretning i mælkemodulet, og hvorved varmt vand, især ikke med rengøringsmiddel blandet varmt vand, ledes igennem mælkeledningen under en yderligere rengøringsproces, som tidsmæssig følger efter den første rengøringsproces, hvor dette varme vand i forvejen er opvarmet i en varmtvands- og/eller dampfremstiller (28) i kaffemaskinen til en temperatur, som muliggør den termiske desinfektion af den mælkeførende komponent (35, 36, 18, 30, 12) ved hjælp af det varme vand.

9. Fremgangsmåde ifølge krav 8, **kendetegnet ved,** at der under en yderligere, fortrinsvis de to ovenfor nævnte rengøringsprocesser, tidsmæssigt forudgående rengøringsproces ledes koldt vand igennem den mælkeførende komponent (35, 36, 18, 30, 12).

10. Fremgangsmåde ifølge et eller flere af de foregående krav 8 - 9, **kendetegnet ved,** at vandet, som ledes igennem den mælkeførende komponent (35, 36, 18, 30, 12), stammer fra en mellembeholder (42), som i forvejen er blevet fyldt med koldt vand eller med varmt vand, især med varmt vand, som stammer fra kaffemaskinens varmtvands- og/eller dampfremstiller (28), og/eller at varmt-

vands- og/eller dampfremstilleren (28) inden for rammen af rengøringsdriften flere gange fyldes med vand, som efterfølgende ledes ind i mellembeholderen (42).

11. Fremgangsmåde ifølge krav 10, **kendetegnet ved,** at vandet før, ved eller efter en eller flere af varmtvands- og/eller dampfremstillerens (28) fyldeprocesser tilsættes et rengøringsmiddel, således at varmtvands- og/eller dampfremstilleren (28) fyldes eller bliver fyldt med vand, som er tilsat rengøringsmiddel.

12. Fremgangsmåde ifølge et eller flere af de foregående krav 8 - 11, **kendetegnet ved,** at kaffemaskinens rengøringsdrift, især efter manuel betjening af et passende betjeningselement i kaffemaskinen ved hjælp af en bruger, er udløselig, idet især mindst de to følgende betingelser er kumulativt opfyldt:

a) under en udleveringsindretning (22) i kaffemaskinen er en passende spildevandsbeholder anbragt, og

b) der mellem en rengøringstilslutning (90) i kaffemaskinen på den ene side, tilføres rengøringsmiddel, især blandet med vand, som under rengøringsdriften især stammer fra en rengøringsmiddelforrådsbeholder (40), eller vand, især vand, som stammer fra varmtvands- og/eller dampfremstilleren (28), og en mælkeforrådsbeholdertilslutning (35) i kaffemaskinen på den anden side skal være etableret en væskeledende forbindelse.

13. Fremgangsmåde ifølge krav 12, **kendetegnet ved,** at der til enhver tid registreres automatisk ved hjælp af en passende føler om spildevandsbeholderen er anbragt under udleveringsindretningen (22), eller om den væskeledende forbindelse imellem rengøringstilslutningen (90) og mælkeforrådsbeholdertilslutningen (35) er etableret.

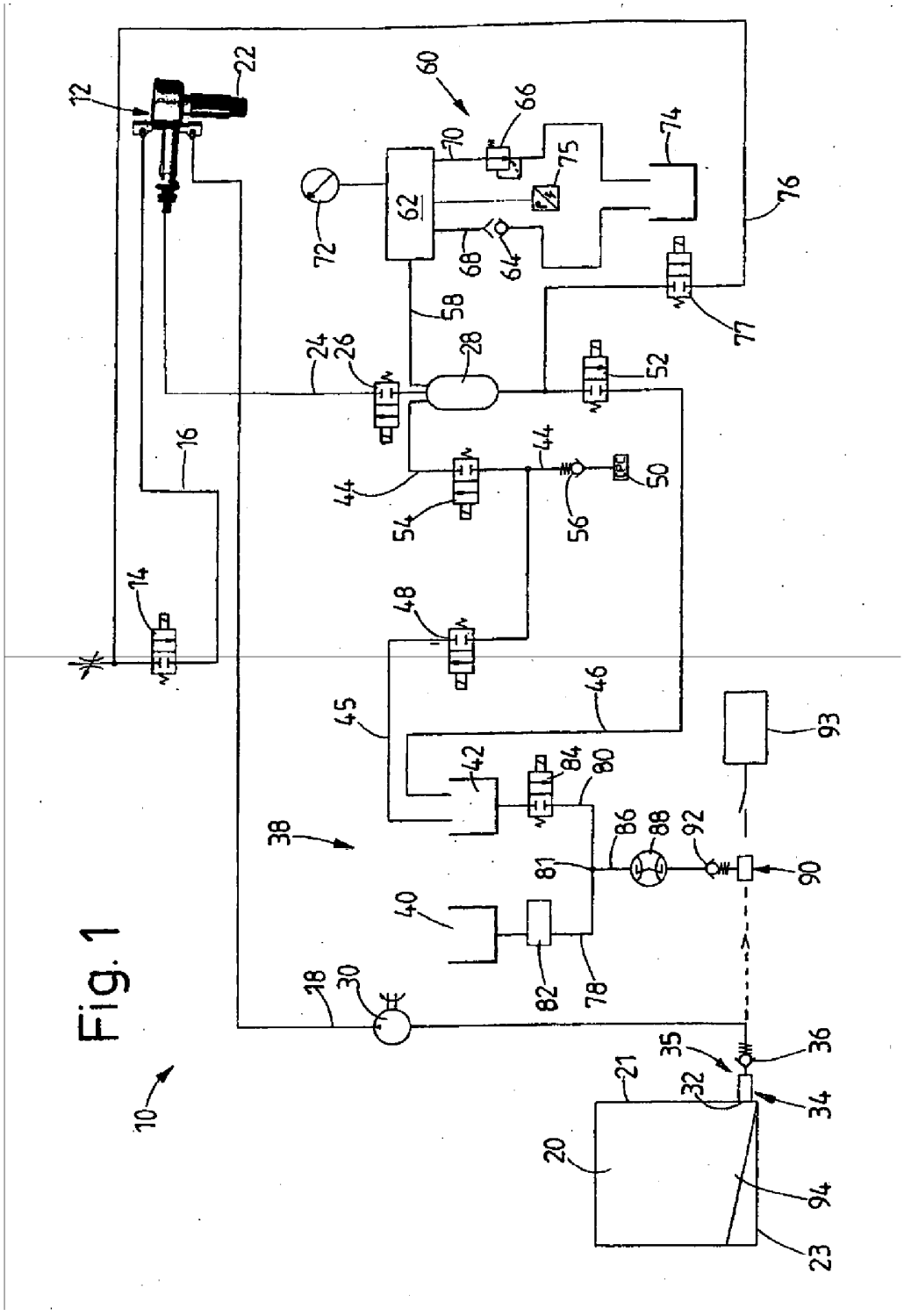

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Fig. 1