Coffee machine with integrated steam delivery device

The present invention relates to a coffee machine and more particularly to a coffee machine comprising an integrated device enabling steam to be delivered in order to heat and emulsify a liquid. The coffee machine forming the subject of the invention is thus particularly well suited for the making of cappuccino, which is obtained by adding hot, foaming milk to the coffee. Some coffee machines of the traditional "espresso" type possess, in addition to the components necessary for the preparation of coffee, a steam jet emerging from the housing of the machine. A switch generally enables the operating mode of the machine to be selected. In a first operating mode, the water contained in the tank is aspirated by a pump which directs it to a heater unit enabling it to be heated. The hot water is then delivered to a percolation nozzle on which is fitted a filter-holding or cartridge-holding device containing the ground coffee. In a second mode of operation, the hot water is passed to the steam jet in order to produce either hot water or steam.

In order to heat and emulsify a liquid such as milk, it is necessary to plunge the steam jet into a receptacle containing the liquid to be heated.

These machines have disadvantages in respect of maintenance and ease of use. In order to heat or emulsify a liquid, it is necessary to bring the receptacle containing the liquid below the jet and to hold it in a position such that the distal end of the jet is immersed in the liquid. The steam gushing from the jet causes splashing if it is not completely immersed in the receptacle or if the latter does not contain sufficient liquid.

Another disadvantage arises from the fact that the steam jet is solidly fixed to the frame of the coffee machine. It cannot therefore be dismantled for

cleaning purposes, which may incidentally result in hygiene problems.

The object of the present invention is to remedy the abovementioned disadvantages by providing a coffee machine of the "espresso" type possessing an integrated device making it possible to emulsify a liquid, such as milk for example. This device is extremely simple to use and easy to maintain, and makes it possible to prevent any undesirable splashing of liquid.

This object is achieved by a coffee machine characterized by the features set out in Claim 1.

Other advantages are apparent from the features stated in the dependent claims and the description below which sets out the invention in greater detail with the aid of drawings representing, diagrammatically and by way of example, an embodiment of a coffee machine according to the invention.

Figure 1 is a frontal view of a coffee machine according to the invention, the receptacle containing the liquid to be emulsified being in the operating position.

Figure 2 is a sectional view along the line A-A in Figure 1.

Figure 3 is a sectional view of the steam delivery device in the position of rest.

Figure 4 is a sectional view of an alternative embodiment of the receptacle interacting with the steam delivery device of the coffee machine shown in Figure 1.

Figure 5 is a sectional view of another alternative embodiment of the receptacle interacting with the steam device shown in Figure 3.

With reference to Figures 1 and 2, the coffee machine comprises a frame 1 incorporating the traditional components of a coffee machine of the "espresso" type, such as a water tank, a pump, a heater unit, water and steam feed circuits, and the control members or buttons making it possible to select and

activate the various functions provided. The mode of operation of machines of this type having been extensively described in the prior art, it will not be recapitulated in the present application.

The coffee machine possesses a percolation nozzle 2 intended to receive a filter carrier or cartridge carrier containing the ground coffee. It also has a steam delivery device 3 which interacts with the closure 4 of a receptacle 5. The receptacle 5, in the operating position, rests on a base 6 solidly fixed to the lower part of the frame 1. The base 6 has lateral edges 7 raised so as to assist the guiding of the receptacle 5 when it is placed in the operating position. The rear part 8 of the base 6 likewise has an over-thickness acting as a detent or end-of-travel stop member. By virtue of its particular shape, the base enables the receptacle 5 to be positioned easily and precisely in the seating defined by the lateral edges 7 and the back 8 of the base so that the aperture 9 in the closure 4 faces the steam outlet 10 of the steam delivery device 3.

The closure 4 of the receptacle 5 is equipped with a steam tube 11 which allows steam to be passed to the interior of the receptacle 5. The steam tube 11 has a length of between half and ninth-tenths of the depth of the receptacle 5. Preferably, the tube 11 has a length which corresponds approximately to four-fifths of the depth of the receptacle 5, so as to be capable of being used when the receptacle 5 is only partially filled.

The steam delivery device 3 possesses a vapour inlet 12 connected to the steam delivery circuit (not shown). The steam inlet 12 communicates via a steam intake connector 16 with a valve formed by the cylindrical piece 13 which can slide freely in the cylindrical body 14. The cylindrical body 14 has a radial aperture 15 which opens into the steam intake connector 16. The cylindrical body 14 has an aperture on its upper part which enables the upper part of the

cylindrical piece 13 to emerge from the body 14. The unit formed by the cylindrical body 14 which receives the connector 16 can move under the action of a control member equipped with a control finger 17 pivoted about a pivot 18. The cylindrical piece 13 has, in its central part, a diameter substantially equal to the internal diameter of the body 14. Two annular grooves 23 are machined in the central part of the piece 13 and are intended to accept gaskets of the O-ring type. The lower and upper parts of the piece 13 have a diameter smaller than the internal diameter of the body 14. This reduced diameter substantially corresponds to that of the aperture situated on the upper part of the cylindrical body 14, so that the piece 13 can emerge from the body 14 depending on the position of the unit (see Figure 2). A resilient member, such as a spring 24, is disposed in the lower part of the body 14 and exerts its action so as to force the position of the cylindrical piece 13 upwards into the body 14. In the operating position shown in Figure 2, the upper part of the piece 13, subject to the action of the spring 24, emerges from the body 14. In this position, the radial aperture 15 of the body 14 faces the lower part of the piece 13, below the gaskets accommodated in the grooves 23, and hence enables steam to pass from the intake connector 16 connected to the steam inlet 12 towards the steam outlet 10.

The lower part of the body 14, forming the steam outlet 10, comes into contact with the aperture 9 of the closure 4 in the operating position. An annular seating in which a gasket of the O-ring type 19 is provided ensures leaktightness between the steam outlet 10 and the aperture 9 of the closure 4.

The other end of the control member, relative to the pivot point, possesses a sprout 22 which actuates a microswitch 20 controlling the steam production.

When the receptacle 5 is withdrawn from its seating 6, 7, 8, the control finger 17 returns to the

position of rest under the action of a resilient member, pivoting about the pivot 18. In doing so, it displaces all the pieces 13, 14, 16 upwards, and these then occupy the position shown in Figure 3. In this position, the piece 13, in abutment against the frame of the device, is forced against the action of the spring 24 into the interior of the body 14. The aperture 15 is then opposite the central part of the cylindrical piece 13, the gaskets situated in the grooves 23 being located on either side of the aperture 15, thus guaranteeing the leaktight closure of the steam circuit.

On the other hand, the sprout 22 of the control member is no longer in contact with the microswitch 20 and thus triggers the production of steam.

The closure 4 of the receptacle 5 will preferably be equipped with holding means which enable it to be fixed in a leaktight manner on the receptacle 5. Any known means such as a screw thread or clip-type closure systems may be envisaged.

Use is thus very simple, since it is sufficient to fill the receptacle 5 with liquid, close it with the closure 4, then position it in the seating provided on the support. When the receptacle 5 reaches the back of the seating, it acts on the control finger 17 which progressively lowers the body 14 until the steam outlet 10 is positioned opposite the aperture 9 situated in the top of the closure 4. In this position, the steam circuit is open and the steam, passing through the tube 11, can emulsify the liquid contained in the receptacle.

Figure 4 shows an alternative embodiment of the receptacle 5, which has in its closure 4 a device for delivering the emulsified liquid directly into a cup via an outlet jet 25. In this alternative embodiment, the intake of steam takes place via an intake pipe 26 into an intake chamber 27 which has, in its lower part, an aperture opening into a pipe 28, itself connected to the outlet jet 25. The piece 28 which comprises the

intake 26 possesses an annular groove 29 intended to receive a gasket. Below this gasket, the piece 28 possesses, in its lower part, a frustoconical section which provides a small passage 30 within the pipe 31 which connects the steam tube 11 and the intake chamber 27. When the steam is injected via the intake pipe 26 into the chamber 27, the liquid contained in the receptacle is aspirated by the venturi effect, through the steam tube 11, the pipe 31 and the passage 30 to the chamber 27. In the chamber 27, the liquid emulsifies under the action of pressure, then the steam/liquid mixture escapes via the pipe 28 to the outlet jet 25. The outlet jet 25 can pivot about a horizontal axis. The part of the jet 25 located within the closure possesses an aperture 32 over part of its circumference which opens, in the position shown in the drawing, into the pipe 28. When the jet 25 is pivoted through at least one quarter of a turn, the aperture 32 is no longer opposite the pipe 28 and the steam circuit is thus closed. In this position, the steam will be directed to the interior of the receptacle via the passage 30, the pipe 31 and the steam tube 11 and will cause the emulsification of the liquid in the receptacle, as described above. An adjusting screw 33 acts by friction on the outlet jet 25 to enable it to be held in the pivoted position and thus avoid any premature change of position. There also exists, in this version, the possibility of directly emulsifying the liquid, for example milk, in the receptacle by the pipe 11.

Figure 5 gives another possibility, specifically that of emulsifying the liquid with an internal jet 35. The steam intake still takes place via the intake pipe 26 into an intake chamber 27. The difference from the device shown in Figure 4 is the presence of the internal jet 35. In the position shown in Figure 5, the liquid is aspirated by the tube 11 and the steam arriving at 26 emulsifies the liquid in the

chamber 27, which liquid emerges at 38 via the outlet jet 25.

If the jet 25 is turned through one quarter of a turn, the bore 37 faces the intake chamber 27 and the emulsified liquid returns into the receptacle 5 via the internal jet 35. When all the liquid is emulsified, the closure of the receptacle 5 is released and a quantity of foamed milk can be manually added to each cup of coffee.

Finally, the knurled wheel 36 allows the intake of air into the system to be adjusted.

With one or other of the receptacles described, the coffee machine according to the invention makes it easily possible to emulsify a liquid with no risk of splashing of liquid during use thereof.

Claims

1. Coffee machine comprising a water tank, a pump, a heater unit and circuits for feeding hot water and steam to a percolation nozzle (2), characterized in that it possesses an integrated steam delivery device (3) comprising a steam inlet (12) connected to the steam feed circuit and a steam outlet (10) together with means (13, 14, 17) enabling the steam outlet (10) to be brought into contact with an aperture (9, 26) in the closure (4) covering a receptacle (5) containing a liquid to be heated or emulsified.

2. Coffee machine according to Claim 1, characterized in that the said means enabling the steam outlet (10) to be brought into contact with the closure (4) of the receptacle (5) are formed by a hollow body (14) provided with a radial aperture (15) and by a piece (13) which can be moved against the action of a resilient member within the body (14) by means of a control member entrained by the outer surface of the receptacle (5).

3. Coffee machine according to Claim 2, characterized in that the control member is formed by a control finger (17) emerging from the frame of the machine and pivoted about a pivot (18) of which one end is solidly fixed to the body (14) and the other end, shaped like a sprout (22), acts on a microswitch controlling the production of steam, and in that this control finger (17) is displaced by the lateral wall of the receptacle when the latter is in the operating position defined by the guide means (7, 8) of the machine.

4. Coffee machine according to one of the preceding claims, characterized in that the closure (4) of the receptacle (5) possesses a steam tube (11) connected to the aperture (9) in the closure (4) and directed towards the interior of the receptacle (5).

5. Coffee machine according to one of the preceding claims, characterized in that the closure (4)

of the receptacle (5) comprises means allowing the liquid to be aspirated by the tube (11) and directed towards an outlet jet (25) by the venturi effect.

6. Coffee machine according to one of the preceding claims, characterized in that the said means are formed by an intake chamber (27) communicating in its upper part with a pipe (31) connected to the steam tube (11) and in its lower part with a pipe (28) ending in an aperture (32) of the outlet jet (25).

7. Coffee machine according to Claim 5, characterized in that the outlet jet (25) is pivoted in the closure (4) and in that, depending on its relative position in relation to the closure, it allows the liquid to pass towards the outlet or steam to enter directly into the receptacle (5).

8. Coffee machine according to one of Claims 1 to 3, characterized in that the closure (4) of the receptacle (5) comprises a steam tube (11), an outlet jet (25) and an internal jet (35), the outlet tube (25) being pivotable to enable the liquid to emerge either to the said jet (25) or to the internal jet (35).

9. Coffee machine according to one of the preceding claims, characterized in that it comprises a base (6) provided with guide means (7) and stop means (8) defining a seating intended to accommodate and maintain the receptacle (5) in the operating position.

10. Receptacle for emulsifying a liquid, characterized in that it possesses a leaktight closure (4) having an aperture (9) connected to a steam tube (11) extending within the receptacle, the aperture (26) of the receptacle being intended to be connected to the steam outlet of a coffee machine.

11. Receptacle according to Claim 10, characterized in that the aperture (9) in the closure (4) is connected to an intake chamber (27) which is itself connected on one side to an outlet jet (25) and on the other side by a venturi tube to the steam tube (11).

12. Receptacle according to Claim 11, characterized in that the outlet jet (25) is mounted to pivot in the

closure (4) of the receptacle (5) and in that, depending on its relative position in relation to that closure, a connection with the intake chamber (27) is sealed or otherwise.

13. Receptacle according to one of Claims 10 to 12, characterized in that its aperture (9) is shaped so as to be automatically connected to the steam outlet of a coffee machine according to one of Claims 1 to 8 when the receptacle is positioned on that machine.

14. Receptacle according to Claim 10, characterized in that the aperture (26) in the closure (4) is connected to an intake chamber (27) which is itself connected to an outlet jet (25), by a venturi tube to a steam tube (11) and to an internal jet (35).