Installation for preparing a drink comprising:

- a reservoir (14) in which the drink is present
- a metering unit (60) connected to the metering unit (46) which contains the measured quantity of drink
- a temperature controlling means (50), a heating means (50), a control means (46) which control the metering unit and the heating means, such that the measured quantity of drink is supplied at the desired temperature.

The diagram shows various parts like pipes, valves, and gauges, indicating the flow and measurement of the drink.
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Installation for preparing hot drinks

The invention relates to an installation for preparing hot drinks and more particularly relates to an installation for bringing a cold drink, in particular chocolate milk, to consumption temperature.

Installations for preparing hot drinks are known per se in numerous variants. It is, of course, known that a hot drink can be prepared from a cold drink by placing the drink in a container suitable for this purpose (such as, for example, a pan or something similar) and heating said container. However, a number of products, such as chocolate milk, coffee and the like, are found to undergo a change during a heating process carried out in such a way, as a result of which the taste is adversely affected and clearly impaired as far as the consumer is concerned. As can be seen from the prior art, in the past attempts have already been made to solve this problem in various ways.

In Netherlands Application NL 7 410 764, for example, use is made of a liquid concentrate, a metered quantity of which is fed, together with a metered quantity of hot water, to a mixing unit, in which a mixture of the desired composition and at the desired temperature, suitable for immediate consumption, is prepared, which mixture is then dispensed into a cup, beaker or something similar.

The use of a concentrate in powder form is described, for example, in EP 0 262 361. A measured quantity of said pulverulent concentrate is fed, together with a quantity of hot water, to a mixing chamber in which the drink is mixed and also brought to the desired temperature.

However, the use of concentrate, either in powder or in liquid form, has a number of disadvantages, in particular lying in the fact that the concentrates have to be prepared via a separate process, the desired drink generally being first prepared and a liquid or pulverulent concentrate then being prepared from said desired drink. The aim of the invention is, now, to eliminate these additional steps for the preparation of a concentrate by providing an installation with which a hot drink can be prepared in a simple manner starting from the prepared cold drink, without this resulting in the abovementioned taste disadvantages.

To this end, the invention provides an installation for preparing
a drink, comprising:
- a reservoir in which the drink is present at a temperature which is lower than the desired temperature,
- a metering unit, coupled to the reservoir, for measuring a pre-determined quantity of drink,
- heating means, connected to the metering unit, through which the measured quantity of drink flows and, during this operation, is brought to the desired temperature, and
- a control unit which controls the metering unit and the heating means in such a way that the measured quantity of drink is dispensed at the desired temperature at the outlet of the heating unit.

The invention is based on the insight that the drink undergoes no (or at least no discernible) change in taste during heating if heating of the drink is carried out rapidly. This can be achieved by always exposing a small portion of the measured quantity to the heating element in a flow-through process.

The invention is furthermore based on the insight that in many of the prior art heating processes the contact time between the drink and the actual heating element is so long that a deposit of material from the drink will be formed on the heater. Such deposits or residues will cause an undesirable change in taste of the heated drink.

The forming of such deposits is in agreement with the invention prevented by using a flow through heating means whereby the contact time between the drink and heater is restricted and just sufficient to heat the drink to consumption temperature.

Various embodiments of heating means through which the measured quantity of drink can flow in such a way that the drink is brought to the desired temperature during the relatively short flow-through period are already known per se.

In this context, a first embodiment of the installation according to the invention is characterised in that the heating unit is formed by a chamber through which the measured quantity of drink flows, which chamber is heated by suitable means to a temperature such that the drink issuing from the chamber is at the desired temperature. In particular, said installation can be so constructed that the means for heating the chamber are formed by an electric heating element, or that the means for heating the chamber are formed by a microwave element.
An embodiment which has proved very successful in trials makes use of the characteristic that use is made of steam for heating the chamber, which steam is fed into the chamber. More particularly, in this case the heating unit is provided with

- a steam generator,
- steam metering means and
- a mixing chamber which is connected both to the drink metering means and to the steam metering means,

the quantities of drink and steam fed by said metering means to the mixing chamber being mixed in the mixing chamber.

According to the invention, it is preferable that the reservoir is formed by a container of flexible material which contains drink at least virtually exclusively, which container is supported by a casing of non-flexible material. A reservoir of this type, which is also known under the English term of bag-in-box, is already known per se for the storage of drinks or drink concentrates, for example from Japanese Patent Publication J 6 211 299 and from European Patent Application EP 0 252 420. The combination of a reservoir of this type with a metering unit and heating means is, however, not indicated in said publications.

It is further preferred that the reservoir is provided with coupling means by means of which the reservoir can be detachably connected to the metering unit. By this means it is possible for the reservoir, after it has been completely emptied, to be replaced by a new reservoir which is filled and is supplied as such to the user. It is furthermore possible to detach the reservoir and place it, for example, in a cold room when the installation is not in use, for example overnight.

Incidentally, it is also preferable to ensure that the temperature of the reservoir does not rise too high even when the latter is in use. A preferred embodiment of the installation is therefore characterised in that the installation is provided with cooling means with which the drink, which is present in the reservoir, can be kept at a desired relatively low temperature.

Within the scope of the invention, the metering means can be constructed in various ways.

According to a preferred embodiment, a flexible hose is present between the reservoir and the heating unit and the metering unit is
provided with a hose pump which can be activated under the control of the control unit in such a way that a predetermined quantity of drink is withdrawn from the reservoir.

In another embodiment the metering unit is provided with a combined suction and force pump provided with a cylindrical chamber with a piston movable therein, which chamber is connected in the installation in such a way that drink is drawn from the reservoir into the chamber when the piston moves in one direction and the drink present in the chamber is forced out of said chamber and fed to the heating unit when the piston moves in the other direction.

By spraying or atomising a measured quantity of the cold drink into a hot steam environment, condensing of the steam together with the drink droplets is achieved, the steam releasing its heat to the drink droplets, which are rapidly brought to the desired temperature as a result. With correct metering of both the cold drink and the quantity of steam, the end result achieved is a measured quantity of drink at the desired consumption temperature.

In a preferred embodiment of the installation, it is preferred that the reservoir is formed by a container of flexible material which contains drink exclusively, which container is supported by a casing of non-flexible material. By storing the cold drink in a so-called "bag-in-box", the ingress of air to the liquid, and consequently any oxidising effect thereof, is prevented and the quality of the cold drink remains constant within wide time limits, so that there is no change in taste between the first portions taken from the reservoir and the final portions.

In a preferred embodiment of the installation, the measuring and feeding of a desired quantity of cold drink is effected in that the reservoir is connected to a first connection opening of a three-way tap, the second connection opening of which is connected to the metering unit and the third connection opening of which is connected to the spray unit in the mixing chamber, wherein in one position of the tap the first connection opening communicates with the second connection opening and in the other position of the tap the second connection opening communicates with the third connection opening. With this embodiment of the installation, no air from the surroundings is able to enter the drink reservoir even during measuring and metering of the quantity of cold drink.
The invention also covers embodiments in which the installation comprises more than one reservoir.

One of said embodiments is characterised in that the installation comprises a second reservoir in which a drink is present at a temperature which is lower than the desired temperature, and that the installation further comprises selection means for selectively connecting either the outflow opening of the first reservoir or the outflow opening of the second reservoir to the metering unit.

A further development thereof is characterised in that the installation furthermore comprises an additional reservoir in which a cleaning solution is present, the outflow opening of said further reservoir being connected to said selection means which are embodied such that either drink from a reservoir or cleaning solution from said additional reservoir is passed to the metering unit.

Another embodiment is characterised in that the installation comprises a second reservoir in which a drink is present at a temperature which is lower than the desired temperature, second metering means coupled to the second reservoir for measuring a predetermined quantity of drink, and selection means for selectively connecting either the outflow opening of the first metering unit or the outflow opening of the second metering unit to the heating means.

Furthermore the installation may comprise a unit for dispensing a predetermined quantity of powdered material, such as sugar, and may comprise furthermore an intermediate flow through chamber at the outflow side of the heating means, said intermediate chamber receiving both the heated drink from the the heating means as well as the powdered material from the dispensing unit to mix the drink with the powdered material while they pass the intermediate chamber.

The invention relates not only to an installation for bringing a cold drink to consumption temperature, which installation comprises, inter alia, a reservoir in which the drink is present at a temperature which is lower than the desired temperature, but the invention also relates to the drink-filled reservoir, especially a bag in box, for which separate protection is therefore also requested. Within the scope of the invention, the reservoir is provided with connection means, by means of which the reservoir can be coupled to the metering means.

Depending on the embodiment of the installation the bag in box
may comprise different connection means. In case the installation has uses metering means of the suction and force pump type (or plunger pump type) the bag in box may have a relatively short outlet hose or tube the free end of which is coupled to a connector part corresponding to a counter connector part coupled the three way valve cooperating with the metering means.

In case the metering function is carried out by a so called hose pump the bag in box may have a relatively long outlet hose.

Both embodiments of said bag in box are distinguishable from prior art bag in boxes because in stead of a hose most prior art bag in box configurations comprise an outlet valve.

Cooling means for cooling the cold drink can optionally be present in or on the reservoir. Furthermore, the dimensions of the reservoir are so chosen that the reservoir as a whole fits inside the installation which will be described in more detail below. The dimensions are furthermore so chosen that the capacity of the reservoir is sufficient to be able to serve a predetermined number of portions of hot drink over a predetermined period.

The invention will be explained in more detail below with reference to the appended figures.

Figure 1 shows a perspective view of an installation according to the invention.

Figure 2 shows a diagrammatic cross-section through the installation according to Figure 1.

Figure 3 shows a functional diagram with reference to which the functioning of the installation can be explained; Figure 3a shows an associated time diagram.

Figure 4 shows a possible embodiment of the mixing chamber in more detail, with the spray head accommodated therein.

Figure 5 shows a diagrammatic cross-section through another embodiment of the installation according to the invention.

Figure 6 shows an embodiment of the installation comprising two reservoirs for drink and an additional reservoir for a cleaning agent.

Figure 7 shows another embodiment with two drink reservoirs.

Figure 8 illustrates schematically the addition of a dispenser for sugar or another powdered material.

In Figure 1 a preferred embodiment of the installation according to the invention is indicated in its entirety by numeral 10. The in-
stallation comprises a lower housing section 12 and an upper housing section 14. A container 16, in which the cold 'drinkis present, is located in said upper housing section 14. The container 16 is manufactured from a flexible material and on one side is provided with a connection element 18, to which a line 20 can be connected for removing liquid from the bag 16. Liquid reservoirs of this type provided with a flexible bag which is enclosed in a container of rigid material are known per se to those skilled in the art, for example under the English term "bag-in-box".

The line 20 runs between the connection 18 and a three-way tap 22. In addition to the line 20, a combined suction and force pump 24, which is coupled to its own drive unit 26, and, furthermore, the mixing chamber 28 are connected to the three-way tap. The mixing chamber 28 is further connected, via a line 32 with a non-return valve 34 therein, to the boiler 30. The liquid flowing from the mixing chamber 28 can be collected in a container suitable for this purpose, such as, for example, a beaker 42, which is placed on the plate of the drip tray 44.

The boiler 30 is connected via a valve 38 to the cold water mains 40, via which cold water can be fed from the water mains into the boiler 30. The valve 38 is actuated by the water level sensors 35 and 36 which detect, respectively, a maximum and a minimum permissible water level in the boiler 30.

The various moveable and controllable elements, such as the three-way valve 22, the drive unit 26 for the combined suction and force pump 24 and the regulating valve 34, are controlled by an electronic control unit which is indicated in its entirety by 46.

The operation of the installation will be explained in more detail with reference to the schematic diagram in Figure 3 and the time diagram in Figure 3a.

As indicated in Figure 3, the boiler 30 is provided with an electric heating unit 50, which is connected via two switches 52 and 54 to the mains connections 56. The switch 54 is coupled to a pressure sensor 56, by means of which the pressure P in the boiler 30 is measured. The switch 52 is coupled to a temperature sensor 58, by means of which the temperature T inside the boiler 30 is measured. As long as the pressure P in the boiler 30 is below a preset limiting value, the switch 54 will be closed. As long as the temperature T in
the boiler is below a preset limiting value, the switch 52 will be closed. If one of the two limiting values is exceeded, the relevant switch will open, as a result of which the heating unit 50 will be switched off. The switches 52 and 54, in combination with the sensors 56 and 58, ensure automatic control of the heating unit 50 in a manner such that steam under a predetermined pressure is present in the boiler.

The boiler is further provided with two level sensors 35 and 36, by means of which, respectively, the maximum water level H and the minimum water level L in the boiler are monitored. Depending on the signals from said sensors 35 and 36, the control unit 46 for the valve 38 will or will not be activated. Via said valve 38, water can be fed from the water mains 40 to the boiler 30. If the water level in the boiler 30 has fallen to such a degree that the level sensor 36 responds, the control unit 46 will be activated and the tap 38 will be opened. If the sensor 35 indicates that the maximum water level H has been reached, the control unit 46 will receive a command to close the tap 38. The combination of the elements 35, 36, 38 and 46 thus ensures that the water level in the boiler 30 is maintained within specific limits.

The boiler 30 is further provided with a safety valve 48, which is opened immediately should the pressure in the boiler become too high for any reason whatsoever.

When the installation is at rest, the steam valve 34 and the non-return valve 34a, directly coupled thereto, are closed. The three-way valve 22 can assume two positions. In the first position, designated I below, a connection between the line 20, which is coupled to the reservoir 14, and the input of the combined suction and force pump 24 is provided via the valve. In the other position, designated II below, there is a connection between the input/output of the combined suction and force pump 24 and the input of the mixing chamber 28. In the rest position the three-way valve is in position II, in which, therefore, the line 20 is shut off. The piston of the combined suction and force pump is in the cylinder close to the suction/pressure opening. As is indicated diagrammatically in Figure 3, the steam valve 34, the three-way valve 22 and the drive unit 26 are controlled by the electronic control unit 46 which transmits the requisite control signals via the outputs U1, U2, U3.
The control unit 46 receives an activation signal at its input I if a user of the installation wishes to receive a portion of drink at consumption temperature. Said activation signal, which is received at time T0 (see Figure 3a), ensures that the drive unit 26 of the combined suction and force pump 24 is started up, as a result of which a portion of cold drink is drawn, via the line 20 and the three-way valve 22, from the reservoir 14 into the piston chamber of the pump 24. As will be clear, the volume of the portion of drink to be drawn in can be adjusted by means of the setting for the stroke length of the combined suction and force pump.

At time T1 the drive unit 26 is switched over, as a result of which the direction of movement of the piston in the combined suction and force pump 24 is reversed. At the same time the three-way valve 22 is switched from position I to position II, producing a connection between the input/output of the combined suction and force pump 24 and the input of the mixing chamber 28. Furthermore, the steam valve 34 is also opened. As a consequence of the compression movement of the piston in the combined suction and force pump 24, the quantity of cold drink present in the pump is now forced via the three-way valve 22 into the mixing chamber 28. At the same time steam is fed into the mixing chamber via the steam valve 34, which steam is mixed with the cold drink and, as a result, the cold drink rapidly heats up to consumption temperature. The drink brought to temperature flows out of the mixing chamber at the bottom into a suitable container, such as the cup 42. At time T2 the piston in the combined suction and force pump has reached its outermost position and the drive unit 26 is deactivated. The three-way valve 22 remains in its position and thus ensures closure of the drink feed line 20. The steam valve 34 is closed and the steam feed is thus terminated. The installation is thus ready for preparation of a subsequent portion of drink.

In order to prevent non-condensed steam remaining in the mixing chamber 28, as a result of which the final portion of drink could perhaps be forced out under too great a pressure, it is preferable to close the valve 34 just before time T2, that is to say at time T2'. By trial and error it is simple to adjust the time difference between T2 and T2' such that the final quantity of steam is able to condense together with the final quantity of cold drink, in such a way that at time T2 only drink at consumption temperature under atmospheric
pressure is still present in the mixing chamber 28.

It is furthermore preferable that the steam valve 34 is not opened at time T1, at which the combined suction and force pump 24 starts to deliver the measured quantity of drink, but is opened at a time just before this, for example time T1', indicated in Figure 3a. The effect of this is that an adequate quantity of steam is already present in the mixing chamber at the point in time when the first cold drink enters the mixing chamber. Consequently, all cold drink reliably comes into contact with the hot steam and is heated to the desired temperature.

The way in which the steam and the cold drink are brought into contact with one another in the mixing chamber 28 will be discussed in more detail with reference to Figure 4.

Figure 4 shows more details of the construction of the mixing chamber 28. The mixing chamber consists of a cylindrical outer jacket 60, which is sealed at the top by a top plate 62. In said top plate 62 there is a central inlet to which a connecting stub 64 with a coupling nut 66 is connected so as to be able to connect the mixing chamber to the drink feed line 20. The seal between the top plate 62 and the outer jacket 60 is achieved by means of a sealing ring 68 and the two elements 62 and 60 are clamped to one another by means of the clamping ring 70, which is provided with an internal screw thread and which is screwed onto that section of the outer jacket 60 which is provided with a screw thread, in the manner indicated in the figure.

The spray plate 72 is located on the underside of the outer jacket 60, the drink spray opening 74 being arranged in the middle of said spray plate. A number of steam guide channels 76 are present around said drink spray opening 74.

The actual drink collecting funnel 80 is located on the underside of the mixing chamber. A clamping ring 82 is used to clamp the protruding top edge of the funnel 80 together with the spray plate 72 tightly against the underside of the outer jacket 60. To this end the clamping ring 82 is screwed onto a screw thread which is provided on the underside of the outer jacket 60 for this purpose.

Between the top plate 62 and the spray plate 72 there is an inner sleeve 84, by means of which the interior space within the outer jacket 60 is divided into a central channel, which runs from the connecting stub 64 to the spray opening 74, and a steam guide channel,
which is located concentrically around said central channel and by means of which the steam, which is fed via the connection 90 into said central chamber, is distributed over the entire chamber in such a way that all steam channels 76 exhibit, at least approximately, an identical steam delivery.

As is shown in Figure 4, an adjusting element 86 by means of which the spray pattern of the drink can be adjusted is located in the central drink passage. Preferably, said element 86 is adjusted such that the drink, which issues from the opening 74 and passes into the collection chamber 80, is distributed as a conical cloud of very fine droplets. At the same time as the drink is sprayed, the steam is fed via the various openings 76 into the chamber 80, specifically preferably in such a way that the feed direction of the steam makes an angle of approximately 90° with at least a major proportion of the drink droplets sprayed into the chamber. By this means intensive contact is achieved between the steam and the drink and rapid condensation of the steam and, at the same time, rapid heating of the drink are achieved. The heated drink can issue from the bottom of the funnel-shaped collection chamber 80 into a suitable container, such as a beaker, cup, or the like.

Preferably, the spray head 86 is so adjusted that the drink is atomised or sprayed via a conical pattern into the mixing chamber. At the same time, as can be seen in Figure 4, the steam feed openings are directed obliquely inwards in such a way that the steam makes an angle with the wall of the said conical pattern. By this means not only is good intensive contact between the steam and the drink achieved but said contact also takes place uniformly in such a way that all drink droplets come into contact with the steam in approximately the same way and, therefore, will be heated in virtually the same manner.

It is particularly preferred that the direction in which the steam is blown into the mixing chamber makes an angle of approximately 90° with respect to the wall of the cone pattern in which the drink is sprayed into the mixing chamber.

Preferably a ring 92 is present beneath the spray plate 72, which ring has at least a bottom edge where there is a changeover from a vertical edge section of the ring to a horizontal edge section. As a result of the sharp corner thus created all liquid which deposits on the bottom of the spray plate or on the wall of said ring does not run
downwards over the wall of the mixing chamber 90 but drips downwards immediately from the said edge in the direction of the discharge opening 94 of the mixing chamber. Preferably, the ring 92 is, furthermore, of such construction that the wall 93 thereof has a smooth transition between a virtually horizontal wall section at the top and the virtually vertical section, which has already been mentioned, at the bottom.

Instead of a combined suction and force pump 24 with combined drive means 26, it is also possible to make use of a so-called hose pump, which can serve to replace the three-way valve 22 and the combined suction and force pump 24 with drive unit 26. Pumps of this type are known per se from the prior art and are also used in the drinks preparation sector, as can be seen, for example, from Japanese Application J 06 211 299.

Figure 5 shows another embodiment of an installation according to the invention. Those components of the installation which are identical to the corresponding components in the embodiment in Figure 2 are indicated by the same reference symbols. In this embodiment as well, use is made of a relatively rigid container 14 which has inside it a flexible container 16, in which the drink in the cold state is present. In this embodiment the outlet 18 of the flexible container 16 is connected to a flexible hose 100 which runs through a hose pump 102, which is known per se. When the hose pump 102 is stationary the latter in fact acts as a closure for the hose 100. As soon as the hose pump is brought into motion, a certain quantity of drink is measured out and fed to the heating unit 28, said quantity depending on the period for which the hose pump 102 is activated.

A further difference between Figures 2 and 5 is the presence of a cooling element 104 at the top of the housing 12, positioned such that the reservoir containing the cold drink, in particular the bottom of the bag 16, is cooled.

Hose pumps and cooling elements are known per se to those skilled in the art and a more detailed explanation is therefore considered superfluous.

Instead of the heating unit operating with steam which is illustrated in Figures 1 to 5, it is also possible to use other heating devices which are constructed in such a way that the drink flows through them and is brought to the desired temperature as it passes
through the heating device. In another embodiment the heating unit comprises, for example, a tube of material with good thermal conductivity which is located in a hot water reservoir. The water in the reservoir is kept at a desired temperature by a heating coil which is connected via a thermostatically controlled switch to the mains. Depending on the setting of the thermostat, the water in the reservoir is kept at a desired temperature, preferably somewhat above the desired temperature of the prepared drink.

Instead of a hot water bath, it is also possible, for example, to make use of microwaves for heating the cold drink flowing through the tube. Even at relatively high flow rates, it is possible to bring the drink to the desired temperature with the aid of microwaves. Heating units operating with microwaves are known per se.

Instead of only one drink reservoir it is conceivable to apply two drink reservoirs in the installation. A respective embodiment is illustrated in figure 6. Figure 6 is based on the right half of figure 3 whereby those parts in figure 6 which correspond to parts in figure 3 are indicated by the same reference number. The line 32 could be connected to a steam generator identical to the circuit shown in the left half of figure 3.

Not shown in figure 3 are the second drink reservoir 114, the multiway valve 118 and the cleaning agent reservoir 116. The output of the reservoir 14 is connected to one input of the multiway valve 118, the output of the second drink reservoir 114 is connected to a second input of the multiway valve 118 and the output of the cleaning agent reservoir 116 is connected to a third input of the multiway valve 118. The output of the multiway valve 118 is connected to the three-way valve 22.

In a simple embodiment the multiway valve 118 is embodied as a hand operated valve selecting between the two drink reservoirs 14 and 114 and the cleaning agent reservoir 116. Both drink reservoirs 14 and 114 may contain the same drink (a configuration usable in situations where there is a relatively large demand for the hot drink), or may comprise different drinks (for instance chocolate milk in the one and coffee in the other). Preferably the multiway valve 118 is embodied such that the average user has only the option to select either reservoir 14 or reservoir 114. Preferably the selection of reservoir 116 is reserved for instance to maintenance personnel. After the
reservoir 14 or reservoir 114 is selected the functioning of the whole system is completely equal to the functioning of the system described in figure 3.

It is remarked the addition of the cleaning agent reservoir 116 forms an option which is not necessary as such. If the reservoir 116 is omitted, the multiway valve 118 can be replaced by a two-way valve and an installation is obtained in which one of two reservoirs can be selected.

Another embodiment in which one of two reservoirs can be selected is illustrated in figure 7. Figure 7 can also be considered as a further development of the installation shown in figure 3 and therefore components with the same function as in figure 3 are indicated by corresponding reference numerals. New in figure 3 are the second reservoir 214 the output of which is connected to one input of a further three-way valve 222 and the second metering unit the in/output of which is connected to a second port of the three-way valve 222. The output port of valve 222 is connected to a three-way valve 218 by means of which the user can select either the combination of reservoir 14 and metering unit 24 or the combination of reservoir 214 and metering unit 224. The output of the three-way valve 218 reads the input of the heating means 28.

Also in this case both reservoirs 14 and 214 may comprise the same drink but are preferably filled with a different drink, such chocolate milk in reservoir and coffee in reservoir 214.

In case the three-way valve 218 is embodied as a valve which can be controlled by the control unit 46 it is conceivable to control the various components of the installation such that first a predetermined amount of liquid is retrieved from the reservoir 14, heated in the heating chamber 28 and delivered to the cup 42 whereafter a second quantity of liquid is derived from the second reservoir 214, heated in the heating chamber 28 and also delivered to the cup 42 to become mixed with the first quantity of liquid.

To take into account the varying taste of every individual it can be preferred to install one or more dispensers in the installation for dispensing powdered material such as sugar, milk powder etc. Adding predetermined amounts of powdered material such as sugar of milk powder will result in a different taste of the hot drink accommodating the taste of the respective user. An embodiment in which one powdered
product dispenser is added is shown schematically in figure 8. Already known and discussed components shown in figure 8 are the multiway valve 22, the heating unit 28 and the cup 42. Added to the installation is a dispenser 230 for adding a powdered product such as milk powder or sugar to the hot drink and the intermediate chamber 232 in which the hot drink together with the dispensed amount of powdered product is received to become mixed before the mixture is delivered to the cup 42. Dispensing units such as the dispenser 230 are known in a wide variety and do not need further discussion. Also the function of the intermediate chamber 232 will be clear and a further detailed discussion of figure 8 is therefore considered superfluous.
Claims

1. Installation for preparing a drink, comprising:
   - a reservoir in which the drink is present at a temperature which is lower than the desired temperature,
   - a metering unit, coupled to the reservoir, for measuring a pre-determined quantity of drink,
   - heating means, connected to the metering unit, through which the measured quantity of drink flows and, during this operation, is brought to the desired temperature, and
   - a control unit which controls the metering unit and the heating means in such a way that the measured quantity of drink is dispensed at the desired temperature at the outlet of the heating unit.

2. Installation according to Claim 1, characterised in that the heating unit is formed by a chamber through which the measured quantity of drink flows, which chamber is heated by suitable means to a temperature such that the drink dispensed from the chamber is at the desired temperature.

3. Installation according to Claim 2, characterised in that the means for heating the chamber are formed by an electric heating element.

4. Installation according to Claim 2, characterised in that the means for heating the chamber are formed by a microwave element.

5. Installation according to Claim 2, characterised in that use is made of steam for heating the chamber, which steam is fed into the chamber.

6. Installation according to Claim 5, characterised in that the heating unit is provided with
   - a steam generator,
   - steam metering means and
   - a mixing chamber which is connected both to the drink metering means and to the steam metering means,
   the quantities of drink and steam fed by said metering means to the
mixing chamber being mixed in the mixing chamber.

7. Installation according to Claim 6, characterised in that a spray unit is present in the mixing chamber, by means of which spray unit the quantity of drink measured by the drink metering unit is sprayed into the quantity of steam measured by the steam metering means.

8. Installation according to Claim 6 or 7, characterised in that the control means are constructed such that during a first period only steam is fed to the mixing chamber, that during a second period steam and drink are then fed to the mixing chamber and that during a third period only drink is then fed to the mixing chamber.

9. Installation according to Claim 6, 7 or 8, characterised in that the drink is fed to the mixing chamber via a drink feed channel which, at least partially, runs concentrically within a steam feed channel, the spray head being positioned at the end of the drink feed channel and, at approximately the same level, a ring of steam feed openings being made concentrically around the spray head at the end of the steam feed channel.

10. Installation according to Claim 9, characterised in that the spray head is constructed in such a way that viewed in an arbitrary cross section through the drink feed channel the drink is sprayed outwards from an imaginary centerline through said drink feed channel and the steam feed openings are directed inwards to said imaginary centerline such that in each cross section there is an angle between the direction in which the drink is sprayed and the direction in which the steam is supplied.

11. Installation according to Claim 10, characterised in that the said angle is approximately 90 degrees.

12. Installation according to one of Claims 6, 7 or 8, characterised in that there is a downward-directed wall around the steam feed openings, there being a transition to a horizontal surface at the bottom edge of said wall.
13. Installation according to Claim 12, characterised in that the said wall has a smooth transition between a horizontal part adjoining the steam feed openings and a vertical part adjoining the said bottom edge.

14. Installation according to one of the preceding claims, characterised in that the reservoir is formed by a container of flexible material which contains drink at least virtually exclusively, which container is supported by a casing of non-flexible material or at least of material of little flexibility.

15. Installation according to Claim 1 or 2, characterised in that the reservoir is provided with an outflow opening provided with a closure which can be operated by hand.

16. Installation according to Claim 15, characterised in that the closure can be detachably connected to the metering unit via coupling means.

17. Installation according to one of the preceding claims, characterised in that the installation is provided with cooling means by means of which the drink, which is present in the reservoir, can be kept at a desired relatively low temperature.

18. Installation according to Claim 17, characterised in that the cooling means are so arranged in the installation that said means form a cooling surface on which the reservoir is placed during operation.

19. Installation according to Claim 17, characterised in that the cooling means are formed by an insulated chamber in which a cooling element is installed and into which the reservoir can be introduced.

20. Installation according to Claim 17, characterised in that the cooling means are located inside the said casing of non-flexible material or at least of material of little flexibility.

21. Installation according to one of the preceding claims, characterised in that a flexible hose is present between the reservoir
and the heating unit and in that the metering unit is provided with a hose pump which is coupled to said flexible hose and which can be activated under the control of the control unit in such a way that a predetermined quantity of drink is withdrawn from the reservoir.

22. Installation according to one of the preceding Claims 1-21, characterised in that the metering unit is provided with a combined suction and force pump provided with a cylindrical chamber with a piston movable therein, which chamber is connected in the installation in such a way that drink is drawn from the reservoir into the chamber when the piston moves in one direction and the drink present in the chamber is forced out of said chamber and fed to the heating unit when the piston moves in the other direction.

23. Installation according to Claim 22, characterised in that the reservoir is connected to a first connection opening of a three-way valve controllable by the control unit, the second connection opening of which three-way valve is connected to the metering unit and the third connection opening of which three-way valve is connected to the heating unit, the first connection opening communicating with the second connection opening in one position of the valve and the second connection opening communicating with the third connection opening in the other position of the valve.

24. Installation according to one of the preceeding claims, characterised in that the installation comprises a second reservoir in which a drink is present at a temperature which is lower than the desired temperature, and that the installation further comprises selection means for selectively connecting either the outflow opening of the first reservoir or the outflow opening of the second reservoir to the metering unit.

25. Installation according to claim 24, characterised in that the selection means are embodied as a three-way valve, the first connection opening of which is connected to the outflow opening of the first reservoir, the second connection opening of which three-way valve is connected to the outflow opening of the second reservoir and the third connection opening of which three-way valve is connected to
the metering unit, the first connection opening communicating with the third connection opening in one position of the valve and the second connection opening communicating with the third connection opening in the other position of the valve.

26. Installation according to one of the preceding claims 24-25, characterised in that the installation furthermore comprises an additional reservoir in which a cleaning solution is present, the outflow opening of said further reservoir being connected to said selection means which are embodied such that either drink from a reservoir or cleaning solution from said additional reservoir is passed to the metering unit.

27. Installation according to one of the preceding claims 1-23, characterised in that the installation comprises a second reservoir in which a drink is present at a temperature which is lower than the desired temperature, second metering means coupled to the second reservoir for measuring a predetermined quantity of drink, and selection means for selectively connecting either the outflow opening of the first metering unit or the outflow opening of the second metering unit to the heating means.

28. Installation according to claim 27 characterised in that the selection means are embodied as a three-way valve, the first connection opening of which is connected to the outflow opening of the first metering means, the second connection opening of which three-way valve is connected to the outflow opening of the second metering means and the third connection opening of which three-way valve is connected to the heating unit, the first connection opening communicating with the third connection opening in one position of the valve and the second connection opening communicating with the third connection opening in the other position of the valve.

29. Installation according to one of the preceding claims, characterised in that the installation comprises a unit for dispensing a predetermined quantity of powdered material, such as sugar, and comprises furthermore an intermediate flow through chamber at the outflow side of the heating means, said intermediate chamber receiving
both the heated drink from the heating means as well as the powdered material from the dispensing unit to mix the drink with the powdered material while the pass the intermediate chamber.

30. Installation according to one of the preceding claims, characterised in that the speed at which the metering unit delivers the metered quantity of drink to the heating unit and the heat emitted by the heating unit are matched to one another in such a way that the drink is heated to the desired temperature.

31. Reservoir, filled with cold drink, in particular filled with chocolate milk, intended for use in an installation according to one of the preceding claims, comprising a container of flexible material which contains the cold drink at least virtually exclusively, which container is supported by a casing of non-flexible material or at least of material of little flexibility.
Fig. 1
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

| IPC   | A47J331/40 |

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>X</td>
<td>US, A, 3, 589 559 (COLTON) 29 June 1971 see column 1, line 35 - line 53 see column 2, line 12 - line 54 see claims; figures ---</td>
<td>1-3, 23</td>
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<td>A</td>
<td>EP, A, 0173 651 (NUOVA FAEMA S.P.A.) 5 March 1986 see page 4, line 10 - line 27 see claim 1; figures -----</td>
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Patent family members are listed in annex.

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**Date of the actual completion of the international search**

6 May 1996

**Date of mailing of the international search report**

17.05.96

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**Authorized officer**

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