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**Remarks:**
The file contains technical information submitted after the application was filed and not included in this specification.

### Int Cl.:


### Machine for producing soft ice-cream

Vorrichtung zur Herstellung von Speiseeis
Appareil pour la préparation de crème glacée

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This invention relates to an apparatus for the production of the so-called soft ice-cream. Various types of soft ice-cream production machines are well known to the expert of the art, these being machines for preparing and continuously dispensing portions of soft ice-cream in which the air content is generally around 70%, but can reach as high as 90%.

One of these is described and illustrated for example in Italian patent No. 736,656 of 28 August 1964. The machine of that patent comprises an upper mixture feed vessel and a lower beating cylinder connected together by a conduit.

The feed vessel is provided with heating and cooling means, by which the mixture is pasteurized before being fed to the beating cylinder. In machines of this type the entire mixture contained in the feed vessel above the beating cylinder is pasteurized by a traditional process of heating to about +85°C followed by cooling to about +4°C.

When the machine is fully working, the beating cylinder is fed with pasteurized mixture to be beaten, via controlled communication with the overlying feed vessel, to disperse newly required portions of soft ice-cream.

When the mixture in the feed vessel has reached its bottom level the machine must be halted, and only in this state can a further quantity of mixture fed into the vessel be pasteurized.

In this respect, it is impossible to pasteurize the mixture in the feed vessel when the underlying beating cylinder is in operation, this being usable only if fed with mixture at a relatively low temperature (around +4°C), so as not to melt the ice-cream undergoing beating.

Document US 3,858,498 describes a dispensing freezer is divided into a heated zone and a cooled zone. Dry and liquid ingredients are proportionately mixed in the heated zone and allowed to free-fall through a transition zone into the cooled zone. The temperatures in the heated and cooled zones are such that bacteria growth is inhibited and no product touches the surfaces in the transition zone where bacteria growth can more readily occur. The cooling zone has a freezing chamber and a reservoir. A float operated switch senses the level of the liquid in the reservoir and controls the dispensing and mixing of fresh ingredients.

Additionally, as is well known to the expert of the art, the mixture can be fed from the vessel to the underlying beating cylinder either by simple gravity fall or with the aid of a pump. Machines of the aforesaid type suffer from two serious drawbacks.

The first and most important is the problem of hygiene, in that the pasteurized mixture can stagnate for even a considerable time in the feed vessel, which is usually not hermetically sealed but is in communication with the external environment. This favours rapid re-formation of a bacterial load unacceptable in the previously pasteurized mixture.

The second drawback is operational in that, as stated, the feed vessel can only be refilled, and its contained mixture be pasteurized, with the machine at rest.

The object of the present invention is to obviate the aforesaid drawbacks of the known art by providing a machine in which it is absolutely certain that the mixture fed from the vessel to the beating cylinder has been pasteurized correctly, ie with its bacterial load within regulations, and by which the vessel can be refilled and the filled mixture be pasteurized with the machine in operation.

Said object is attained by an apparatus having the characteristics defined in the accompanying claims.

The characteristics of the invention and its advantages over the known art will be more apparent from an examination of the following description given with reference to the accompanying schematic drawings, which show two different embodiments of apparatus suitable for implementing the method of the invention.

On the drawings:

Figure 1 is a schematic view showing a first embodiment of an apparatus of the invention, when drawing a measure from a vessel feeding the metering-heating unit;

Figure 2 is a view of the apparatus of Figure 1 when pumping a measure from a metering-heating unit to a pre-cooling system;

Figures 5 shows a possible embodiment of an apparatus of the invention.

With reference to Figures 1 and 2 of the drawings, the reference numeral 10 indicates a vessel for feeding a mixture 11, suitable for preparing soft ice-cream, to a beating cylinder indicated overall by 12.

The vessel 10 is cooled by a cooling system comprising a cylinder 15 and piston 16, heating means indicated schematically by 13, able to maintain the mixture 11 at a relatively low positive temperature, for example around +4°C.

In a first embodiment of the present invention, a metering-heating unit 14 is provided between the vessel 11 and the beating cylinder 12.

In the illustrated embodiment the metering-heating unit 14 consists of a positive displacement pump having the aforesaid drawbacks of the known art by providing a machine in which it is absolutely certain that the mixture fed from the vessel to the beating cylinder has been pasteurized correctly, ie with its bacterial load within regulations, and by which the vessel can be refilled and the filled mixture be pasteurized with the machine in operation.

Said object is attained by an apparatus having the characteristics defined in the accompanying claims.

The characteristics of the invention and its advantages over the known art will be more apparent from an examination of the following description given with reference to the accompanying schematic drawings, which show two different embodiments of apparatus suitable for implementing the method of the invention.

On the drawings:

Figure 1 is a schematic view showing a first embodiment of an apparatus of the invention, when drawing a measure from a vessel feeding the metering-heating unit;

Figure 2 is a view of the apparatus of Figure 1 when pumping a measure from a metering-heating unit to a pre-cooling system;

Figures 5 shows a possible embodiment of an apparatus of the invention.

With reference to Figures 1 and 2 of the drawings, the reference numeral 10 indicates a vessel for feeding a mixture 11, suitable for preparing soft ice-cream, to a beating cylinder indicated overall by 12.

The vessel 10 is cooled by a cooling system indicated schematically by 13, able to maintain the mixture 11 at a relatively low positive temperature, for example around +4°C.

In a first embodiment of the present invention, a metering-heating unit 14 is provided between the vessel 11 and the beating cylinder 12.

In the illustrated embodiment the metering-heating unit 14 consists of a positive displacement pump comprising a cylinder 15 and piston 16, heating means 17 cooperating with the cylinder 15. Two conduits 18, 19, namely for suction and delivery respectively and controlled by suitable valves of known type (not shown), connect the metering unit 14 to the vessel 10 and to the beating cylinder 12.

According to the present invention, the beating cylinder 12 comprises, upstream of a traditional beating chamber 20, an additional chamber 21 for pre-cooling the measure of mixture 11 originating from the metering-heating unit 14. Said pre-cooling chamber 21 is separated from the beating chamber 20, for example by a partitioning baffle 22.
The method used by the machine of the invention consists of:

- drawing into the metering-heating unit 14 from the vessel 10 a measure of mixture 11 corresponding to one portion of soft ice-cream (or to multiples or sub-multiples thereof) and heating said measure of mixture 11 in the shortest possible time (a few seconds) to a temperature of around +85°C; then
- feeding said measure of heated mixture to the beating cylinder 12 by making it first pass through the pre-cooling chamber 21, which cools it to a temperature of between about +10°C and about +12°C.

The measure of pre-cooled mixture at about +10°C to +12°C is fed directly into the chamber 20 of the beating cylinder 12, which is at a temperature of about -35°C, so that it begins in a very short time to freeze. Any danger of bacteriological contamination is therefore prevented.

The aforesaid inventive concept is therefore to withdraw from the vessel 10, which can even be in communication with the external environment (not hermetically sealed), only a small measure of mixture corresponding to one portion of soft ice-cream (or to multiples or sub-multiples thereof), eliminate the bacteriological load of said measure of mixture by a very rapid heating process, pre-cool, and provide final cooling within the beating cylinder, with beating of the measure of mixture which has just been treated.

This attains the object of processing within the beating cylinder only a measure of mixture which has just been pasteurized, and hence under ideal bacteriological conditions for producing a soft ice-cream satisfying any health regulation.

It also attains the object of providing a machine in which the mixture feed vessel 10 can be filled even with the beating cylinder in operation, as the pasteurization process takes place in a region separated from said vessel.

Figure 5 shows a further possible embodiment of an apparatus with which the method of the invention can be implemented.

The embodiment shown in Figure 5 comprises a heating chamber 31 into which a measure of the mixture 11 contained in the vessel 10 is fed. The measure of mixture 11 is fed to the chamber 31 by a pump 32 driven by a motor 33, the pump 32 being provided with a suction (dip) tube 34 immersed in the mixture 11, and a delivery tube 35 which terminates in said heating chamber 31.

The measure of mixture 11 fed into the chamber 31 is heated in a very short time by a steam jet fed in counter-current. Said steam jet originates from a delivery tube 36 of a steam generator 37 fed by a pump 38 which, via a tube 39, dips into a reservoir 40 containing a store of water 41.

The measure of mixture heated in the heating chamber 31 is fed to the beating chamber 20 via an additional pre-cooling chamber 21, as in the embodiment shown in Figures 1 and 2.

The objects stated in the introduction to the description are hence attained.

The scope of protection of the invention is defined by the following claims.

Claims

1. A machine for producing soft ice cream comprising a refrigerated vessel (10) configured to contain a liquid mixture (11), a unit (17) for rapidly heating said liquid mixture, a beating cylinder (12,30) including a beating chamber (20), and a pre-cooling device (21,29) configured to rapidly cool the liquid mixture after the liquid mixture is heated by the heating unit (17) and before the liquid mixture is fed to the beating chamber (20), characterised in that said unit (17) includes a metering unit (14) arranged to withdraw a single measure of liquid mixture from said refrigerated vessel (10), also said pre-cooling device (21,29) and said beating chamber (20) being configured to process said single measure of liquid mixture, wherein said pre-cooling device comprises a chamber (21) adjacent to the beating chamber (20) of the beating cylinder (12) and said chambers (20, 21) are separated by a partitioning baffle (22) provided with communication holes (23).

2. A machine as claimed in claim 1, characterised in that said metering unit (14) is a positive displacement metering unit with a cylinder (15) and piston (16).

3. A machine as claimed in claim 1, characterised by comprising a rapid heating chamber (31) for said single measure of liquid mixture withdrawn from said feed vessel (10), the delivery (36) of a steam generator (37) opening into said heating chamber (31).

4. A machine as claimed in claim 3, characterised in that the measure of mixture is fed to said heating chamber (31) by a metering pump (32).

5. A machine as claimed in claim 3, characterised in that said heating chamber (31) is connected to a...
pre-cooling chamber (21) adjacent to the beating chamber (20) of the beating cylinder (12).

Patentansprüche

1. Vorrichtung zur Herstellung von Speiseeis bzw. Softeiscreme, mit einem gekühlten Behälter (10), der so gestaltet ist, dass er ein Flüssigkeitsgemisch (11) enthält, einer Einheit (17) zum schnellen Erwärmen des flüssigen Gemisches, einem Schlag- bzw. Rührzylinder (12, 30), der eine Schlag- bzw. Rührkammer (20) umfasst, und einer Vorkühlvorrichtung (21, 29), die so gestaltet ist, dass sie das flüssige Gemisch schnell kühlt, nachdem das flüssige Gemisch durch die Erwärmungseinheit (17) erwärmt wird und bevor das flüssige Gemisch der Schlag- bzw. Rührkammer (20) zugeführt wird, dadurch gekennzeichnet, dass die Einheit (17) eine Dosierseinheit (14) umfasst, welche so angeordnet ist, dass sie eine einzelne Dosis des flüssigen Gemisches aus dem gekühlten Behälter (10) entnimmt, und wobei die Vorkühlvorrichtung (21, 29) und die Schlag- bzw. Rührkammer (20) so ausgeführt ist, dass sie eine einzelne Dosis des flüssigen Gemisches verarbeiten, wobei die Vorkühlvorrichtung eine Kammer (21) benachbart zur Schlag- bzw. Rührkammer (20) des Schlag- bzw. Rührzyinders (12) und die Kammern (20, 21) durch eine Abteilungswand (22) getrennt sind, die mit Verbindungslöchern (23) versehen ist.

2. Maschine nach Anspruch 1, dadurch gekennzeichnet, dass die Einheit (17) eine Dosierunseinheit (14) umfasst, welche so angeordnet ist, dass sie eine einzelne Dosis des flüssigen Gemisches aus dem gekühlten Behälter (10) entnimmt, und wobei die Vorkühlvorrichtung (21, 29) und die Schlag- bzw. Rührkammer (20) so ausgeführt ist, dass sie eine einzelne Dosis des flüssigen Gemisches verarbeiten, wobei die Vorkühlvorrichtung eine Kammer (21) benachbart zur Schlag- bzw. Rührkammer (20) des Schlag- bzw. Rührzyinders (12) und die Kammern (20, 21) durch eine Abteilungswand (22) getrennt sind, die mit Verbindungslöchern (23) versehen ist.

3. Maschine nach Anspruch 1, dadurch gekennzeichnet, dass sie eine Schnellenwärmekammer (31) für die einzelne Dosis des flüssigen Gemisches aufweist, das von dem Zuführungsbehälter (10) entnommen wird, wobei der Ausstoß (36) eines Dampferzeugers (37) sich in die Erwärmungskammer (31) hinein öffnet.


Revendications

1. Machine pour produire de la crème glacée molle comprenant un récipient réfrigéré (10) adapté pour contenir un mélange liquide, une unité (17) pour chauffer rapidement ledit mélange liquide (11), un cylindre de battage (12, 30) comprenant une chambre de battage (20), et un dispositif de préréfrigération (21, 29) adapté pour refroidir rapidement le mélange liquide après le chauffage du mélange liquide par l'unité de chauffage (17) et avant l'introduction du mélange liquide dans la chambre de battage (20), caractérisé en ce que l'unité (17) comprend une unité de dosage (14) adapté pour prélever une dose unique du mélange liquide se trouvant dans ledit récipient réfrigéré (10), le dit dispositif de préréfrigération (21, 29) et ladite chambre de battage (20) étant adapté pour transformer ladite dose unique du mélange liquide, dans lequel le dit dispositif de préréfrigération comprend une chambre (21) adjacente à la chambre de battage (20) du cylindre de battage (12) et lesdites chambres (20, 21) sont séparées par une cloison (22) comprenant des trous de communication (23).

2. Machine selon la revendication 1, caractérisé en ce que ladite unité de dosage (14) est une unité de dosage volumétrique comprenant un cylindre (15) et un piston (16).

3. Machine selon la revendication 1, caractérisé en ce qu'elle comprend une chambre de réchauffage rapide (31) pour ladite dose unique du mélange liquide prélevée du dit récipient réfrigéré (10), la tuyauterie de sortie (36) d'un générateur de vapeur (37) débouchant à l'intérieur de ladite chambre de réchauffage (31).

4. Machine selon la revendication 3, caractérisé en ce que la dose de mélange est introduite dans ladite chambre de réchauffage (31) par une pompe doseuse (32).

5. Machine selon la revendication 3, caractérisé en ce que ladite chambre de réchauffage (31) est reliée à une chambre préréfrigération (21) adjacente à la chambre de battage (20) du cylindre de battage (12).