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(54) **AUTOMATIC MACHINE FOR PRODUCING AND DISPENSING SEMI-LIQUID FOODSTUFFS**

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(57) **ABSTRACT**

An automatic machine for producing and dispensing semi-liquid foodstuffs, in particular ice creams, has a tank for containing a basic product to be processed to obtain the ice creams, a basic product feed and processing circuit, in communication with the tank to draw out the basic product, one or more dispenser taps positioned at an outfeed end of the feed and processing circuit, actuators for operating the dispenser taps, a check and control unit for the actuators and at least one sensor for detecting the quantity of ice cream dispensed, associated with the control unit and designed to detect at least part of the profile of the ice cream dispensed.

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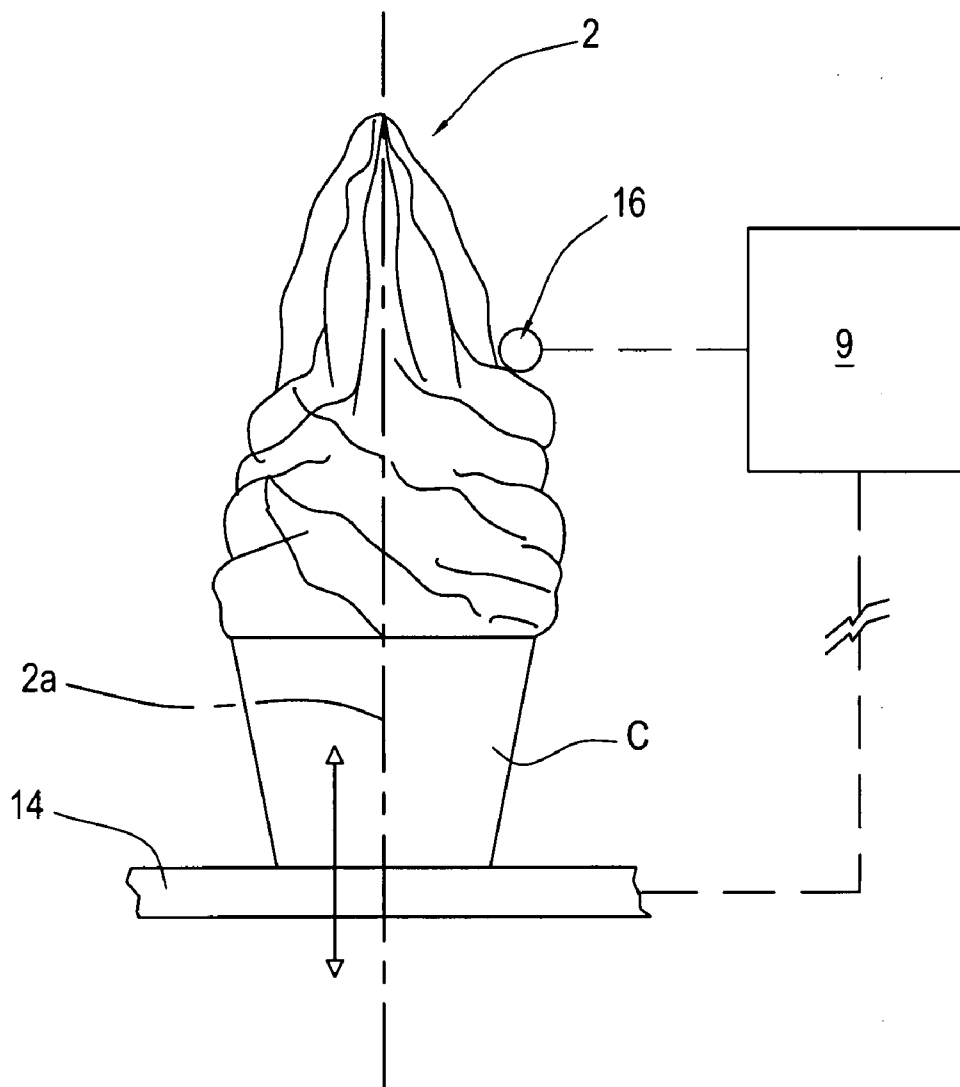


FIG. 1

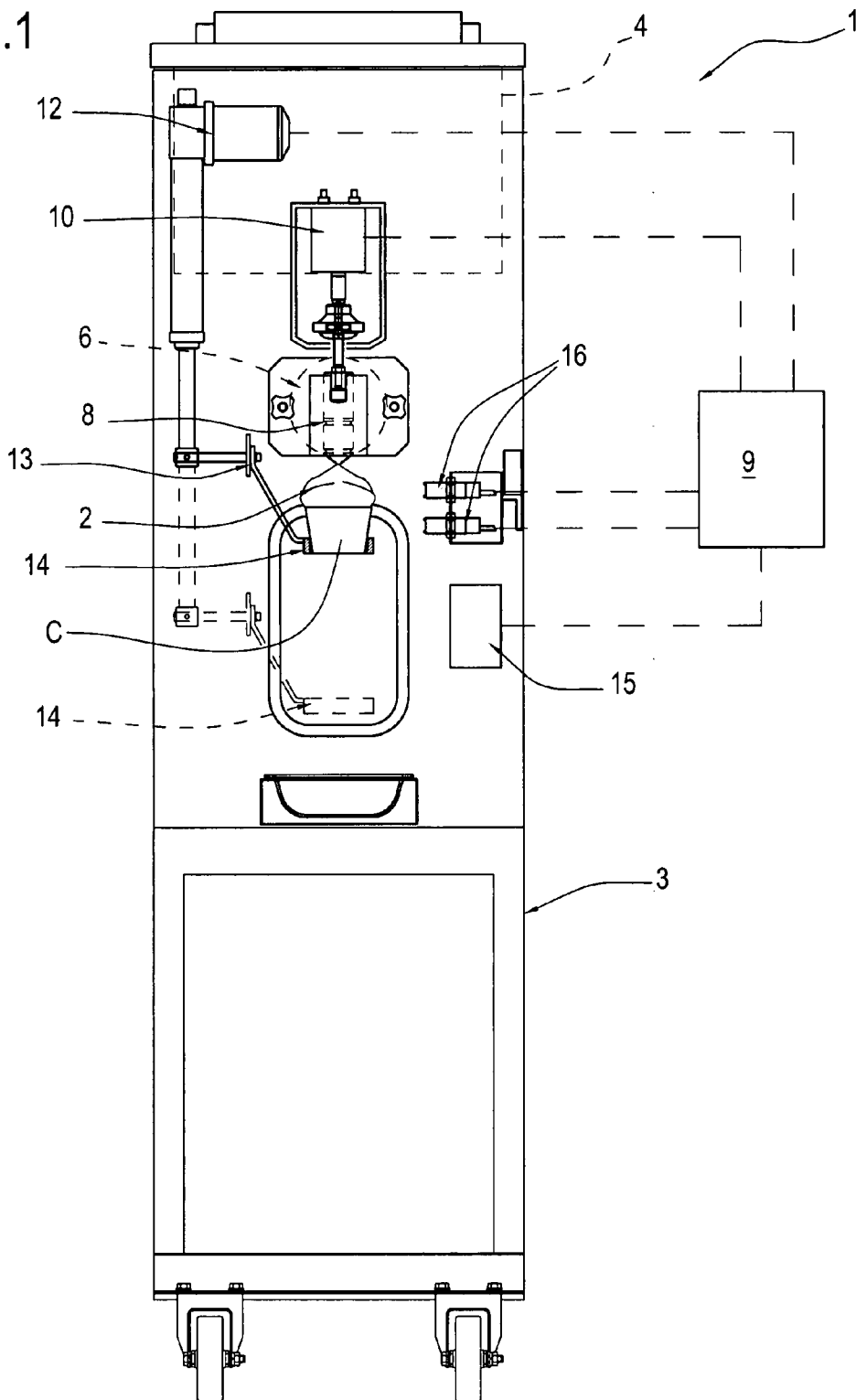


FIG.2

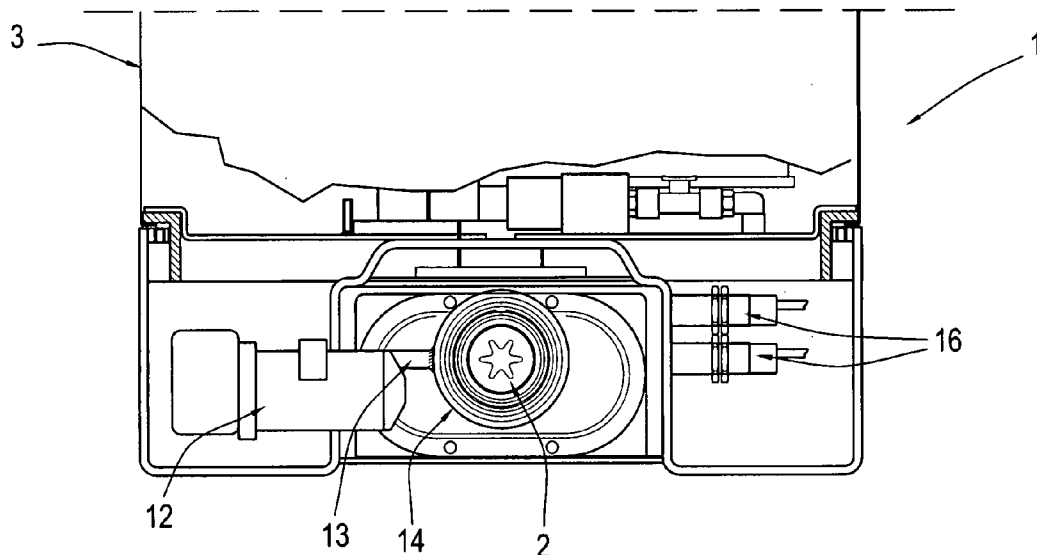


FIG.3

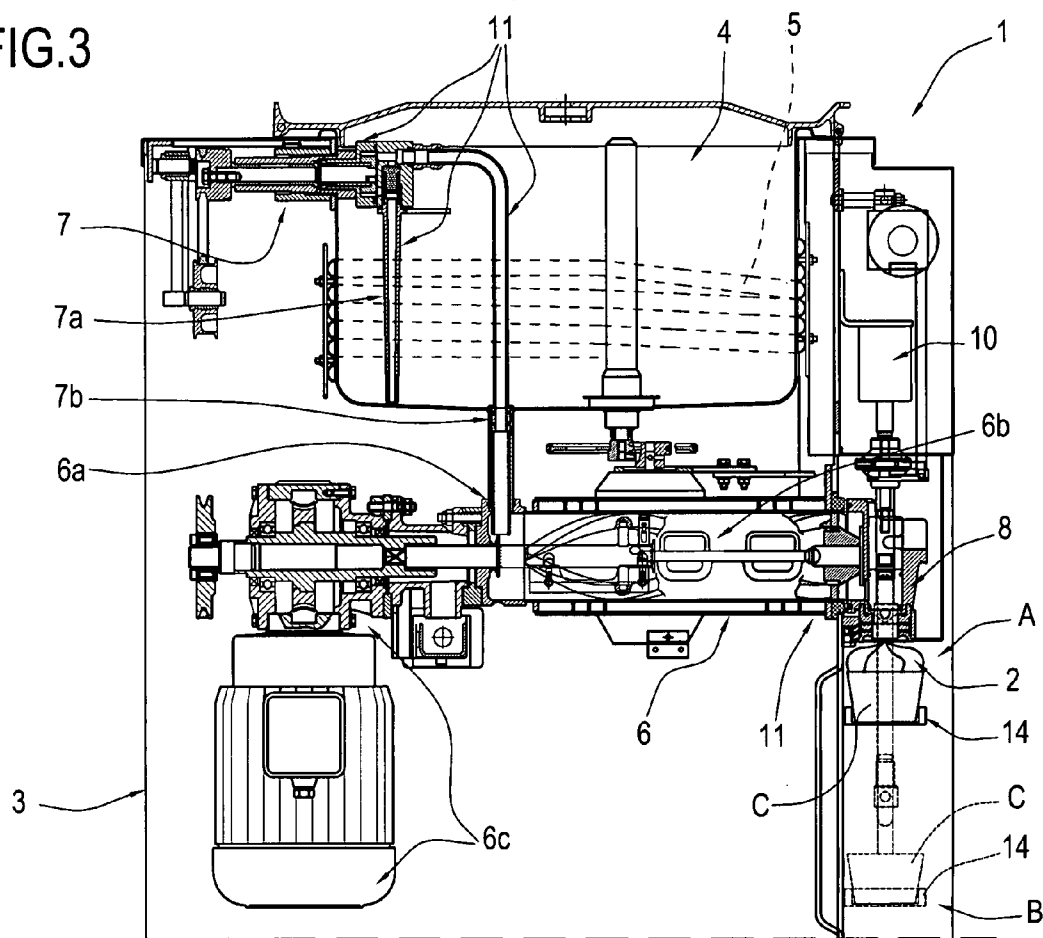


FIG.4

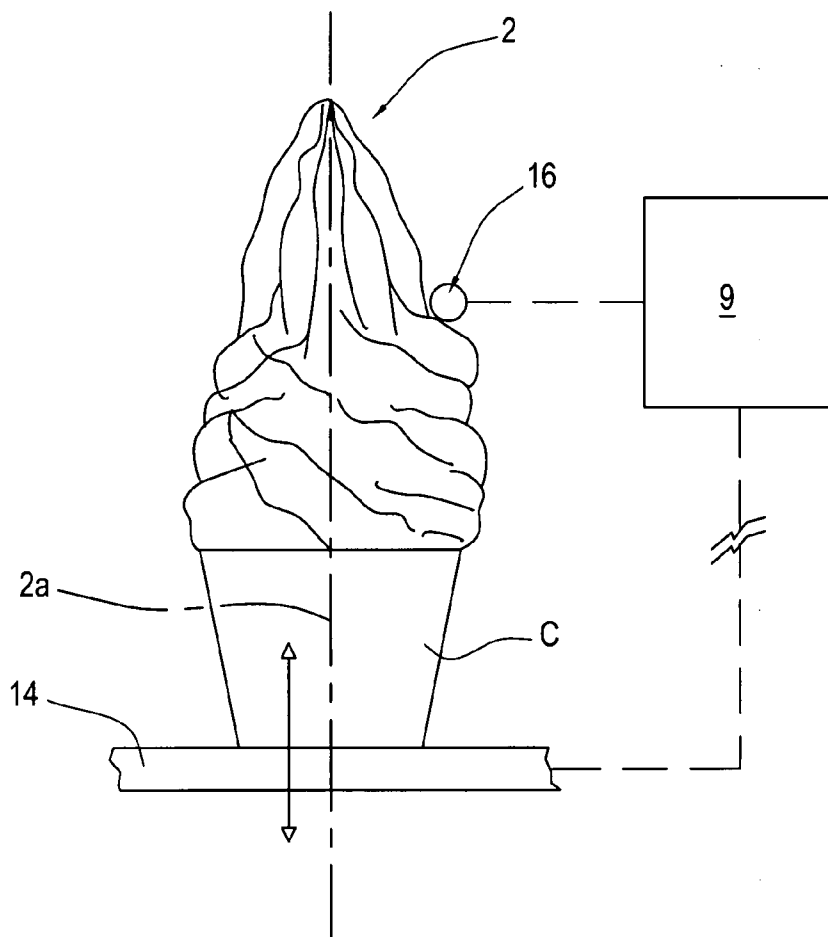


FIG.5

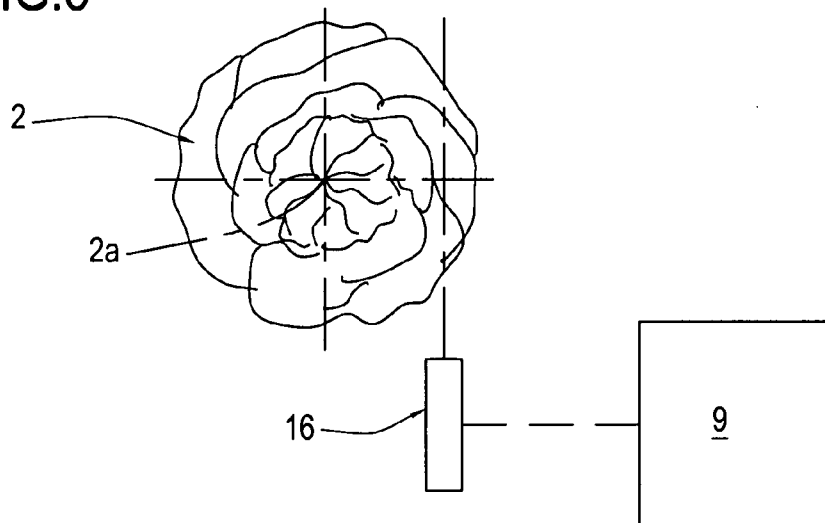
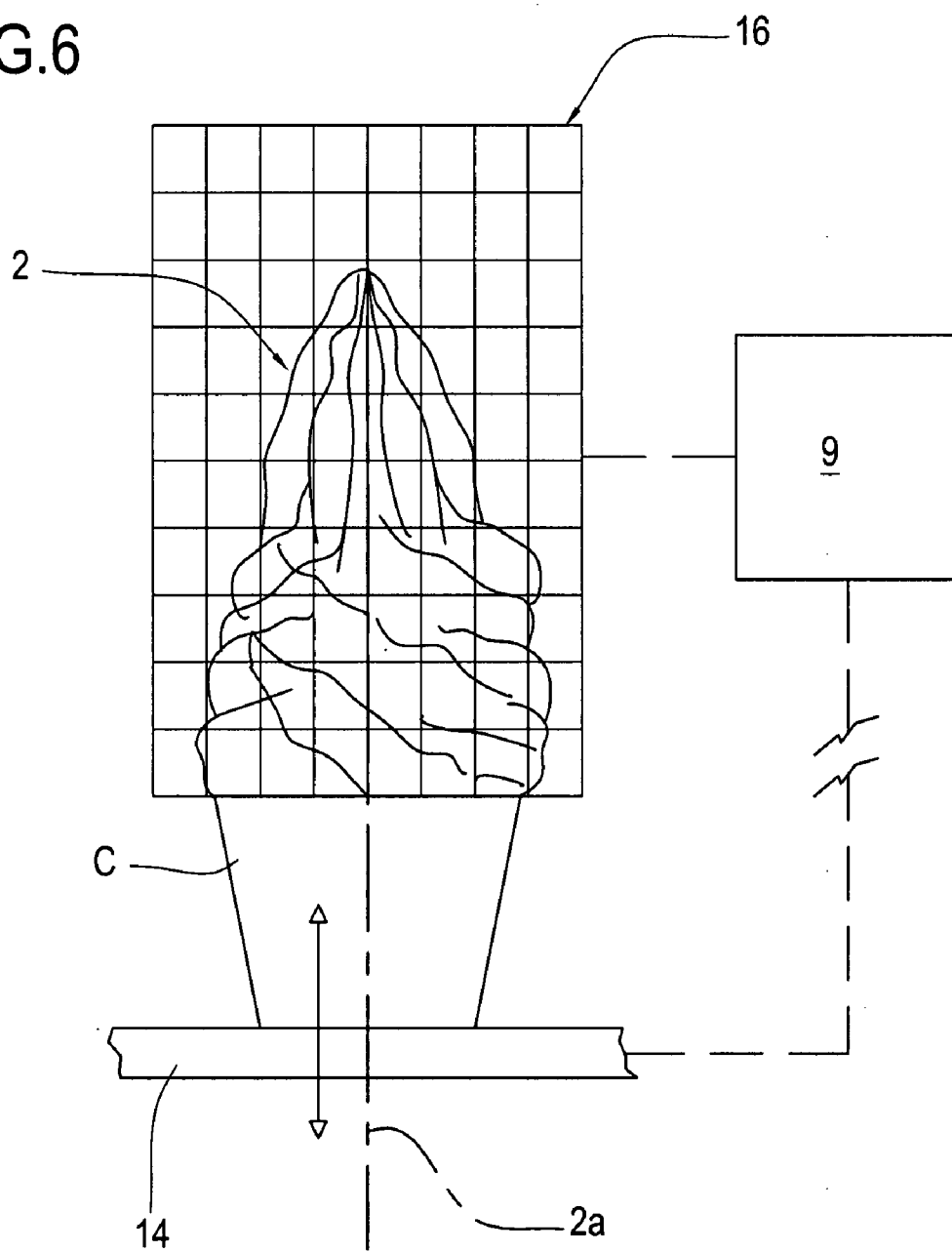


FIG.6



AUTOMATIC MACHINE FOR PRODUCING AND DISPENSING SEMI-LIQUID FOODSTUFFS

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an automatic machine for producing and dispensing semi-liquid foodstuffs.

[0002] In particular, without limiting the scope of the inventive concept, the present invention relates to machines for producing and dispensing ice creams, soft ice creams, yogurt ice creams, sorbets and the like.

[0003] As is known, machines of the above-mentioned type, in particular those for producing soft ice creams referred to hereinafter by way of example, comprise a tank for containing a liquid mixture to be processed to obtain the finished product, refrigerating means associated with the tank to keep the mixture at a predetermined temperature, a horizontal whipping and freezing cylinder, to which the mixture is fed by a gear pump, and one or more dispenser taps, positioned on the whipping and freezing cylinder outfeed front wall. The gear pump pressurizes the mixture with air, making the ice cream more or less creamy.

[0004] The dispenser taps may be operated manually, or, in the case of the automatic dispensing machines covered by this invention, they may be controlled by a control unit operating in conjunction with one or more sensors which detect the quantity of ice cream dispensed.

[0005] As is known, said sensors consist of devices designed to detect the weight of the ice cream dispensed, for example load cells.

[0006] In other cases there are devices equipped with volumetric sensors able to control the quantity of ice cream dispensed.

[0007] The density of the ice cream is normally electronically controlled during production to prevent it from varying, for example with variations in the type of mixture. However, even small variations in the density can result in unacceptable variations in the volume of the ice cream dispensed.

[0008] Moreover, it is important to consider that the types of devices described above are relatively complex, expensive and present objective difficulties in terms of manual and automatic washing.

SUMMARY OF THE INVENTION

[0009] The aim of the present invention is to produce an automatic machine for producing and dispensing semi-liquid foodstuffs which is free of the above-mentioned disadvantage.

[0010] Accordingly, the present invention provides an automatic machine for producing and dispensing semi-liquid foodstuffs comprising the features described in one or more of the claims herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention is now described, by way of example and without limiting the scope of application, with reference to the accompanying drawings, in which:

[0012] FIG. 1 is a front view, with some parts schematically illustrated as blocks, of an embodiment of the machine in accordance with the present invention;

[0013] FIG. 2 is a top view, with some parts in cross-section, of the machine of FIG. 1;

[0014] FIG. 3 is a side view, with some parts in cross-section, of the machine of FIG. 1;

[0015] FIGS. 4 and 5 are respectively a schematic side view and plan view of a portion of the machine of FIG. 1; and

[0016] FIG. 6 is a schematic view of an alternative embodiment of what is illustrated in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] With reference to FIGS. 1 to 3, the numeral 1 denotes as a whole an automatic machine for producing and dispensing semi-liquid foodstuffs, in particular soft ice creams 2.

[0018] The machine 1 comprises a frame 3 which substantially has the shape of a parallelepiped and supports, at the top, a tank 4 for containing a basic product, in the form of a liquid mixture, to be processed to obtain the ice creams 2. Associated with the tank 4 there is a circuit 5 of a refrigerating system for keeping the mixture at a predetermined temperature, in particular around 4° C.

[0019] Below the tank 4, the frame 3 supports a horizontal whipping and freezing cylinder 6, of the known type, to which the mixture is fed by a gear pump 7, positioned at the tank 4 and in communication with the tank via a suction pipe 7a for drawing the mixture from the tank 4 and sending it by means of a delivery pipe 7b to a whipping and freezing cylinder 6 infeed 6a.

[0020] Inside the cylinder 6 there is a mixing blade 6b for the product processed, which is driven in rotation about its axis by a variable speed motor unit 6c and can push the product towards and into a dispenser tap 8 mounted on the whipping and freezing cylinder 6 outfeed front wall. The dispenser tap 8 is checked and controlled by a control unit 9 (FIGS. 1, 4, 5 and 6) with an actuator 10 inserted between them.

[0021] It should be noticed that the pump 7, the suction pipe 7a, the delivery pipe 7b and the cylinder 6 as a whole form a feed and processing circuit 11 for the above-mentioned mixture.

[0022] As illustrated in FIG. 1, the control unit 9 also checks and controls, using another actuator 12 inserted in-between, a carriage 13 for supporting a plate 14 on which a container C is stably rested, for example a glass, a cup or a cone, into which the ice cream 2 is dispensed.

[0023] The plate 14 can move between an upper station A for ice cream 2 dispensing and a lower station B from which the ice cream 2 is picked up by the consumer (FIG. 3).

[0024] The control unit 9 receives the consent to dispense an ice cream 2 from any sensor designed to serve the user, for example a coin box 15, or from a reader for keys with saved credit, and adjusts the dispensing based on the information received from a sensor 16 in a predetermined position close to the tap 8.

[0025] As shown more clearly in FIGS. 4 and 5, the sensor 16 is designed to detect at least part of the profile of the ice cream 2 dispensed and operates according to a line of action skew relative to the central axis 2a according to which the height of the ice cream 2 extends. The sensor 16 may be electro-optical, in particular a photocell, ultrasonic or a thermal sensor.

[0026] According to the alternative embodiment illustrated in FIG. 6, the sensor 16 is of the electro-optical type, in particular a CCD type image detector, and operates according to a matrix of action substantially centered relative to the central axis 2a according to which the height of the ice cream 2 extends.

[0027] In the station A the control unit 9 places and holds the plate 14 in a predetermined position relative to the sensor 16 during ice cream 2 dispensing.

[0028] During operation, after dispensing consent has been supplied by the sensor 15 of any type at the service of the user, the user takes a container C from a stack positioned in a suitable magazine—distributor (not illustrated) in the machine 1 and places the container C on the plate 14 which is at the station A, at a predetermined height relative to the sensor 16 for the size selected.

[0029] It should be noticed that, in an automatic form, it is the control unit 9 which serves a glass, cone or the like, in the station A by means of the plate 14 which, as indicated above, is positioned at the predetermined height relative to the sensor 16 for the size selected.

[0030] In both cases, said height is clearly greater for a small size and less for a large size.

[0031] As illustrated in FIG. 1, one of the two sensors 16, for example the lower one as seen in FIG. 1, is a container C presence sensor and allows correct container C positioning on the plate 14 to be checked. If correct container positioning is not detected, the sensor 16, by means of the control unit 9, stops product 2 dispensing. Obviously, the presence sensor may also consist of any sensor positioned at another point of the machine but always able to perform the checks described above.

[0032] Once ice cream 2 dispensing has started, the sensor 16 sends an end dispensing signal when it intercepts the profile of the ice cream 2 dispensed. This interception may be optical, ultrasonic or thermal, depending on the type of sensor 16 mounted at the station A.

[0033] When ice cream 2 dispensing has stopped, the control unit 9 moves the plate 14 to the station B so that the consumer can pick up the ice cream 2.

[0034] As illustrated in FIGS. 1 and 2, in addition to the sensor 16 described above, close to the dispenser tap 8 there may be, in a different position, for example at a different height and/or a different distance from the front of the machine 1, another sensor 16, so that the two sensors 16 can detect at least part of the profile of an ice cream 2 dispensed according to respective sizes if the plate 14 is placed in a single position in the station A, or for more accurate detection of the profile of the ice cream 2 during dispensing. In the latter case, each sensor 16 detects a respective part of the profile of the ice cream 2 dispensed.

[0035] According to other alternative embodiments, not illustrated but within the scope of the present invention, close to the tap 8 there may also be more than two sensors 16.

[0036] Finally, mounted on the whipping and freezing cylinder 6 outfeed front wall there may be two or more dispenser taps 8.

1. An automatic machine for producing and dispensing semi-liquid foodstuffs, comprising a tank for containing a product to be processed to obtain the products, a feed and processing circuit for said product to be processed, dispens-

ing means positioned at an outfeed end of the feed and processing circuit, first actuator means for operating the dispensing means, check and control means for the first actuator means and sensor means for detecting the quantity of product dispensed, associated with the check and control means; wherein the sensor means comprise at least one device designed to detect at least part of the profile of the product dispensed.

2. The machine according to claim 1, wherein the sensor means are of the electro-optical type.

3. The machine according to claim 2, wherein the sensor means comprise at least one photocell.

4. The machine according to claim 2, wherein the sensor means comprise at least one CCD type image detector.

5. The machine according to claim 1, wherein the sensor means are of the ultrasonic type.

6. The machine according to claim 1, wherein the sensor means are of the thermal type.

7. The machine according to claim 1, wherein the device designed to detect at least part of the profile of the product dispensed operates according to a line of action skew relative to the central axis according to which the height of the product dispensed extends.

8. The machine according to claim 7, comprising means for supporting the product dispensed and second actuator means controlled by the check and control means for placing and holding the supporting means in a predetermined position relative to the sensor means during product dispensing.

9. The machine according to claim 8, wherein the means for supporting the product dispensed can move between an upper station for product dispensing and a lower station from which the product is picked up by the consumer.

10. The machine according to claim 9, wherein the sensor means comprise at least two devices designed to detect at least part of the profile of the product dispensed; each of the devices being designed to detect at least part of the profile of a product dispensed according to a respective size or to detect a respective part of the profile of a product dispensed.

11. The machine according to claim 10, wherein at least one of the sensors is for detecting the presence of a product container, said sensor sending a signal to the check and control means if the container is missing and/or incorrectly positioned, so as to interrupt product dispensing.

12. The machine according to claim 1, comprising means for supporting the product dispensed and second actuator means controlled by the check and control means for placing and holding the supporting means in a predetermined position relative to the sensor means during product dispensing.

13. The machine according to claim 1, wherein the sensor means comprise at least two devices designed to detect at least part of the profile of the product dispensed; each of the devices being designed to detect at least part of the profile of a product dispensed according to a respective size or to detect a respective part of the profile of a product dispensed.

14. The machine according to claim 1, wherein at least one of the sensors is for detecting the presence of a product container, said sensor sending a signal to the check and control means if the container is missing and/or incorrectly positioned, so as to interrupt product dispensing.

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