Food preparation systems are well known in the food science and consumer goods area. Such systems allow a consumer to prepare at home a given type of food, for instance a beverage such as a coffee-based beverage, e.g. an espresso or a brew-like coffee cup.

In the following description, the invention will be described in relation to a its specific application to beverage preparation systems. However, the invention globally encompasses systems for non-beverage items preparation, such as for instance ice cream, soups comprising particles (herbs, croutons, etc.), jellies, dairy items (e.g. yogurts, cream desserts, etc.), or any kind of similar non liquid flowable edible products.

Today, most preparation systems for in-home food and beverage preparation comprise a machine having a so-called “brewing chamber” or “brewing unit” which can accommodate portioned ingredient for the preparation of the food or beverage. A so-called “brewing unit” comprises several parts which are designed to be assembled so as to create a closed cavity wherein the food or beverage ingredient can be placed. The brewing unit comprises means for injecting a preparation medium under pressure such as a fluid which is typically water through the ingredient, so as to prepare a corresponding food or beverage, which is then dispensed out of the brewing unit, to the consumer. The preparation fluid is sourced from a fluid conducting system of the machine to which the brewing unit is connected. The preparation is performed within the brewing unit at a pressure above the atmospheric pressure, which is typically comprised between 1 and 20 bar, preferably between 2 and 15 bar (relative pressure). The preparation can be performed by passing preparation fluid through the ingredient in a loose form or through the ingredient contained in a capsule or pod. For this reason, it is an essential characteristic of a brewing unit to be able to withstand a pressure difference between inside the cavity, and the ambient pressure (which is generally equal or substantially equivalent to atmospheric pressure) without opening itself when pressure inside the cavity increases (typically fluid pressure, e.g. water pressure).

Ingredient portions can be pre-dosed before they are placed into the cavity of the brewing unit, and can take the form of soft pods or pads, or sachets. More and more systems utilize semi-rigid or rigid portions such as rigid pods or capsules. In

In all instances known today, when a beverage preparation machine comprises a detachable functional element (i.e. an element that is necessary to conduct the correct functioning of the machine from the ingredients to the dispensing of the finished product to the serving container), said machine comprises complex means to attach and detach the functional element from the main machine base. For instance, such means can involve, cams, levers, hooks, locks and other similar mechanical means. Such means are complex and therefore expensive to manufacture, and also they are somehow complex to use for the consumer as they require several handling steps to unlock, unscrew, etc. Last but not least, their complex construction is an obstacle to easy maintenance and cleaning, and some of them can be subject to breakage after a certain time, due to the wearing of the mechanical parts. This is of course undesirable to the consumer.

There is therefore a need for a flowable food, or beverage preparation machine that comprises at least one detachable functional element, that obviates the disadvantages of the known systems.

Summary of the invention

The objectives set out above are met with a food or beverage preparation machine for preparing a flowable food product or a beverage by mixing a fluid with a precursor ingredient, said machine comprising:

- a base having a fluid source, a pump means suitable for conducting said fluid from the source through fluid-conducting pipes to a fluid delivery port, and
- a functional element detachable from the base, comprising connecting means for connecting fluidly to the delivery port of the base,

characterized in that said base and said detachable functional element both have cooperating magnetic releasable attachment means comprising:

(i) at least one first permanent magnetic element attached to the detachable functional element or to the base, said first magnetic

ingredient, such that said brewing unit can inject fluid through said ingredient under pressure for mixing with said ingredient.

In a second possible embodiment of the invention, said functional detachable element is a drinking cup, and wherein the connecting means of said cup have integrated valve means able to open when said cup is fluidly connected to the machine base, and close in a leaktight manner when said cup is detached from said base.

The magnets of the base, and the magnets of the detachable functional element, are preferably each placed at diametrically opposed locations relative to the fluid connection between said base and said detachable element.

In a highly preferred embodiment of the invention, the cooperating magnetic attachment means comprise:

(i) two rows of three magnets on a wall of the machine base, the two rows located in diametrically opposed locations relative to the fluid delivery port between the base and the detachable element, and

(ii) two corresponding rows of three magnets on a wall of the detachable functional element, the two rows located in diametrically opposed locations relative to the fluid connection means between the base and said detachable element,

such that each magnet of the base is aligned to a corresponding magnet of the detachable functional element when the functional element is fluidly and functionally connected to the base, and magnets in each alignment have opposite polarities.

In a preferred embodiment of this invention, the connection between the machine base and the detachable functional element is performed by insertion of a cylindrical channelled protrusion that protrudes from said base or from said detachable element, into a corresponding cylindrical recessed channelled port of the detachable element, or respectively a corresponding cylindrical recessed channelled port of the base,

functionally connected together. In the connected configuration, corresponding magnets in each alignment have opposite polarities so that they attract each other to keep the machine base and the detachable brewing unit secured one to another in a leaktight and fluid-connected assembly.

To release the detachable brewing unit 3 from the machine main base 2, the user rotates said brewing unit around the pivot point made by the fluid connection. Doing this, the connecting protrusion 6 rotates inside the fluid delivery port 9 of the base 2, until the magnets 20 of the brewing unit are in magnetic contact with the magnets 18 of the machine base that have the same polarity. Once magnets of same polarity start to be in alignment, the magnetic repulsion force tends to separate the base 2 and the brewing unit 3, and the disconnection is performed easily.

As it is easy to understand, the system according to the invention provides a very user-friendly and safe fluid connection between functional parts of the same beverage preparation machine: the same magnets are used to secure the fluid connection between the two functional elements of the machine, and at the same time, at least some of the same magnets are used to disconnect easily the two elements. The only way to easily disconnect the brewing unit from the base is by rotating it around the fluid connection.

In a second embodiment of the invention, illustrated in **figures 6** and **7**, the functional principle of the beverage machine is similar as for the first embodiment, but the number of magnets is different. This second embodiment is a “lighter” and less expensive version of the invention, where the main machine base 2 comprises only two magnets 18 as shown in **figure 6**, which are used for magnetic attraction and repulsion with only one corresponding magnet 20 of the detachable brewing unit (illustrated in **figure 7**). To attach the brewing unit 3 to the base 2, the magnet 20 of the brewing unit ~~if~~ is brought in magnetic contact with the magnet 18 of the base 2 having an opposite polarity. Then to detach the brewing unit from the base 2, the user rotates said brewing unit 3 to bring the magnet 20 in magnetic contact with the magnet 18 of the machine base having the same polarity.

It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the ~~spirit and~~ scope of the present invention and without diminishing its attendant advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

Claims

1. A food or beverage preparation machine (1) for preparing a flowable food product or a beverage by mixing a fluid with a precursor ingredient, said machine comprising:

- a base (2) having a fluid source, a pump means suitable for conducting said fluid from the source through fluid-conducting pipes to a fluid delivery port (9), and
- a functional element (3) detachable from the base (2), comprising connecting means (6, 7, 8) for connecting fluidly to the delivery port (9) of the base ~~(9)~~,

characterized in that said base (2) and said detachable functional element (3) both have cooperating magnetic releasable attachment means comprising:

(i) at least one first permanent magnetic element attached to the detachable functional element (3) or to the base (2), said first magnetic element being located on a wall surface that also comprises the connecting means (6, 7, 8), respectively the fluid delivery port (9), and

(ii) at least two second magnetic elements (18, 20) attached to the base (2) or, respectively, attached to the detachable functional element (3), said corresponding magnetic elements being located on a wall surface that also comprises the fluid connection port (9), respectively the connecting means (6, 7, 8), and one of said second magnetic elements having a permanent opposite polarity to that of the first magnetic element,

such that:

- when the detachable element (3) is fluidly and functionally connected to the base (2), magnetic elements of the detachable