BEVERAGE OR FOODSTUFF PREPARATION SYSTEM

TECHNICAL FIELD

The present disclosure relates generally to electrically operated beverage or foodstuff preparation systems, with which a beverage or foodstuff is prepared from a pre-portioned capsule.

BACKGROUND

Systems for the preparation of a beverage comprise a beverage preparation machine and a capsule. The capsule comprises a single-serving of a beverage forming precursor material, e.g. ground coffee or tea. The beverage preparation machine is arranged to execute a beverage preparation process on the capsule, typically by the exposure of pressurized, heated water to said precursor material. Processing of the capsule in this manner causes the at least partial extraction of the precursor material from the capsule as the beverage.

This configuration of beverage preparation machine has increased popularity due to 1) enhanced user convenience compared to a conventional beverage preparation machines (e.g. compared to a manually operated stove-top espresso maker) and 2) an enhanced beverage preparation process, wherein: preparation information encoded by a code on the capsule is read by the machine to define a recipe, and; the recipe is used by the machine to optimise the preparation process in a manner specific to the capsule. In particular, the encoded preparation information may comprise operating parameters selected in the beverage preparation process, including: fluid temperature; fluid pressure; preparation duration, and; fluid volume.

EP 2594171 A1 discloses a machine that reads a code from an underside of a flange of a capsule. A drawback is that the code cannot be applied to parts of the capsule that are more flexible, e.g. the membrane, since the code can only be read from a rigid support. Moreover, for the same reason, the code cannot be applied to alternative capsules where a body of the capsule is made from different materials which are more flexible, e.g. recyclable materials, including paper or wood pulp.

US 2022071440 A1 discloses a coffee capsule machine comprising a recognition of a code placed on the capsule by using a camera, capturing an image of an identification code of a coffee capsule, and a control circuit, comparing the captured image with the images and the graphic data of the coffee capsule stored in the control circuit. A drawback is that this process is computationally intensive, therefore requiring costly devices and more time to identify the code,

the identification of the same being only possible if the image can be retrieved in the set of images already stored in the control circuit.

Therefore, in spite of the effort already invested in the development of said systems further improvements are desirable.

SUMMARY

The present disclosure provides a system comprising a container and a machine for preparing a beverage and/or foodstuff.

The container includes a body portion that has a storage portion for containing a precursor material and a closing member to close the storage portion, and; a machine-readable code storing preparation information. As used herein reference to a "code" may include one or more repetitions of the code. In embodiments, the code is arranged on a central region of the closing member. The storage portion includes a cavity that extends in a depth direction from the closing member. The container may have a maximum depth that is less than its diameter, which can be measured at the opening of the storage portion. In embodiments the code is an optically readable code.

In embodiments, the body portion includes a flange portion that connects the storage portion to the closing member. The cavity of the storage portion extends in a depth direction from the flange portion. The flange portion presents a generally planar peripheral rim for receiving the closing member. In embodiments, the flange portion is planar. As used herein the term "planar" in respect of the flange portion may refer to the flange portion arranged to extend entirely with the lateral and longitudinal directions, or substantially with said directions (e.g. with major components in these directions as opposed to a depth direction).

The machine includes a code reading system with a code reader to read the code of the container; a processing unit for processing the precursor material of the container, and; electrical circuitry to control the processing unit based on the preparation information read from the code. As used herein the term "based on" in respect of the preparation information may refer to a direct relationship (e.g. a value of a parameter of a recipe is encoded directly on the code) or a rule is used via a stored relationship to look up one or more of said values using the preparation information as an identifier. The code reader may include an image capturing unit (e.g. a camera) a lens and an outermost aperture (e.g. a reading window). An outermost portion of the code reader may be referred to as a reading head.

In embodiments, the machine includes a positioning mechanism which is configured to position the container in a holding position or a reading position in which the code can be read by the code reading system.

In embodiments, the positioning mechanism is adapted to deform the body portion of the container from an undeformed configuration to a deformed configuration, in which the code is

CLAIMS

1. A system comprising a container and a machine for preparing a beverage and/or foodstuff thereof,

   the container including:

   a body portion comprising a storage portion for containing a precursor material;

   a closing member to close the storage portion, and;

   a machine-readable code storing preparation information,

   the machine including:

   a code reading system to read the code of the container;

   a processing unit for processing the precursor material of the container, and;

   electrical circuitry to control the processing unit based on the preparation information read from the code,

   the code reading system including a code reader to obtain a digital image of the code,

   and the code reading system includes electrical circuitry to determine from the digital image of the code if the container is in a reading position,

   and if said condition is met, then the electrical circuitry configured to process the code to extract the preparation information in the reading position,

   characterized in that the electrical circuitry of the code reading system determines if the container is in a reading position based on a predetermined condition of the digital image of the code, wherein the predetermined condition is based on a geometric property of the code.

2. The system of claim 1, wherein the geometric property is based on a size of one or more units forming the code crossing a threshold size.

3. The system of claim 1, wherein the geometric property is based on a number of units forming the code arranged within a predetermined area crossing a threshold.

4. The system of claim 1, wherein the geometric property is based on a geometric pattern of the code.

5. The system of any preceding claim, wherein the predetermined condition is based on an optical property of the code.

6. The system of any preceding claim, wherein the code is formed of units which are 50 - 200 μm, and are arranged within an area of 600 - 1600 μm.

7. The system of any preceding claim, wherein the code reading system includes a positioning mechanism to apply a loading condition to transfer the container to a reading position, and the digital image is obtained in the reading position.

8. The system of claim 7, wherein the positioning mechanism is arranged to apply said loading condition as increasing in magnitude and the detection system is arranged to determine said predetermined condition during the application of said increasing in magnitude load condition.

9. The system of claim 7, wherein the electrical circuitry is configured to maintain the load condition as the same as when the predetermined condition is met and to read the code with the container subject said maintained load condition.

10. The system of claim 7, wherein the electrical circuitry is configured to control the positioning mechanism to reapply the loading condition if the predetermined condition for reading the code is not met and/or it is determined in the reading position when processing the code that it can not be read.

11. The system of any preceding claim, wherein the positioning mechanism is configured with the container in the reading position the code of the container to be in contact with a code reader of the code reading system and with the container in an unloaded holding position with the code separated from the code reader.

12. A machine for preparing a beverage and/or foodstuff or a precursor thereof, the machine comprising:

   a code reading system to read a code from a container;

   a processing unit for processing precursor material of the container, and;

electrical circuitry to control the processing unit based on preparation information read from the code,

the code reading system including a code reader to obtain a digital image of the code,

and the code reading system includes electrical circuitry to determine from the digital image of the code if the container is in a reading position,

and if said condition is met, then the electrical circuitry configured to process the code to extract the preparation information in the reading position,

characterized in that the electrical circuitry of the code reading system determines if the container is in a reading position based on a predetermined condition of the digital image of the code, wherein the predetermined condition is based on a geometric property of the code.

13. Use of a container for the machine of claim 12.

14. A method of reading a code of a container for containing a precursor material for preparing a beverage and/or foodstuff with the system according to one of claims 1-11 or the machine according to claim 12, the method comprising:

obtaining a digital image of the code;

determining if a predetermined condition of the digital image of the code for reading the code is met from the digital image of the code, and if met;

processing the code to extract the preparation information.