BEVERAGE POD SYSTEM WITH POD EJECTOR

Field of the invention

The present invention relates to the field of preparation of beverages with a system including a single-serve container comprising a beverage ingredient and a machine that has an extraction chamber in which the container can be inserted, extracted and from which it can be ejected.

Background of the invention

Single serve containers for the automatic preparation of beverages encompass various formats of containers that can be relatively soft or flexible, such as pods, and made of any material, recyclable or non-recyclable, biodegradable or non-biodegradable, such as aluminium, plastic, filter paper.

One problem encountered with the systems extracting beverages from said pods is the handling of the pod in an extraction device, specifically the closing of the chamber around the pod to perform the extraction process and then the proper ejection of the pod from the chamber. The pod usually has to be positioned by the user in a housing, then the device is closed manually or automatically around the pod.

It is important to correctly position the pod so that the device closes properly around the latter and to form a good seal to ensure good conditions of extraction. Bad positioning may damage the pod, and thus affect the conditions of extraction. The loading must also be as rapid as possible and not require excessive manipulations.

Finally, at the end of the beverage preparation, the pod shall be easily ejected without risk of false orientation and machine blocking. EP 1767129 discloses a beverage producing device comprising a first jaw member and a cooperating second jaw member that in a closed state are in tight contact enclosing a capsule, and a capsule detaching unit with an annular member that rotates to engage with the outer rim of the capsule and detach it from the device.

EP 1859714 and WO 2013/026844 describe beverage preparation systems and means to handle soft or flexible pods inside the extraction device. These pods present specific characteristics:

- the pods are made of aluminium or plastic materials,
- the pods present a symmetrical shape relatively to the plane comprising the flange of the pod,
- the pods always present the same shape, dimension and volume and the extraction chamber is designed for receiving this single type of pod shape.

WO 2020/089404 describes another system extracting beverages from soft or flexible pods presenting other characteristics :

- the pods present asymmetrical shape relatively to the plane comprising the flange of the pod,

- a plane top lid attached to the top surface of the circumferential flange, said plane top lid closing the top opening of the pod body,

and

said device comprising :

- upstream and downstream pod enclosing parts relatively translatable along a longitudinal axis (XX') between an open position for inserting and/or ejecting the pod and a closed position for forming an extraction chamber enclosing the pod during extraction,

- the upstream part defining a cage for enclosing the pod body and bearing :

. an upstream piercing arrangement for opening the bottom wall of the pod body and

. a liquid injector, and

- the downstream part defining a plate transverse to the longitudinal axis (XX'), said plate comprising :

. a fixed downstream plane piercing arrangement for opening the lid of the pod, and

. a peripheral area, said peripheral surrounding the fixed downstream plane piercing arrangement

and

- an insertion section for inserting the pod in the device, said insertion section being designed to position the pod with the plane top lid facing the downstream piercing arrangement, and

wherein, in the closed position :

- the central part of the peripheral area of the downstream enclosing part, the downstream plane piercing arrangement and the cage of the upstream enclosing part form the extraction chamber, and

- the edge of the opened end of the cage defined by the upstream enclosing part faces and contact the central part of the peripheral area of the downstream enclosing part, and

wherein the peripheral area of the downstream enclosing part is able to pivot around an axis (YY'), said axis being transversal to the longitudinal axis (XX') and positioned at the bottom of the downstream enclosing part, the peripheral area being able to pivot in the direction of the upstream enclosing part.

The invention relates to a device for extracting a beverage ingredient typically comprised in a beverage preparation machine configured for receiving pods. For instance, the machine is a coffee, tea, chocolate or soup preparation machine, preferably a coffee machine. In particular, the machine is arranged for preparing within the extraction chamber a beverage by passing

In the present application :

- the term "pod" is used to broadly designate any kind of single-dose container suitable for preparing beverages or other edible products such as capsule, cartridge, portioned or individual package without limitation to the shape of this container, in particular the shape of the body, or the types of piercing means needed to extract the beverage therefrom.
- the term "longitudinally" refers to the orientation of the two enclosing parts one to the other and their movement along the longitudinal axis XX'. Accordingly, the term "transversally" refers to the orientation that is transverse or perpendicular to that longitudinal orientation. Generally, the longitudinal and transverse orientations extend in a horizontal plane. The terms "lateral" is defined by reference to the vertical axis including the longitudinal axis XX'.
- the term "vertically" and "downwardly" refers to the movement of the pod in the extraction device from its introduction above the two enclosing parts to its ejection below the two enclosing parts. The terms "upper" and "lower" refer to this vertical axis too. The terms "top" and "bottom" refers to this vertical axis when an element of the extraction is considered.
- for the pod, the terms "top" and "bottom" are defined in accordance with the description of Figure 1A.
- the terms "upstream" and "downstream" refer to the path of liquid through the extraction device from the upstream enclosing part to the downstream enclosing part.

Generally, these terms are used to describe the relational positioning of features of the extraction device. These terms should be understood to refer to said device in its normal orientation when positioned in a beverage machine for the production of a beverage as shown in the figures 2A, 2B, 3A, 3B and 3C.

Further objects and advantageous features of the invention will be apparent from the claims, from the detailed description, and annexed drawings.

beverage ingredient, like a coffee cake, goes out of the pod and dirties the internal parts of the extraction device.

By making this annular central part 131 of the peripheral area part of the brewing chamber and inclinable with peripheral area, the risk of tearing is avoided and efficient and proper ejection of the pod is obtained.

Preferably the width of the annular central part 131 can be of few mm.

Preferably, the pivotable peripheral area 13 it is pulled and pivoted by the upstream closing part and is spring loaded so that when the upstream closing part releases the pivotable peripheral area, the latter automatically comes back to its position around the downstream piercing arrangement 12 such as illustrated in Figure 4B.

In general, the extraction device is configured for ejecting the pod just after the extraction to limit the risk that the lid dries on the downstream piercing arrangement 12 in particular around the spikes 121 and to facilitate ejection

This operation can be obtained by moving the upstream enclosing part 2 in direction of the downstream enclosing part 1 as developed above in relation with Figure 4D.

Although the invention has been described with reference to the above illustrated embodiments, it will be appreciated that the invention as claimed is not limited in any way by these illustrated embodiments.

Variations and modifications may be made without departing from the scope of the invention as defined in the claims.

List of references in the drawings :

downstream enclosing part	1
pod holder	11
retaining and positioning elements	11a, 11b
holding surface	111a, 111b
arc-shaped ridge	112a, 112b
downstream plate piercing arrangement	12
spikes	121
peripheral area	13
central part	131

CLAIMS

1. A device for extracting a beverage ingredient by supplying an extraction liquid such as heated water into a pod,

said pod (3, 3') comprising :

- a pod body (31), said pod body comprising :
  . a side wall (311) and a bottom wall (313) defining a chamber, said chamber extending axially between the bottom and a top end (3111) of the sidewall, said top end defining a top opening (312)
  . a circumferential annular body flange (314) projecting radially outward from the top end (3111) of the sidewall, said body flange comprising a top surface opposite to the chamber with respect to the opening,
  said pod body containing a beverage ingredient,
  and
- a plane top lid (32) attached to the top surface of the circumferential flange, said plane top lid closing the top opening of the pod body,

and

said device comprising :

- upstream and downstream pod enclosing parts (1, 2) relatively translatable along a longitudinal axis (XX') between an open position for inserting and/or ejecting the pod (3) and a closed position for forming an extraction chamber (5) enclosing the pod (3) during extraction,
- the upstream pod enclosing part (2) defining a cage (21) and bearing an upstream piercing arrangement (22) for opening the bottom wall (313) of the pod (3) and a liquid injector (25),
- the downstream pod enclosing part (1) defining a plate transverse to the longitudinal axis (XX'), said plate comprising :
  . a fixed downstream plane piercing arrangement (12) for opening the lid (32) of the pod (3),
  and
  . a peripheral area (13), said peripheral area (13) surrounding the fixed downstream plane piercing arrangement (12),

and

- an insertion section (4) for inserting the pod (3) in the device, said insertion section (4) being designed to position the pod (3) with the plane top lid (32) facing the fixed downstream plane piercing arrangement (12), and

wherein, in the closed position :
- a central part (131) of the peripheral area (13) of the downstream pod enclosing part (1), the fixed downstream plane piercing arrangement (12) and the cage (21) of the upstream pod enclosing part (2) form the extraction chamber (5), and
- an edge (211) of the opened end of the cage (21) defined by the upstream pod enclosing part (2) faces the central part (131) of the peripheral area (13) of the downstream pod enclosing part (1),

and

wherein the peripheral area (13) of the downstream pod enclosing part (1) is able to pivot around an axis (YY'), said axis being transversal to the longitudinal axis (XX') and positioned at the bottom of the downstream pod enclosing part (1), the peripheral area (13) being able to pivot in the direction of the upstream pod enclosing part (2).

2. A device according to the precedent claim, wherein the fixed downstream plane piercing arrangement (12) is circular and the central part (131) of the peripheral area (13) of the downstream pod enclosing part (1) forms an annular area.

3. A device according to Claim 1 or 2, wherein the upstream pod enclosing part (2) comprises pulling means (261a, 261b) configured to engage with upper parts (136a,136b) of the peripheral area (13) of the downstream pod enclosing part (1), when the upstream pod enclosing part (2) is moved from the closed position to an open position for ejecting the pod (3).

4. A device according to any one of the precedent claims, wherein said device comprises a pod holder (11), said pod holder (11) being attached to said peripheral area (13) of the downstream pod enclosing part (1) and said pod holder (11) being movable between :
- a receiving position for receiving and holding the lid (32) of the pod (3) in front of the fixed downstream plane piercing arrangement (12), and
- a retracted position at the lateral sides of the fixed downstream plane piercing arrangement (12).

5. Beverage preparation machine comprising an extraction device according to any one of Claims 1 to 4.

6. System comprising an extraction device according to any one of Claims 1 to 4 and a pod, or a beverage preparation machine according to Claim 5 and a pod,

wherein the pod (3, 3') comprises :

- a pod body (31), said pod body comprising :

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. a side wall (311) and a bottom wall (313) defining a chamber, said chamber extending axially between the bottom and a top end (3111) of the sidewall, said top end defining a top opening (312)

. a circumferential annular body flange (314) projecting radially outward from the top end (3111) of the sidewall, said body flange comprising a top surface opposite to the chamber with respect to the opening,

said pod body containing a beverage ingredient,

and

- a plane top lid (32) attached to the top surface of the circumferential flange, said plane top lid closing the top opening of the pod body,

and wherein, when the upstream and downstream pod enclosing parts (1, 2) are in the closed position,

the central part (131) of the peripheral area (12) of the downstream pod enclosing part (1) is designed to face the circumference of the top end (3111) of the sidewall of the pod body (31).

7. System according to the precedent claim, wherein the pod body (31) and the lid (32) of the pod (3) are made of paper material.

8. System according to Claim 6 or 7, wherein the mechanical properties of the paper material decreases when it is wetted.

9. System according to any one of Claims 6 to 8, wherein the elastic modulus of the paper material becomes ten times less when it is wetted.

10. System according to any one of Claims 6 to 9, wherein the paper material of the pod (3) presents :

- an elastic modulus of at least 2000 MPa when dry and of less than 250 MPa when wet, and/or
- a tensile strength of at least 30 MPa when dry and less than 10 MPa when wet.

11. Use of a pod (3, 3') for preparing a beverage in a device for extracting a beverage ingredient according to any one of Claims 1 to 4 or with a beverage machine according to Claim 5 or in a system according to any one of Claims 6 to 10,

said pod (3, 3') comprising :

- a pod body (31), said pod body comprising :

. a side wall (311) and a bottom wall (313) defining a chamber, said chamber extending axially between the bottom and a top end (3111) of the sidewall,

. a circumferential annular body flange (314) projecting radially outward from the top end (3111) of the sidewall, said body flange comprising a top face (3141) opposite to the chamber with respect to the opening,

said pod body containing a beverage ingredient,

and

- a plane top lid (32) attached to the top face (3141) of the body flange, said plane top lid (32) closing the top opening of the pod body (31).

12. Use according to the precedent claim wherein the pod body (31) and the lid (32) of the pod (3) are made of paper material.

13. Use according to the precedent claim wherein the mechanical properties of the paper material decreases when it is wetted.

14. Use according to the precedent claim wherein the elastic modulus of the paper material becomes ten times less when it is wetted.

15. Use according to the precedent claim wherein the paper material of the pod (3) presents :

- an elastic modulus of at least 2000 MPa when dry and of less than 250 MPa when wet, and/or
- a tensile strength of at least 30 MPa when dry and less than 10 MPa when wet.