

"Piercing device for a single-dose capsule for powdered coffee and the like"

DESCRIPTION

The present invention relates to a device for piercing a single-dose capsule for a powder substance and the like.

Many types of single-dose capsules containing a product in powder or granular form, or a finely shredded product, suitable for the preparation of beverages, are known from the prior art. In the description below reference will be made specifically to a capsule containing coffee powder, it being understood, however, that the present invention is likewise applicable also to products such as herbal teas, infusions, etc.

A capsule of this type is described for example in Italian patent IT 0001342663, in the name of the same applicant. Said patent describes a capsule with a substantially cylindrical outer structure made of polymer material where the top base and the bottom base are lined with a film suitable for being sealed on the top edge and bottom edge of the outer structure, respectively. Generally, the film consists of an aluminum foil or the like suitable for alimentary use.

The use of capsules results in numerous advantages, including the possibility of keeping a product packaged in a controlled atmosphere until the moment it is used. Moreover, by using capsules it is possible to stock a huge variety of products, without the risk of rapid deterioration of the open and unconsumed product.

For the same reasons, capsules are widely used not only in a domestic environment, but also in bars, both in specifically designed coffee machines and in professional coffee machines which were originally designed for producing coffee using loose powder.

With regard to professional coffee machines, the international patent application WO 2011/010338, in the name of the same applicant, describes an adaptor to be applied to a professional coffee machine so that a capsule (for example the capsule mentioned further above) may be used instead of a loose product. In one of the embodiments of the adaptor, a first device suitable for being positioned inside a removable filter-holder, designed to contain a capsule, and a second device which can be gripped, suitable for piercing the upper film of the capsule, are described.

Even though this device is widely used, it is not, however, without certain drawbacks.

A first drawback arises during piercing of the upper film of the capsule positioned inside the filter-holder. In some cases it has been noted that the capsule remains attached to the device for piercing the upper film, resulting in extraction of the capsule from the filter-holder.

A second drawback arises during the dispensing of products which have widely varying characteristics. For example, it has been noted that, in order to produce better coffee,

numerous holes must be provided in the upper film, while for the production of other infusions, it is advisable to have few holes preferably arranged on the periphery of the upper film of the capsule, in order to enhance the properties of the shredded product contained inside the capsule.

5 A further drawback consists in the fact that, during piercing of a capsule inserted inside a filter-holder, the user with one hand grips the handle of the filter-holder, while with the other hand he/she acts on the capsule with the piercing device. It can therefore be easily understood that the direction in which the user uses his/her two hands is not the same, resulting in problems of stability during the piercing operation. In some cases, therefore,
10 imprecise or irregular piercing of the capsule may occur.

The object of the present invention is therefore to overcome, at least partly, the drawbacks of the prior art.

A first aim of the present invention is to provide a device for piercing the upper film of a capsule which is suitable for preventing a capsule from remaining attached to the device
15 for piercing the upper film, at the end of the film piercing operation.

A second aim of the present invention is to provide a device for piercing the upper film of a capsule which is able to obtain at least two types of piercing impression on the upper film of a capsule.

A further aim of the present invention is to provide a kit for piercing a capsule, which
20 is able to ensure a stable position so that the piercing impression is precise and regular.

The abovementioned object and aims are achieved by a piercing device according to Claim 1 and by piercing kit according to Claim 12.

The characteristic features and further advantages of the invention will emerge from the description provided hereinbelow, of a number of examples of embodiment, provided by
25 way of a non-limiting example, with reference to the accompanying drawings in which:

Fig. 1 shows a bottom plan view of a device for piercing the upper film of a capsule, according to the present invention;

Fig. 2a shows a cross-sectional view along the plane II-II of Fig. 1, with the piercing device in a first configuration;

30 Fig. 2b shows a cross-sectional view along the plane II-II of Fig. 1, with the piercing device in a second configuration;

Fig. 3a shows a cross-sectional view, similar to that of Fig. 2, of an alternative embodiment of a piercing device according to the present invention;

35 Fig. 3b shows a cross-sectional view, similar to that of Fig. 3, of an alternative embodiment of a piercing device according to the present invention;

Fig. 4 shows a cross-sectional view, similar to that of Fig. 2, of an alternative embodiment of a piercing device according to the present invention;

Fig. 5 shows a top plan view of a capsule-holder support device according to the present invention;

Fig. 6 shows a cross-sectional view, along the plane VI-VI of Fig. 5, of the capsule-holder support device according to the present invention;

5 Fig. 7 shows a longitudinally sectioned view of a capsule suitable for being pierced with a piercing device according to the present invention; and

Fig. 8 shows a laterally sectioned view of the kit according to the present invention in a possible operating condition.

10 Figures 1, 2a and 2b show a piercing device 12 suitable for piercing the upper film 31 of a capsule 30 containing a material suitable for being used for preparation of a beverage.

The piercing device 12 according to the present invention comprises: e:

- a first end 14;
- a central body 15; and
- a second end 16 suitable for being grasped.

15 The first end 14 of the piercing device 12 has an operating surface 18 from which a plurality of piercing spikes 20, 26 protrudes.

With particular reference to Figure 2a, the following are defined:

- a longitudinal direction, parallel to the piercing direction and joining the first end 14 to the second end 16; and
- 20 - a radial direction, perpendicular to the longitudinal direction.

The piercing device 12 is characterized in that it comprises disengagement means 28 on the operating surface 18, suitable for disengaging the capsule 30 once the upper film of the capsule 30 has been pierced.

25 In accordance with a possible embodiment of the present invention the disengagement means 28 comprise a pin 24 protruding from the operating surface 18, sliding inside an axial duct 36 formed in the operating surface 18 and having an axial extension. The pin 24 is slidable in the longitudinal direction between two different positions:

- a first forward position, where it protrudes from the operating surface 18; and
- a second retracted position, where the pin returns at least partially inside the duct 36.

30 Figures 2a and 2b show two possible operating conditions of the device according to the present invention. In particular, Figure 2a shows the first position, while Figure 2b shows the second position.

In accordance with a possible embodiment of the present invention, the pin 24, at its end inserted inside the axial duct 36, comprises a head 32 (visible in Figures 2a, 2b, 3a, 3b and 35 4) at least partially protruding in a radial direction and suitable for cooperating with a corresponding shoulder 34 provided inside the axial duct 36. In a manner known per se, the shoulder 34 defines the first position, acting as a stop for the pin 24 which, owing to the

interaction between head 32 and shoulder 34, cannot be extracted from the operating surface 18.

The embodiment shown in Figures 2a and 2b will now be described in detail. Figure 2a shows the rest condition of the device 12, corresponding in this specific case to the pin 24 in the first position, protruding by a height greater than the heights of the piercing spikes 20, 26. The pin 24 is kept in position by elastic means 33, consisting for example of a compressed spring acting between the bottom of the axial duct 36 and the head 32. Therefore, in accordance with the present embodiment, the elastic means 33 are suitable for moving the pin 24 from the second position to the first position. Figure 2b shows the same device with the pin 24 retracted, corresponding to the second position defined above. The operating principle of the device is therefore clear to the person skilled in the art:

- the device is brought into the vicinity of the upper film 31 of the capsule 30 so that the pin 24 is in contact with the film 31;
- a pressure is exerted in order to overcome the resistance of the elastic means 33;
- the piercing spikes 20, 26 pierce the upper film 31 of the capsule 30;
- the device 12 is moved away from the capsule which, owing to the action of the pin 24 and the elastic means 33, is disengaged from the piercing spikes 20, 26.

It is also clear to the person skilled in the art how, in accordance with an embodiment similar to that described above, the pin 24 in a first position could project by a height less than the height of the piercing spikes 20, 26.

The embodiment of the piercing device 12 according to the present invention shown in Figure 3a will now be described in detail. Figure 3a shows the rest condition of the device 12 corresponding in this specific case to the pin 24 in the second position, not projecting from the operating surface 18. The pin 24 is kept in position by elastic means 33, consisting for example of a spring acting between the bottom of the axial duct 36 and the head 32. The elastic means 33 are suitable for moving the pin 24 from the first position into the second position. The central body 15 is provided with an extended side slot 35 from which a portion 37 of the head 32 of the pin 24 protrudes. The portion 37 is therefore movable by a user inside the side slot 35 in the longitudinal direction. It is therefore clear to the person skilled in the art that the user may move the pin 24, by means of the portion 37, from the second position to the first position. Therefore operation of the device comprises the following steps:

- the device is brought into the vicinity of the upper film 31 of the capsule 30;
 - a pressure is exerted;
 - the piercing spikes 20, 26 pierce the upper film 31 of the capsule 30;
 - the user displaces the portion 37 so as to push the pin 24 towards the first position;
- then, owing to the action of the pin 24, the capsule is disengaged from the piercing spikes 20,

26;

- the pin 24 returns into the second position owing to the action of the elastic means

33.

In accordance with a possible embodiment, shown in Figure 3b, the elastic means 33 may be absent and the pin therefore must be brought into position by means of the action of the user.

With reference to the embodiment of the present invention shown in Figure 4, the central body 15 of the piercing device 12 is provided with a side slot 35. The pin 24 is provided with a lug 27 which is elastically deformable in the radial direction and has at one end a button 29 which in the rest condition protrudes partially from the side slot 35. The button 29 can be pushed towards the inside of the axial duct 36, substantially in the radial direction, so as to be disengaged from the edge of the side slot 35. Since the elastic means 33 are suitable for moving the pin 24 from the second position to the first position, the pin 24 moves from the second position to the first position. The operating principle of the device is therefore clear to the person skilled in the art:

- the device is brought into the vicinity of the upper film 31 of the capsule 30;
- a pressure is exerted;
- the piercing spikes 20, 26 pierce the upper film 31 of the capsule 30;
- the user presses the button 29 in the radial direction inside the axial duct 36, disengaging it from the edge of the side slot 35;
- the pin 24 moves from the second position to the first position, disengaging the upper film of the capsule from the piercing spikes 20, 26;
- the user presses the head of the pin 24 towards the inside of the axial duct 36 until the button 29, by means of the elastic lug 27, returns into position inside the side slot 35.

Alternatively, the device according to the invention could also be used in the following manner:

- the device is brought into the vicinity of the upper film 31 of the capsule 30;
- a pressure is exerted;
- the piercing spikes 20, 26 pierce the upper film 31 of the capsule 30;
- the pin 24 is pushed towards the inside of the axial duct 36 until the button 29, by means of the elastic lug 27, returns into position inside the side slot 35;
- the user presses the button 29 in the radial direction inside the axial duct 36, disengaging it from the edge of the side slot 35;
- the pin 24 moves from the second position to the first position, disengaging the upper film of the capsule from the piercing spikes 20, 26.

According to a possible embodiment of the present invention, the plurality of piercing spikes 20, 26 are conical spikes. They may comprise first piercing spikes 26 and second

piercing spikes 20, where the first piercing spikes 26 have a greater height than the second piercing spikes 20 with respect to the operating surface 18.

In accordance with a possible embodiment of the piercing device 12 according to the present invention the first piercing spikes 26 are three in number. They may be arranged in the vicinity of the peripheral edge of the operating surface 18, for example along a circumference having its centre on the main axis *a* of the piercing device 12. Advantageously the piercing spikes 26 are spaced at 120° from one another. It is therefore clear to the person skilled in the art that, by exerting a first piercing pressure value, it is possible to pierce the upper film 31 of a capsule 30 only in three points corresponding to the first spikes 26. By increasing the intensity of the pressure exerted by the piercing device 12 on the film 31 of the capsule 30, it is possible to pierce the capsule also with the second spikes 20.

In a manner known per se, in the case of the embodiment of the piercing device 12 shown in Figures 2a and 2b, temporary locking devices may be provided (not shown), these being suitable for stopping the punch 24 in an intermediate position between the first position and the second position. Advantageously, in the intermediate position, only the first piercing spikes 26 may pierce the upper film 31 of the capsule 30.

The advantages of the piercing device according to the present invention are therefore clear.

A first advantage of the present invention is that of providing a device 12 for piercing the upper film 31 of a capsule 30 which is suitable for preventing the capsule from remaining attached to the piercing device 12, at the end of piercing of the film 31.

A second advantage of the present invention is that of providing a device 12 for piercing the upper film of a capsule 30 with which it is possible to obtain at least two types of piercing impression on the upper film 31 of a capsule 30. It is therefore possible to pierce the upper film 31 of a capsule 30 with the first spikes 26 in the case of capsules suitable for preparing a beverage such as barley coffee or ginseng coffee, since percolation requires greater pressure inside the capsule. In the case, instead, of espresso coffee the pressure must be slightly less and therefore the upper film 31 of the capsule 30 is perforated in several points by the first spikes 26 and the second spikes 20.

Figures 5, 6 and 8 show a kit 60 for piercing the upper film 31 of a capsule 30 according to the present invention, comprising a piercing device 12 and a support element 40 suitable for supporting a filter-holder 42 of an espresso coffee machine.

In accordance with a possible embodiment of the present invention, the kit 60 comprises a hollow frustoconical support element 40, with a larger base 44 suitable for resting on a flat surface, and a smaller base 46 suitable for engagement with the filter-holder 42. The filter-holder 42, known per se, comprises a receiving container 62 to which a handle 52 is connected.

Advantageously, the smaller base 46 comprises an edge 48 provided with a recess 50 suitable for engagement with the handle 52 of the filter-holder 42. A lug 54, suitable for supporting the piercing device 12 when it is not used, may also be provided.

5 The advantages compared to the prior art are therefore clear: in fact with the kit 60 for piercing the upper film 31 of a capsule 30, it is possible to obtain a stable position during the piercing operation, so that the piercing impression is precise and regular.

The person skilled in the art may, in order to satisfy specific requirements, modify and/or replace the parts described with equivalent parts, without thereby departing from the scope of the accompanying claims.

10 For example, embodiments may be envisaged where the piercing device 12 is mounted slidably, in the longitudinal direction, on the support element 40.

In accordance with an alternative embodiment, the piercing device 12 could have its second end 16 which can be fixed to a professional coffee machine or to a dosing/grinding device, in a manner similar to that of a coffee powder presser.

CLAIMS

1. Piercing device (12), suitable for piercing the upper film (31) of a capsule (30) containing a material suitable for being used for preparation of a beverage, comprising:

a first end (14), a central body (15) and a second end (16);

5 said first end (14) having an operating surface (18) provided with a plurality of piercing spikes (20, 26) projecting from said operating surface (18);

said second end (16) being suitable for being grasped by a user;

said piercing device (12) being characterized in that it comprises disengagement means (28) on said operating surface (18), said disengagement means being suitable for disengaging the
10 capsule (30) once the upper film of the capsule (30) has been pierced.

2. Piercing device (12) according to claim 1, characterized in that said disengagement means (28) comprise:

a pin (24) sliding inside an axial duct (36) between: a first forward position, where said pin (24) protrudes from the operating surface (18); and a second retracted position, where said
15 pin (24) returns at least partially inside the axial duct (36).

3. Piercing device (12) according to claim 2, characterized in that said pin (24), at its end inserted inside the axial duct (36), comprises a head (32) at least partially protruding in a radial direction from said pin (24) and suitable for cooperating with a corresponding shoulder (34) provided inside the axial duct (36), said shoulder (34) defining said first position.

20 4. Piercing device (12) according to either one of claims 2 or 3, characterized in that it comprises elastic means (33) suitable for moving the pin (24) from the second position to the first position.

5. Piercing device (12) according to any one of claims 2 or 3, characterized in that it comprises elastic means (33) suitable for moving the pin (24) from the first position to the
25 second position.

6. Piercing device (12) according to any one of claims 3 to 5, characterized in that said central body (15) is provided with an extended side slot (35) from which a portion (37) of said head (32) of said pin (24) protrudes, said portion (37) being movable along a longitudinal direction by a user.

30 7. Piercing device (12) according to any one of claims 2 or 4, characterized in that said central body (15) is provided with a side slot (35); said pin (24) being provided with an elastically deformable lug (27), having an end (29) partly protruding from said side slot (35) of said central body (15), said end (29) being suitable for being pushed inside the axial duct (36) and disengaged from the edge of said side slot (35).

35 8. Piercing device (12) according to any one of the preceding claims, characterized in that said plurality of piercing spikes (20, 26) comprises first piercing spikes (26) and second

piercing spikes (20), wherein said first piercing spikes (26) have a greater height than said second piercing spikes (20) with respect to the operating surface (18).

9. Piercing device (12) according to claim 8, characterized in that said first piercing spikes (26) are three in number.

5 10. Piercing device (12) according to claim 9, characterized in that said first piercing spikes (26) are arranged in the vicinity of the peripheral rim of the operating surface (18), along a circumference having its centre on the main axis (a) of the piercing device (12).

11. Piercing device (12) according to claim 10, characterized in that the first piercing spikes (26) are arranged at 120° from one another.

10 12. Piercing kit (60) for a capsule (30) for powder material or the like, comprising a piercing device (12) according to any one of claims 1 to 11, and a support element (40) suitable for supporting a filter-holder (42) of an espresso coffee machine.

13. Piercing kit (60) according to claim 12, characterized in that the support element has a hollow frustoconical shape, with a larger base (44) suitable for resting on a flat surface, 15 and a smaller base (46) suitable for engagement with the filter-holder (42).

14. Piercing kit (60) according to any one of claims 12 or 13, characterized in that said smaller base comprises an edge (48) provided with a recess (50) suitable for engagement with a handle (52) of the filter-holder (42).

15 20 15. Piercing kit (60) according to any one of claims 12 to 14, characterized in that said support element comprises a lug (54), suitable for supporting the piercing device (12).