

Automatic device for the extraction of a substance

The present invention relates to an automatic device for the extraction of a substance for preparing a beverage from a capsule.

Numerous devices for extracting a substance from an open or closed capsule already exist on the market. Patent EP 0 242 556 already relates to a device for the extraction of closed cartridges in a cartridge holder, in which device the said cartridge holder is engaged on an extraction head therefore allowing extraction and making it possible to obtain the desired beverage. The problem with this device is that the consumer has to place the capsule in the cartridge holder and then engage the said cartridge holder on the extraction head. It is this last operation which causes the problems, because the cartridge holder has to be engaged precisely and clamped firmly enough to ensure a good seal for extraction.

The object of the present invention is to make available to the consumer a device in which the handling operations that the consumer performs are reduced to the minimum and in which the device is closed automatically without any human intervention, thus setting aside any risk of lack of sealing.

The present invention relates to a device for the extraction of a substance for preparing a beverage from a capsule, comprising

- a chassis with a horizontal flat part and a vertical part at the rear of the said chassis,
- a drawer which can be moved in horizontal translation over the flat part of the chassis between an open position and a closed position and which comprises, in the said drawer, a capsule housing unit with at least one housing for the capsule which is to be extracted and a pin for

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- holding on each side of the housing unit and secured thereto,
- a fixed capsule-extraction head mounted on the chassis with at least one capsule cage, the said cage facing the housing for the capsule when the drawer is in the closed position,
 - holding means making it possible, when the drawer is in the closed position, to raise the capsule housing unit using the holding pin so as to bring the capsule that is to be extracted into the capsule cage.

It is just as possible, in the device according to the invention, to extract closed capsules, such as those described in Patent EP 0 512 468 and EP 0 602 203 in the name of the Applicant Company. It is also possible to use the device to extract other sachets, closed cartridges or capsules. It is also possible to use the device according to the invention for open capsules, for example capsules made of plastic or sachets made of filter paper and of nonwovens.

The substance contained in the closed or open capsule or the like, is a powdered substance for preparing a beverage. This substance is preferably roasted ground coffee, but may also be tea, instant coffee, a mixture of ground coffee and instant coffee, a chocolate product or any other dehydrated edible substance.

It is possible, with the device according to the invention, to have a capsule housing unit comprising several housings for the capsule that is to be extracted. This means that it is possible, in a single go, to obtain 1, 2, 3 or more cups of coffee: this system would be particularly advantageous in cafes, restaurants and other public places where simultaneous demands for cups of coffee may be great. As a preference, a device with 1 to 4 housings is provided.

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What is important in the device according to the invention is that the extraction head be fixed. This is because it is this part which is mechanically the most complicated, because of the water inlet. By contrast,
5 the drawer with the capsule housing unit can move: reliable and effective holding means are needed.

These holding means consist of

- 10 - two pulling rods and a lifting bar on each side of the fixed extraction head and secured to the fixed vertical part at the rear of the chassis, so as to form two deformable quadrilaterals, each lifting bar comprising a hook designed to engage over the holding pin secured to the housing unit when the
15 drawer is in the closed position and a drive rod connecting the two quadrilaterals, and
- a cam system able to act on the drive rod to deform the quadrilaterals and thus allow the lifting bar to raise the capsule housing unit
20 towards the fixed extraction head.

When the consumer has filled the drawer with the capsule or capsules that is or are to be extracted, the said drawer closes in a transitional movement: this
25 distance through which it translates is at least twice the diameter of the capsule that is to be extracted.

Furthermore, when the drawer is closed, the holding means allow the capsule housing unit to be raised
30 through an angle at least equal to the height of the capsule that is to be extracted, that is to say an angle of the order of 10 to 20°.

As already mentioned hereinabove, it is just as
35 possible to extract open capsules as closed capsules. If open capsules are extracted, nothing need be added to the present device according to the invention.

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By contrast, if closed capsules are extracted, that is to say capsules which open through an increase in pressure, it is necessary to ensure that the capsule that is to be extracted is a closed capsule, in which
5 case each extraction head comprises a capsule cage with either a needle with water inlet or a water inlet with blades to make it possible to perforate the upper part of the capsule that is to be extracted.

10 Still in the case of closed capsules, it is necessary for the bottom of the housing for the capsule to be extracted to comprise recessed and raised elements that allow the bottom of the capsule to open through the rise in pressure in the said capsule.

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The remainder of the description is given with reference to the drawings in which:

Figs. 1 to 6 are perspective views of the device
20 according to the invention during the various phases of the extraction of a capsule, the said device comprising a capsule housing unit with two housings,

Fig. 7 is a section through a capsule cage in a first
25 form of embodiment,

Fig. 8 is a section through a capsule cage in a second form of embodiment, and

30 Fig. 9 is a schematic depiction of the bottom of a housing for a capsule that is to be extracted.

The device comprises a chassis (11) with a horizontal part (22) and a vertical part (14) at the rear of the
35 said chassis. The drawer (5) comprising a capsules (10) housing unit (6) can move in horizontal translation over the aforementioned horizontal part (22) via a guide (15) secured to the said drawer (5). The capsule housing unit (6) comprises, on each side of the said

system, a pin (18) for holding. The fixed extraction head (4) is secured to the vertical part (14) at the rear of the chassis (11) by a connecting bar (16), the said head comprising a capsule cage (20). The holding means consist of two deformable quadrilaterals ABCD each comprising a first pulling rod (13) secured at A to the vertical part (14), a second pulling rod (3) secured at B to the first pulling rod (13), and a lifting bar (2) secured at C to the second pulling rod (3) and secured at D to the vertical part (14). The lifting bar (2) comprises an extension (23) provided with a hook (19) capable of engaging over the holding pin (18) of the capsule housing unit (6). In order to move the holding means, there is a cam (8) comprising a motor (9), the said cam being placed between the two connecting bars (16) of the fixed extraction head (4). Finally, the drive rod (1) arranged between the two quadrilaterals ABCD collaborates with the cam (8) to raise the lifting bar (2).

20. The way in which the device works is as follows, following the various phases from Figure 1 to Figure 6: in the arrangement of Figure 1, the consumer places the two capsules (10) that are to be extracted into the housings (21). At this time, a cell (not depicted) begins the process of the extraction of the said capsules: the drawer (5) closes in a transitional movement in the direction of the arrow A, the guide (15) sliding over the horizontal part (22) of the chassis (11). During this movement, the hook (19) of the lifting bar (2) will engage on the holding pin (18) of the housing unit (6). When the drawer reaches the end of its travel, this is the arrangement of Figure 2. At that moment, it is the cam (8) which will come into action to lift the capsule housing unit (6): the motor (9) starts the cam (8). In its rotational movement, it will push against the drive rod (1) so as to deform the quadrilateral ABCD, that is to say so that the lifting bar (2) raises the capsule housing unit (6) against the

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capsule cage (20). When the cam reaches the end of its travel, the system is adequately sealed and hot water arrives through the pipes (12), passes into the capsule (10) to flow into the two cups placed on the front part (17) of the chassis. This extraction step is depicted in Figure 3. At the end of extraction, the motor (9) causes the cam (8) to turn to allow the lifting bar (2) and, at the same time, the capsule housing unit (6) to drop back down again. This then is the arrangement of Figure 4. At the same time as the lifting bar (2) is dropping back down, means (not depicted) for holding the capsule in the capsule cage (20) are actuated so that the drawer (5) can open without the used capsules. Next, the drawer (5) opens in the direction of the arrow B, resulting in the arrangement of Figure 5: the capsule is still in the capsule cage (20), held in by the aforementioned retaining means. These means are, for example, a finger for each capsule cage (20). Finally, Figure 6 shows the disengagement of the capsule (10) from the capsule cage to allow the said extracted capsule to drop into the lower reservoir of the chassis (11): to do this, the retaining finger retracts to release the capsule. The device is thus ready to be refilled with two fresh capsules (10) for extraction. If the consumer wants just one coffee, he loads just one capsule and the water arriving through the pipe (12) will reach only one single capsule cage (20). On the other hand, it is also possible according to the invention to provide 3, 4 and possibly even more capsule cages (20) per device.

Figures 7 and 8 give part sections of two embodiments of the capsule cage. The cage in Figure 7 shows the water inlet pipe (12) and the water injection needle (30). The capsule (10) to be extracted is in the housing (32) and the needle (30) pierces the top of the said capsule. Hot water arrives through the pipe (12) and through the holes (31) in the needle (30). When the capsule cage is closed, this is the position of the

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aforementioned Figure 3. Figure 9 shows the bottom of the capsule housing (35). This bottom has raised (36) and recessed (37) elements. It is in the recesses that the orifices (38) that allow the coffee to pass are to be found. When the water arrives in the capsule (10) there is an increase in pressure in the said capsule, and this presses the bottom of the capsule firmly against the raised (36) and recessed (37) elements, and when the rupture tension is reached, the film of the bottom of the capsule tears on the said raised and recessed elements and coffee passes and runs through the orifices (38).

Figure 8 shows a second form of embodiment of a capsule cage. The pipe (12) allows hot water to arrive and the said cage comprises a housing (40) for the capsule that is to be extracted. In the housing, there is a piercing system (41) with perforated blades (42). When the capsule is closed, this is the position of the aforementioned Figure 3: the top of the capsule is pierced by the blades (42), the water arrives through the pipe (12) and the increase in pressure in the capsule will cause the lower membrane of the said capsule to tear against the raised and recessed elements visible in Figure 9. When the capsule cage of Figures 8 and 9 is used, the capsule housing bottom is always the same, namely that of Figure 9.

Claims

1. Device for the extraction of a substance for preparing a beverage from a capsule, comprising
 - 5 - a chassis with a horizontal flat part and a vertical part at the rear of the said chassis,
 - a drawer which can be moved in horizontal translation over the flat part of the chassis between an open position and a closed position and
10 which comprises, in the said drawer, a capsule housing unit with at least one housing for the capsule which is to be extracted and a pin for holding on each side of the housing unit and secured thereto,
 - 15 - a fixed capsule-extraction head mounted on the chassis with at least one capsule cage, the said cage facing the housing for the capsule when the drawer is in the closed position,
holding means making it possible, when the drawer
20 is in the closed position, to raise the capsule housing unit using the holding pin so as to bring the capsule that is to be extracted into the capsule cage.
- 25 2. Device according to Claim 1, in which the capsule housing unit comprises from one to four housings for the capsule that is to be extracted.
3. Device according to one of Claims 1 and 2, in
30 which the holding means consist of
 - two pulling rods and a lifting bar on each side of the fixed extraction head and secured to the fixed vertical part at the rear of the chassis, so as to form two deformable quadrilaterals, each lifting
35 bar comprising a hook designed to engage over the holding pin secured to the housing unit when the drawer is in the closed position and a drive rod connecting the two quadrilaterals,

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- a cam system able to act on the drive rod to deform the quadrilaterals and thus allow the lifting bar to raise the capsule housing unit towards the fixed extraction head.

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- 4. Device according to one of Claims 1 to 3, in which the distance through which the drawer translates is at least twice the diameter of the capsule that is to be extracted.

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- 5. Device according to one of Claims 1 to 4, in which the holding means allow the capsule housing unit to be raised through an angle at least equal to the height of the capsule that is to be extracted.

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- 6. Device according to one of Claims 1 to 5, in which the capsule that is to be extracted is an open capsule.

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- 7. Device according to one of Claims 1 to 5, in which the capsule that is to be extracted is a closed capsule, in which case each extraction head comprises a capsule cage with either a needle with water inlet or a water inlet with blades to make it possible to perforate the upper part of the capsule that is to be extracted.

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- 8. Device according to Claim 7, in which the bottom of the housing for the capsule that is to be extracted comprises recessed and raised elements that allow the bottom of the capsule to open through the rise in pressure in the said capsule.

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