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Percolating device

The present invention relates to a percolating device intended to be used in a machine for preparing
5 hot drinks such as coffee for example. More particularly, the invention relates to a percolating device intended for espresso type machines using doses of coffee or of another substance packaged in capsules.

10 The invention also relates to the capsules used in the percolating device.

The known coffee machines of this type generally comprise a cap intended to receive a capsule containing a dose of the drink to be infused. The cap is then taken, manually or automatically, to a percolating head
15 comprising a bored needle which allows the injection of water and/or of steam into the capsule.

One of the disadvantages of the existing machines is the fact that it is not possible to adapt the concentration of the drink prepared as the capsules all
20 contain the same dose of the product to be infused. The only parameter which the user can vary is the quantity of water injected into the capsule.

Thus, if the user desires a concentrated drink in a cup of large capacity, he will have to use two
25 capsules of product in succession in order to obtain the desired concentration.

The purpose of the invention is to solve this problem by proposing a percolating device that operates with capsules of different capacity and dimensions,
30 without the user having to carry out special operations depending on the type of capsule used.

For this purpose, there are provided capsules, generally made of aluminium, whose capacity is variable in accordance with the desired concentration of the
35 drink and a percolating device, equipping the machine, said percolating device comprising a percolating chamber mounted in such a way that it can carry out a displacement in the vertical plane, when a control device is operated, in order to receive a capsule of

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product to be infused, characterized in that it comprises a percolating head mounted such that it slides axially inside the percolating chamber and in that it comprises a stop device to lock the percolating head in the percolating chamber in a definite position according to the size of the capsule used. Other features of the device are given in claims 2 and 3. The machine of the invention is defined by claims 4 and 5. The capsule used according to the invention is defined in claims 6 and 7.

The percolating device that is the subject of the invention will now be described with reference to the accompanying drawings which show, by way of non-limitative example, an embodiment of the percolating device.

Figure 1 is a diagrammatic illustration of the body of a coffee machine equipped with a percolating device according to the invention, the machine being in the position of loading the coffee capsule.

Figure 2 is a view similar to that of Figure 1, the dose of coffee contained in the capsule being in the operating position ready to be infused.

Figure 3 is a cross-sectional view of the percolating device through the line A-A of Figure 1, the device being in the position of rest.

Figure 4 is a cross-sectional view similar to that of Figure 3 in an intermediate position, a small-sized capsule being inserted into the percolating device.

Figure 5 is a view identical to that of Figure 4, the percolating device being at the end of its travel and ready for use.

Figure 6 is a cross-sectional view similar to that of Figure 4, when a large-sized capsule is inserted into the device.

Figure 7 is a cross-sectional view similar to that of Figure 5, a large-sized capsule being loaded in the percolating chamber.

Figure 8 is a side view of a first embodiment of a capsule containing a double dose of coffee.

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Figure 9 is a side view of a second embodiment of a capsule containing a double dose of coffee.

Figures 10 and 11 respectively show two embodiments of the capsules shown in Figures 8 and 9 but whose capacity is adapted to receive a single dose of coffee.

With reference to Figure 1, the frame 1 of the machine for preparing hot drinks comprises a base 2 for receiving a recipient (not shown) intended for receiving the infused drink. The upper part of the frame 1 comprises a mechanism making it possible to bring a loading cap 3 receiving a capsule 4 containing a dose of the product to be infused opposite a percolating end-piece 5. This mechanism is operated by means of a control handle 6 pivoted in the frame about a spindle 7. The control handle 6 is shaped like a cross having a straight section extended by a curved section. The handle 6 is connected, by the intermediary of two rods 8, to the cap 3 by means of spindles 9 which slide freely in slots 10 formed in the side members of the frame.

During the travel of the handle, the cap 3 carrying the capsule 4 is brought progressively below the percolating end-piece 5. At the end of the travel, as shown in Figure 2, the capsule 4 is inserted into the percolating chamber 14 which will be described below and the cap 3 is maintained in a fluid-tight manner against the percolating end-piece.

The curved end of the control handle 6 is also connected by spindles 11 to two rods 12 attached by means of spindles 13 to the upper part of the percolating chamber 14. The percolating chamber 14 consists of a cylindrical section integral with a holding part 15 having a square shape.

The four corners of the holding part 15 are pierced with holes such that the percolating chamber 14, 15 can slide vertically, guided by spindles 16 integral with the frame. In this way the percolating chamber 14 carries out a movement in the vertical plane

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when the control handle 6 is operated, the part 15 being driven by the control handle 6 by the intermediary of the rods 12 and the spindles 13.

Thus, because of this double kinematic link, the control handle 6, during a movement in the direction of the arrow, progressively brings the cap 3 below the percolating end-piece whilst lowering the percolating chamber 14 in such a way as to receive the capsule 4 containing the product to be infused. The end of the travel is illustrated in Figure 2 which shows the device in the operating position, ready to infuse the drink. In this position, the capsule 4 is located inside the percolating chamber 14 and the cap 3 is held against the percolating end-piece in a fluid-tight manner.

Other mechanical devices can furthermore be envisaged for allowing the displacement of the cap 3 from a loading position to an operating position inside the percolating chamber, the latter having carried out a movement in the vertical plane from a high position to a low operating position.

The rear part of the cap 3 has two extraction lugs located at the end of uprights. During the opening of the mechanism by a movement of the control handle 6 in the direction opposite to that of the arrow, the extraction lugs are brought to the proximity of the periphery of the percolating chamber containing the capsule and thus making it possible, by pressing the base of the capsule, to extract it into a container located in the rear section of the frame 1. When using a cartridge whose dimensions correspond to those of the percolating head described below, the upper extraction lugs will make it possible to extract the capsule. When using bigger capsules, that is to say capsules whose dimensions exceed those of the percolating chamber, it is the lower extraction lugs that interact with the rim forming the base of the capsule in order to extract it from the chamber.

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The percolating chamber 14 comprises a percolating head 17 (see Figures 3 to 7), mounted such that it slides inside the cylindrical percolating chamber 14. This percolating head 17 comprises a hollow cylindrical rod 18 whose upper end slides freely in a hole formed in the part 15 of the percolating chamber 14. The lower part of the percolating head 17 has a diameter substantially equal to that of the percolating chamber 14 and has an recess 19 shaped like a bell whose dimensions correspond to those of the capsules containing the product to be infused. At the centre of the recess 19 there is a needle (not shown), whose downward-directed point makes it possible to pierce the top part of the capsule in order to inject water and/or steam into it through the water inlet pipe formed in the rod 18. The travel of the percolating head 17 is limited in its axial displacement by an end-piece 20 integral with the rod 18 and emerging from the holding part 15. The intake of water or steam takes place by the intermediary of a water feed pipe provided on the part 20.

A stop device limiting the axial travel of the percolating head 17 is incorporated in the holding part 15 of the percolating chamber 14. This stop device comprises a rod 21 sliding horizontally against the action of a spring 22 in a tube emerging into an recess formed in the holding part 15 of the percolating head. This rod 21 is terminated by a head 23 which is pushed, by the action of the spring 22, against a cam 24 integral with the frame 1. The cam 24 has, in its lower section, a projecting part which comes into contact with the head 23 of the stop device when, due to the operation of the control handle 6, the percolating chamber is brought into the low position.

Thus, during the vertical displacement of the percolating chamber 14, the rod 21 of the stop device penetrates into the part 15 of the percolating chamber as soon as the head 23 comes into contact with the projecting part of the cam 24.

The function of this stop device 21, 22, 23, 24 is to lock the percolating head 17 in a definite position when the said chamber is in the operating position, at the end of travel of the control handle. For this purpose, the outer surface of the percolating head has a longitudinal groove interrupted by two annular ribs 25 and 26 which cooperate with the end of the rod 21 according to the relative position of the percolating head 17 inside the percolating chamber 14.

The functioning of the percolating head will now be described with reference to Figures 4 to 7. Figures 4 and 5 show the percolating device in two different positions when it is loaded with a capsule of standard dimensions such as those illustrated in Figures 10 and 11. The capsules shown in Figures 10 and 11 have dimensions that correspond to those of the bell-shaped recess 19 of the percolating head 17 and are generally provided for containing a single dose of the product to be infused. Figures 6 and 7 are views identical to those shown in Figures 4 and 5 when the device is loaded with a capsule such as shown in Figures 8 or 9. The capsules of figures 8 and 9 show two embodiments of capsules able to contain a double dose of product to be infused. It will be noted that these capsules have a base whose diameter is greater than that of the capsules shown in Figures 10 and 11 and have a shoulder at about one third of their height. The diameter at the level of the shoulder of the capsules shown in Figures 8 and 9 is substantially the same as that of the base of the capsules shown in Figures 10 and 11.

Figure 4 shows the percolating device in a position close to the one shown in Figure 2, that is to say practically at the end of the travel of the handle 6, when a standard-sized capsule has been loaded into the cap 3. The percolating head 17 is in the low position and, as the capsule has dimensions corresponding to those of the recess 19, no force is applied against the percolating head 17 which, consequently, is not displaced upwards. When the handle

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6 reaches the end of its travel, as shown in Figure 5, the protruding part of the cam 24 applies a pressure on the head 23 and forces the rod 21 inside the upper part 15 of the percolating chamber. In this position, the
5 rod 21 is located above the upper rib 26 of the percolating head 17 and thus locks the percolating head in the low position against the cap in such a way as to allow the piercing of the capsule and the injection of water and/or of steam, into the capsule. Figures 6
10 and 7 are views similar to those of Figures 4 and 5 when a capsule of double capacity, such as those shown in Figures 8 or 9, is inserted in the cap 3. The capsule, because of its size, comes into contact with the end of the recess 19 and pushes the percolating
15 head 17 upwards. The axial displacement of the percolating head 17 is possible because the latter slides freely inside the percolating chamber, the rod 21 not yet having penetrated into the chamber 14.

At the end of its travel, as shown in Figure 7, the percolating head 17 occupies a high position in the
20 chamber 14 and the rod 21 is in contact with the lower rib 25 of the percolating head 17 and, because of this, stopping any upward displacement of the percolating head. In this position, the percolating head is bearing
25 on the shoulder of the capsule, guaranteeing the necessary fluid-tightness during the injection of water or of steam.

Because of the fact that the percolating head 17 is mounted in such a way as to be able to slide freely
30 inside the percolating chamber, its relative position with respect to the chamber varies depending on whether a cartridge of standard size or a cartridge of double capacity is inserted into the cap 3. The locking device 21, 22, 23 actuated at the end of travel by the cam 24
35 cooperates with one of the ribs 25 or 26 in order to lock the percolating head in the chamber in a definite position corresponding to the type of capsule used and thus allowing the injection of water or of steam. This percolating device makes it possible to use at least

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two types of capsules of different capacity and volume without the user having to carry out specific operations according to the type of capsule inserted in the cap 3. In variants, it is possible to make
5 provision for the percolating head to have more than two ribs cooperating with the rod 21 of the stop device in order to be able to accept capsules of intermediate sizes. In one variant, the annular ribs 25 and 26 can
be replaced by simple stop-pieces.

10 Constructive variants, in particular with regard to the way of producing the stop device limiting the travel of the percolating head inside the chamber, can be envisaged without departing from the scope of the invention such as defined in the claims.

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CLAIMS

1. Percolating device comprising a percolating chamber (14) mounted in such a way that it can carry out a displacement in the vertical plane, when a control device (6) is operated, in order to receive a capsule of product to be infused, characterized in that it comprises a percolating head (17) mounted such that it slides axially inside the percolating chamber (14) and in that it comprises a stop device to lock the percolating head (17) in the percolating chamber in a definite position according to the size of the capsule used.

2. Device according to Claim 1, characterized in that the stop device consists of a rod (21) penetrating into the percolating chamber (14) against the action of an elastic device (22) and in that the rod (21) is operated by a cam (24) integral with the frame, when the percolating chamber (14) reaches its operating position.

3. Device according to one of the preceding claims, characterized in that the outer surface of the percolating head (17) comprises at least two annular ribs (25, 26) cooperating with the rod (21) in order to define the operating position of the percolating head (17) according to the capsule used.

4. Machine for preparing hot drinks packaged in capsules, characterized in that it comprises a percolating device according to one of the preceding claims.

5. Machine for preparing hot drinks according to Claim 4, characterized in that it comprises an extraction device comprising at least two extraction lugs located at different levels on uprights driven by means of the control device (6).

6. Capsule designed for use in the percolating device according to one of Claims 1 to 3, characterized in that it comprises a device cooperating with the percolating head (17) to ensure the fluid-tightness of

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the latter during the injection of water and/or of steam.

7. Capsule according to Claim 5, characterized in that the device cooperating with the percolating head
5 consists of a shoulder located approximately one third from the base of the capsule and whose diameter corresponds to the largest diameter of the recess (19) of the percolating head (17).