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Declaration for Translation of PCT Application No PCT/IB2012/051528

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Dated this 14th day of October 2013



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**Injection unit having a resilient suspension device for
the group head of a so-called espresso coffee machine**

The present invention relates to a percolation station
5 for a machine for preparing coffee of the espresso
type. According to the special feature of this
percolation station, the part which is used to support
the portafilter, and which is conventionally known as
the group head, is mounted via a resilient suspension
10 device on the mechanical unit of the injection unit of
this coffee percolation station.

Espresso-type coffee machines comprise one or more
portafilters or filter holders that form a housing for
15 a receptacle known as the filter basket that contains
the coffee grounds and each of which are extended by a
single or double pouring spout. These portafilters all
have a lateral extension in the form of a handle.

20 These portafilters or filter holders are mounted on the
underside of a mechanical assembly referred to as the
injection unit which comprises a fixed mechanical unit
the lower part of which has a cavity in the central
part of the bottom of which there emerges a distributor
25 from which hot water is ejected under pressure onto the
grounds. These portafilters conventionally have two
lugs collaborating with two oblique or helical grooves
formed in the internal lateral surface of the lower
part, referred to as the group head, of the injection
30 unit.

A machine may comprise several injection units each
able to prepare one or two cups of coffee from one
single dose of grounds.

35 Each portafilter is mounted on the lower part of the
injection unit through a pivoting movement, for example
through one quarter of a turn, during which the upper
surfaces of the filter basket and of the grounds volume

move closer to the exterior face of the distributor and
of the seal that surrounds it until the upper outer
edge of the filter basket comes into sealed contact
with the planar lower face of this seal surrounding the
5 distributor.

The last part of the pivoting travel of the portafilter
clamps the filter basket against this seal. This end of
travel requires a degree of effort that varies
10 according to how full the filter basket is of grounds.

While the degree of clamping has practically no
influence over the quality of the coffee, there is the
disadvantage whereby, in order to obtain the necessary
15 seal, it is necessary to apply sufficient clamping
effort, resulting in a movement in which the upper edge
of the filter basket rubs against the exterior lower
face of the seal which becomes worn and deformed with
use, and does so in such a way that the final pivoting
20 travel of the filter holder becomes progressively
longer.

This lengthening of the pivoting travel has to be
compensated for in order to prevent the handles of two
25 adjacent filter holders from becoming so close together
in their final position that they interfere with one
another and become awkward to handle.

The seal has therefore to be changed and readjustments
30 have to be made.

The object of the present invention is greater ease of
engagement without having to force it through a
securing gesture which guarantees sealing from the
35 outset and introduces no variation in the final
position of the handle while at the same time allowing
some variation in the dose of coffee, i.e. some
variation in the volume of grounds.

In order to address this technical problem, the injection unit for a coffee machine of the espresso type according to the invention comprises a fixed upper mechanical unit having a central projection forming a hot water distributor and to which is fixed a removable part known as a group head the interior surface of which has a cavity in which there is mounted a portafilter comprising an operating handle, and a housing for accommodating a filter basket containing coffee grounds for the preparation of coffee of the espresso type. According to this the invention, the filter basket bears in a sealed manner against a seal surrounding the central projection and this injection unit is characterized in that:

- the group head is fixed to the fixed upper mechanical unit of the injection unit by a resilient-effect connecting device that affords the group head a distancing travel with respect to the fixed upper mechanical unit,
- the seal surrounding the distributor bears against the upper interior periphery of the filter basket to form a dynamic sliding seal.

As a result, any adjustment or replacement of the seal becomes needless because it is no longer subjected to friction and its life is appreciably lengthened.

Moreover, compression of the grounds is of little importance. Any possible heightwise overfilling with grounds in habitual use is automatically absorbed.

In addition, the group head is easily removable from the mechanical unit of the injection unit. The resilient-effect connection of the group head reduces maintenance and provides a certain level of comfort and great ease of use for the staff working with the machine.

Other features and advantages of the invention will become apparent from the description which follows, which is given by way of example and accompanied by the drawings in which:

- 5 • figure 1 is an exploded perspective view of the injection unit and of the portafilter-filter basket assembly showing the main characteristics of the invention;
- 10 • figures 2 and 3 and then 4 and 5 are views each time respectively in elevation and in longitudinal section of the percolation station according to the invention, firstly in a raised position and secondly in a lowered position of the group head corresponding to two different height-of-grounds
15 scenarios, the first height being lower in the case of figures 2 and 3 and the second higher in the case of figures 4 and 5 showing a distancing travel "d" of the group head with respect to the underside of the fixed mechanical unit of the
20 injection unit;
- figure 6 is a detailed view of the assembly device showing the screw and its distancing spring corresponding to the ringed part of figure 3;
- 25 • figure 7 is a detailed cross section through the seal showing the position of the rim of the filter basket with respect to the seal and corresponding to the ringed part of figure 5,
- figure 8 is a perspective view of the seal and of its gasket,
- 30 • figure 9 is a view partly in perspective and partly in section on IX-IX of figure 8 showing the seal,
- figure 10 is an exploded perspective view of the assembly formed of the portafilter, the filter
35 basket, the seal at the head of the distributor.

The present invention relates in general to a coffee percolation station in a machine for preparing coffee of the type known as espresso.

5 In the conventional way, a percolation station comprises an injection unit 1 to which various elements and removable components are attached for refilling with grounds representing a dose of powdered coffee, as will be seen hereinafter.

10

The mechanical assembly of the injection unit 1 is made up of a fixed upper mechanical unit 2 having an injection pipe 3 and a central cylindrical projection 4 in the lower central part, for example as a lump, 15 protected by a distribution filter 5 in the form of a perforated disk that forms the outlet face of the head 6 of a distributor 7 of pressurized hot water. The fixed upper mechanical unit 2 of the injection unit 1 serves to support a removable support part referred to 20 as a group head 8 which is assembled with this fixed upper mechanical unit 2 by fixing means which, according to the invention, exhibit a resilient effect.

A portafilter 9 or filter holder having an operating 25 handle 10 and bearing a filter basket 11 with an upper peripheral rim 12 containing coffee grounds 13 is mounted on the group head 8.

The portafilter 9 has, formed as projections from its 30 exterior lateral surface or attached thereto, three retaining lugs 14, 15 and 16 collaborating with three corresponding grooves 17, 18, 19 in the form of oblique or helical ramps, each having an inlet notch such as 20 formed in the interior lateral surface of the group head 8 and via which the portafilter 9 is mounted on 35 the group head after each retaining lug 14, 15 and 16 has entered a corresponding inlet notch 20 and undergone a pivoting movement as far as a straight or

oblique stop surface such as 21 which marks the mechanical end of each groove.

5 The group head 8 is a body of annular overall shape having a free central space 22 occupied by the head 6 of the distributor 7 when the group head is mounted on the fixed upper mechanical unit 2.

10 The injection unit 1 also has, by way of attached component, a special seal 23 positioned around the central projection 4 that forms the body of the distributor 7, as figures 3, 5 and 10 show. This seal 23 is composite, made up of an O-ring 24 housed in, and held by, an annular gasket 25 made of a material which
15 is flexible but harder than the material of the O-ring, as depicted in figures 8 and 9. This annular gasket 25 serves as a protective housing for it. It is open over the entirety of its internal lateral face.

20 This seal bears against the upper interior peripheral lateral surface of the filter basket 11.

The group head 9 is mounted on the fixed upper mechanical unit 2 of the injection unit 1 via a
25 resilient-effect connecting device or means, for example, as depicted in the figures, formed of several mounting screws, for example three screws 26, 27 and 28, with a spring effect to absorb variations in the height of the grounds 13. Thus, variations by 1 to 3
30 grams, which correspond to the variations encountered between the various doses in common use resulting from coffee mill spread, can be tolerated.

35 As can be seen in figures 1, 3 and 5, each mounting screw 26, 27 and 28 provides working or adaptation latitude because of its resilient-effect sliding device but allows a longitudinal adaptation travel "d" for

adapting to the possible variations in the height of grounds 13, through movement of the group head 9.

5 The pivoting movement is limited by the straight or oblique end-of-travel surfaces such as 21 that mark the mechanical limit of each groove 17, 18 and 19. Each surface 21 constitutes an end stop for each corresponding retaining lug 14, 15 and 16 of the portafilter 9.

10

It can be noted here that that there is absolutely no need to force the issue with clamping because the resilient-effect attachment of the group head 8 to the fixed upper mechanical unit 2 partially compensates for
15 clamping force with a view to obtaining a seal and with a view to ensuring that the end-of-travel position is properly delimited by the end-of-groove stops and is so irrespective of the quantity of grounds 13 present in the filter basket 11.

20

Sealing is guaranteed by the composite seal 23 described above against the external contour of which the upper zone of the interior face of the lateral wall of the filter basket 11 delimited by its peripheral rim
25 12 bears during the pivoting movement of the handle.

As already indicated, this composite seal device 23 may, for example, take the form of an annular gasket 25 with an open interior lateral surface serving to house
30 an O-ring 24 as visible in figures 3 and 5.

The annular gasket 25 is pressed against the exterior lateral surface of the head 6 of the distributor 7 or is mounted in a peripheral shoulder such as 29 or in a
35 groove surrounding this head.

The various advantages associated with the invention stem from the peculiarities of the composite seal 23

and how it is mounted, and also from the resilient suspension system via which the group head 8 is mounted on the fixed upper mechanical unit 2 of the injection unit 1.

5

One embodiment of a resilient-effect mounting connection that allows the group head 8 a distancing travel referenced "d" with respect to the fixed upper mechanical unit 2 of the injection unit 1 will now be
10 described hereinafter with reference to figures 1, 3, 5 and 6. This distancing travel "d" is enough to automatically absorb the usual discrepancies in volume and therefore in height of grounds 13 in the filter basket 11 while at the same time maintaining the level
15 of sealing required for correct operation in the production of coffee of the type referred to as espresso.

The group head 8, which is the removable support part,
20 is assembled via at least three screws 26, 27 and 28 with the fixed upper mechanical unit 2 of the injection unit 1 as can be seen in figures 1, 3 and 5.

A helical spring such as 30 has been slipped over the
25 end of each of these screws 26, 27 and 28 and bears in the bottom of each housing such as 31 provided in the body of the group head 8 that each corresponding spring 30 enters. Each head of each screw 26, 27 and 28 remains level with the underside of the group head 8.
30 The screws are, for example, hexagon socket head screws. The springs 30 give the group head 8 a resilient travel away from the fixed upper mechanical unit 2 of the injection unit 1 by the distance "d" that may correspond to the difference in length between a
35 partially compressed state and an almost fully compressed state of each spring 30 as a result of the downward movement of the group head 8 providing grounds-height adjustment while guaranteeing sealing.

To limit this distance, a stop 32 is introduced, for example in the form of a sleeve 33 mounted around each distancing spring 30 and pressing against the underside
5 of the head of each screw 26, 27 and 28. The sleeve 33 acts as a stop by limiting the travel of the group head 8 as its frontal edge presses against the bottom of the housing 31.

10 This movement, associated with the spring effect, is used to automatically compensate for differences in the height of the grounds 13. It is limited by the abutment 32 of the frontal edge of the sleeve 33 against the bottom of the housing 21.

15 The group head 8 is thus suspended elastically from the fixed upper mechanical unit 2 of the injection unit 1 and provides automatic adaptation to suit the variations in volume of the dose of grounds while at
20 the same time ensuring sealing and keeping the handle 10 in the same position.

CLAIMS

1. An injection unit (1) for a coffee machine of the espresso type, comprising a fixed upper mechanical unit (2) having a central projection (4) forming a hot water distributor and to which is fixed a removable part known as a group head (8) the interior surface of which has a cavity (22) in which there is mounted a portafilter (9) comprising an operating handle (10), and a housing for accommodating a filter basket (11) containing coffee grounds (13) for the preparation of coffee of the type referred to as "espresso", the portafilter (9) being mounted on the group head (8) by the collaboration of lugs in grooves during a pivoting movement, the filter basket (11) bearing in a sealed manner against a seal surrounding the central projection (4), characterized in that:
 - the group head (8) is fixed to the fixed upper mechanical unit (2) of the injection unit (1) by a resilient-effect connecting device that affords the group head (8) a distancing travel with respect to the fixed upper mechanical unit (2),
 - the seal (23) surrounding the distributor (7) bears against the upper interior periphery of the filter basket (11) thus creating a seal as the operating handle (10) is pivoted.
2. The injection unit (1) as claimed in claim 1, characterized in that the resilient-effect connecting device is made up of at least three screws (26, 27, 28) passing through the group head (8) and screwed into the fixed upper mechanical unit (2) opposite, and in that the screws (26, 27, 28) are each fitted with a spring (30) that becomes compressed by the downward movement of the group head (8).

3. The injection unit (1) as claimed in claim 2, characterized in that the downward movement of the group head (8) is limited by a stop (32).
- 5 4. The injection unit (1) as claimed in claim 3, characterized in that the stop (32) is a sleeve (33) mounted coaxially on each screw (26, 27, 28) between the spring (30) and the screw head.
- 10 5. The injection unit (1) as claimed in claim 1, characterized in that the composite seal (23) takes the form of an annular gasket (25) with an open interior lateral surface serving to house an O-ring (24).