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(54) **FILLING METHOD FOR FILLING A PACKAGING ASSEMBLY WITH A COSMETIC PRODUCT, AND ASSOCIATED FILLING STATION**

(57) This filling method, for filling a packaging assembly with at least one cosmetic product, comprises the following steps:

- providing the packaging assembly, said packaging assembly comprising a porous matrix (20),
- compressing the matrix (20), and
- impregnating the matrix (20) with the or each cosmetic product, this step comprising decompressing the matrix (20) while simultaneously injecting the or each cosmetic product into the matrix (20).

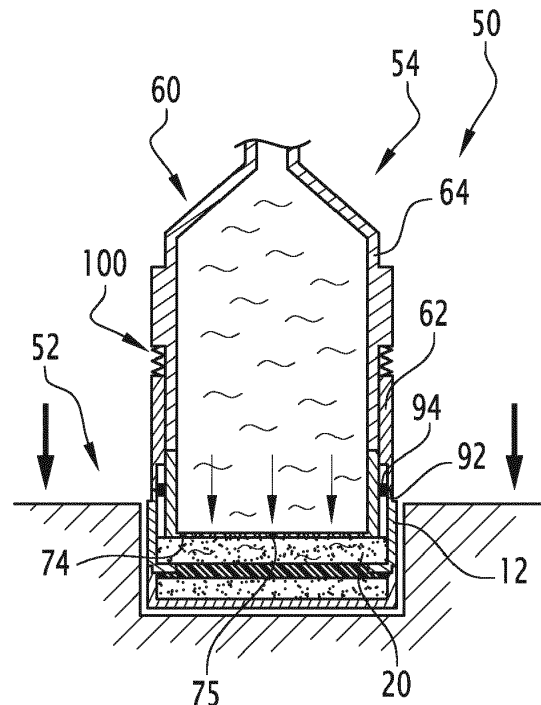


FIG. 8

Description

[0001] The present invention relates to a filling method for filling a packaging assembly with a cosmetic product.

[0002] The expression "cosmetic product" is understood to mean any product as defined in Regulation (EC) No 1223/2009 of the European Parliament and Council of 30 November 2009 relating to cosmetic products.

[0003] It is known to provide a packaging assembly for a cosmetic product, said packaging assembly comprising a porous matrix, such as a sponge or a non-woven material, impregnated with the cosmetic product, as disclosed in EP-A-528 705.

[0004] However, producing such a packaging assembly at high speed faces many problems, one of which being having a satisfactory impregnation of the matrix.

[0005] Indeed, a problem which is commonly encountered with impregnating a porous matrix with a liquid product is that the cavities of the matrix are previously filled with air. Impregnating the matrix with the liquid product therefore implies emptying air from the cavities as the liquid product spreads through the matrix, said emptying considerably slowing the impregnation of the matrix. Thus, absorption and capillarity phenomena are not sufficient to ensure a uniform and complete impregnation of the matrix at high speed. Moreover, part of the liquid used to impregnate the matrix often remains at the surface of the matrix, requiring cleaning the matrix after it has been impregnated.

[0006] A goal of the invention is therefore to ensure a uniform and complete impregnation of a porous matrix with a cosmetic product at high speed. Other goals are to avoid remaining of part of the cosmetic product at the surface of the porous matrix, and to avoid soiling of the external surface of a packaging assembly housing the impregnated porous matrix.

[0007] To that end, the object of the invention is a filling method for filling a packaging assembly with at least one cosmetic product, the method comprising the following steps:

- providing the packaging assembly, said packaging assembly comprising a porous matrix,
- compressing the matrix, and
- impregnating the matrix with the or each cosmetic product, this step comprising decompressing the matrix while simultaneously injecting the or each cosmetic product into the matrix.

[0008] According to specific embodiments of the invention, the filling method also includes one or a plurality of the following features, alone or according to any technically possible combination of features:

- the matrix is compressed between a support and an injection wall of an injection head during the compression step, and, during the impregnation step, the matrix remains in contact with the injection wall of

the injection head, the or each cosmetic product being injected through a plurality of injection holes formed in the injection wall,

- the injection holes consist in a single central injection hole and in a plurality of distributed injection holes, and the injection wall comprises a plurality of pierced concentric circles, each distributed injection hole being localized on one of said pierced circles, the linear density of distributed injection holes on each pierced circle being substantially equal to the linear density of distributed injection holes on each other pierced circle,
- each distributed injection hole localized on a pierced circle is substantially equidistant to the two distributed injection holes, localized on the same pierced circle, which are the closest to said distributed injection hole,
- the pierced circles comprise at least one interposed pierced circle which is interposed between two other pierced circles, the or each interposed pierced circle being substantially equidistant to the two pierced circles which are the closest to said interposed pierced circle,
- the injection wall is divided in a plurality of regions, the injection holes located in each region being fluidly connected to a specific cosmetic product provider providing a specific cosmetic product,
- decompressing the matrix comprises taking the injection wall away from the support at a speed comprised between 0.1 mm/sec and 50 mm/sec, and injecting the or each cosmetic product into the matrix comprises injecting the or each cosmetic product with a flow rate comprised between 0.5 ml/sec and 30 ml/sec,
- the support defines a chamber housing the matrix, and an aperture emerging into the chamber and into an external face of the support, for the penetration of the injection wall into the chamber,
- the injection head comprises a surrounding tube and an injection body surrounded by the surrounding tube, the injection body being movable relative to the surrounding tube along an axis of the surrounding tube, the injection body comprising the injection wall and a duct for the circulation of the or each cosmetic product, the injection wall closing an end of the duct, the compression step comprises displacing the injection body relative to the surrounding tube so that the injection wall compresses the matrix against the support, the method comprises an additional step of enclosing the matrix between the support and the injection head, said step comprising displacing the surrounding tube relative to the injection body until a free end of the surrounding tube

- **[0009]** contacts the support at the periphery of the matrix, and pressing the free end against the support, and the impregnation step comprises displacing the injection body relative to the surrounding tube so that the injection

wall gets away from the support, while maintaining pressure of the free end against the support and feeding the duct with the or each cosmetic product,

- the surrounding tube comprises a cylindrical wall and an annular flexible rim projecting from an inner surface of the cylindrical wall toward a central axis of the surrounding tube, the opening being defined by the border of the flexible rim which is the closest to the central axis, the section of the opening being substantially complementary to an external radial section of the injection body,
- the free end defines an opening for the injection body, said opening having a section which is substantially equal to the section of the aperture,
- the filling method further comprises a step of closing the chamber by sealingly fixing a cap to the support, the cap covering the aperture,
- the support is part of the packaging assembly.
- the support defines an orifice emerging into the chamber and into the external face of the support, opposite the aperture, and the packaging assembly further comprises a watertight cover covering the orifice opposite the chamber, a lid covering the watertight cover, reversibly attached to the support, and, between the cover and the lid, an applicator for applying the or each cosmetic product on the skin of a user,
- the or each cosmetic product is injected in a liquid form, and
- the injection wall is removable.

[0010] The invention also relates to a filling station adapted for implementing a filling method as defined here above.

[0011] According to specific embodiments of the invention, the filling station includes one or a plurality of the following features, alone or according to any technically possible combination of features:

- the filling station comprises a supporting platform defining a support surface for a packaging assembly and an injection body having a duct for the circulation of the cosmetic product and an injection wall closing an end of the duct, the injection body being movable relative to the platform between a compression position in which the support surface and the injection wall are close to each other, and a loosening position in which the support surface and the injection wall are far from each other,
- the injection wall comprises a plurality of injection holes, each injection hole opening into an internal face of the wall, oriented toward the duct, and into an external face of the wall, oriented opposite the duct,
- the injection holes consist in a single central injection hole and in a plurality of distributed injection holes, and the injection wall comprises a plurality of pierced

concentric circles, each distributed injection hole being localized on one of said pierced circles, the linear density of injection holes on each pierced circle being substantially equal to the linear density of injection holes on each other pierced circle

- each injection hole localized on a pierced circle is substantially equidistant to the two injection holes, localized on the same pierced circle, which are the closest to said injection hole,
- the pierced circles comprise at least one interposed pierced circle which is interposed between two other pierced circles, the or each interposed pierced circle being substantially equidistant to the two pierced circles which are the closest to said interposed pierced circle,
- the injection wall is divided in a plurality of regions, the injection holes located in each region being fluidly connected to a specific cosmetic product provider providing a specific cosmetic product,
- the injection wall is removable,
- the filling station comprises a surrounding tube surrounding the injection body, the surrounding tube being movable relative to the platform between a pressing position in which the support surface and a free end of the surrounding tube are close to each other, and a release position in which the support surface and the free end are far from each other,
- the free end defines an opening for the passage of the injection body,
- the injection body is movable relative to the surrounding tube along an axis of the surrounding tube, between a deployed position in which the injection body extends through the opening, the injection wall being far from the free end, and a retracted position in which the injection wall is close to the free end, and
- the surrounding tube comprises a cylindrical wall and an annular flexible rim projecting from an inner surface of the wall toward a central axis of the tube, the opening being defined by the border of the rim which is the closest to the central axis, the section of the opening being substantially complementary to an external radial section of the injection body.

[0012] Other features and advantages of the invention will become apparent from the following description, which is only provided as an exemplary embodiment of the invention, and which is made with reference to the accompanying drawings, in which:

- Figure 1 is a cross-section view of a packaging assembly to be filled with a cosmetic product,
- Figure 2 is a cross-section view of a filling station according to the invention,
- Figure 3 is a front view of an injection wall of the filling station of Figure 2,
- Figure 4 is a view similar to Figure 2 with the packaging assembly positioned in the filling station, at a first step of a filling method according to the inven-

- tion,
- Figure 5 is a view similar to Figure 4, at a second step of the filling method,
 - Figure 6 is a view similar to Figure 4, at a third step of the filling method,
 - Figure 7 is a view similar to Figure 4, at a fourth step of the filling method,
 - Figure 8 is a view similar to Figure 4, at a fifth step of the filling method,
 - Figure 9 is a view similar to Figure 4, at a sixth step of the filling method,
 - Figure 10 is a view similar to Figure 4, at a seventh step of the filling method,
 - Figure 11 is a view similar to Figure 4, at an eighth step of the filling method,
 - Figure 12 is a view similar to Figure 4, at a ninth step of the filling method,
 - Figure 13 is a cross-section view of an injection body of the filling station of Figure 2, seen along a plane referenced XIII-XIII on Figure 2, according to a first alternative of the invention,
 - Figure 14 is a view similar to Figure 13, according to a second alternative of the invention, and
 - Figure 15 is a view similar to Figure 13, according to a third alternative of the invention.

[0013] The packaging assembly 10, which is presented on Figure 1, comprises a support 12, a watertight cover 14, a lid 16, an applicator 18 and a porous matrix 20.

[0014] The support 12 is a cylinder, preferably a right circular cylinder. It defines an inner chamber 22 housing the matrix 20, the chamber 22 and the matrix 20 having preferably substantially complementary shapes. The radial section of the chamber 22 is substantially constant along the axis of the support.

[0015] The support 12 further defines an aperture 24 emerging into the chamber 22 and into an external face 26 of the support 12. In particular, said aperture 24 is formed in a base of the cylinder and has an axis substantially parallel to the axis of the support 12.

[0016] The aperture 24 is bordered at its periphery by a flexible sealing ring 27 which projects radially from an inner surface of a cylindrical wall 32 of the support 12 toward the central axis of the support 12. Advantageously, the diameter of the radial section of the aperture 24 is equal to at least 80%, preferably at least 95%, of the diameter of the radial section of the chamber 22.

[0017] The support 12 also defines an orifice 28 emerging into the chamber 22 and into the external face 26 of the support 12, opposite the aperture 24. In particular, said orifice 28 is formed in the base of the cylinder opposite the base in which the aperture 24 is formed, and it has an axis substantially parallel to the axis of the support 12. The radial section of the orifice 28 is smaller than the radial section of the chamber 22; in other words, the support 12 comprises an annular rim 30 projecting radially from the inner surface of the cylindrical wall 32 of the support 12 toward the central axis of the support 12, the

orifice 28 being defined by the border of the rim 30 which is the closest to the central axis.

[0018] The cover 14 covers the orifice 28 opposite the chamber 22. It is substantially flat. It comprises a central thicker portion 34 received into the orifice 28 and a peripheral thinner portion 36 resting on the annular rim 30.

[0019] The lid 16 covers the cover 14; in other words, the cover 14 is interposed between the lid 16 and the chamber 22.

[0020] The lid 16 comprises a bottom portion 40 and a skirt 42 projecting axially from the periphery of the bottom portion 40, toward the support 12.

[0021] The lid 16 is reversibly attached to the support 12. To that end, the external surface 26 of the support 12 and the skirt 42 of the lid 16 comprise complementary fixing elements (not shown). Said fixing elements consist for example in an external thread formed on the cylindrical wall 32 of the support 12 and in an inner thread formed on the skirt 46 of the lid 16. In alternative, the fixing elements are snap-fit connecting elements.

[0022] The skirt 42 comprises an intermediate portion 44, so that the bottom portion 40 is away from the support 12 when the lid 16 and the support 12 are assembled together. The lid 16 and the support 12 thus define a cavity 46 between them. The cover 14 is housed in said cavity 46.

[0023] The applicator 18 is designed for applying the cosmetic product on the skin of a user. To that end, it is made out of a porous material, preferably a non-woven material, a sponge or foam.

[0024] The applicator 18 is housed in the cavity 46, between the cover 14 and the lid 16, and has preferably a shape which is substantially complementary to the shape of the cavity 46.

[0025] The matrix 20 is made out of a porous material, preferably a non-woven material, a sponge or foam. It is compressible.

[0026] With reference to Figure 2, the filling station 50 for filling the packaging assembly 10 with a cosmetic product comprises a supporting platform 52 for the packaging assembly 10 and an injection head 54 for injecting the cosmetic product in a liquid form into the packaging assembly 10.

[0027] The platform 52 defines a support surface 56 for the packaging assembly 10. Said support surface 56 has a hollow 58 facing the injection head 54. The hollow 58 has a shape which is substantially complementary to the shape of the packaging assembly 10.

[0028] The injection head 54 is placed above the platform 52. It comprises an injection body 60 and a surrounding tube 62 surrounding the injection body 60.

[0029] The injection body 60 comprises a duct 64 for the circulation of the cosmetic product, and an injection wall 66 closing an end 68 of the duct 64 oriented toward the platform 52

[0030] The duct 64 is substantially rectilinear. It comprises a substantially cylindrical wall 70, preferably circularly cylindrical, defining an inner passage 72 for the

cosmetic product. The duct 64 has an external radial section which is substantially complementary to the section of the aperture 24 of the support 12, so that the injection body 60 may penetrate into the chamber 22 while being held in a sealing engagement with the sealing ring 27. Said external radial section constitutes an external radial section of the injection body 60.

[0031] The end 69 of the duct 64 opposite the end 68 closed by the injection wall 66 is fluidly connected to a cosmetic product provider (not shown), adapted for providing the cosmetic product in a liquid form.

[0032] The injection wall 66 extends substantially perpendicularly to the axis of the duct 64. It extends across the passage 72, so that cosmetic product exiting the duct 64 through its end 68 has to flow through the injection wall 66.

[0033] The diameter of the injection wall 66 is substantially equal to an inner diameter of the duct 64. In the exemplary embodiment, the injection wall 66 is flat.

[0034] Preferably, the injection wall 66 is removable. In other words, the injection wall 66 is preferably detachable from the duct 64. Thus, the injection wall 66 may be changed and cleaned easily.

[0035] The injection wall 66 has a plurality of injection holes 74, 75, each injection hole 74, 75 opening into an internal face 76 of the wall 66, oriented toward the duct 64, and into an external face 78 of the wall 66, oriented opposite the duct 64. In other words, each injection hole 74, 75 emerges into the passage 72 and into the external face 78 of the wall 66.

[0036] Preferably, as disclosed in Figure 3, the injection holes 74, 75 consist in a single central injection hole 75 and in a plurality of distributed injection holes 74.

[0037] The central injection hole 75 is formed substantially at the center of the injection wall 66.

[0038] The distribution of the distributed injection holes 74 on the injection wall 66 is adapted so that the flow of cosmetic product across the injection wall 66 is equally distributed along the surface of the injection wall 66. To that end, the injection wall 66 comprises a plurality of pierced concentric circles 80, 82, 84, 86, each distributed injection hole 74 being localized on one of said pierced concentric circles 80, 82, 84, 86. The pierced circles 80, 82, 84, 86 are preferably centered on the central injection hole 75.

[0039] The pierced circles 80, 82, 84, 86 comprise an inner pierced circle 80, an outer pierced circle 82, and, preferably, a plurality of interposed pierced circles 84, 86.

[0040] The inner pierced circle 80 is the pierced circle which is the closest to the central injection hole 75. It is substantially equidistant to the central injection hole 75 and to the pierced circle 84 which is the closest to said inner pierced circle 80.

[0041] The outer pierced circle 82 is the pierced circle which is the farthest to the central injection hole 75.

[0042] Each interposed pierced circle 84, 86 is a pierced circle which is interposed between two other pierced circles 80, 82, 84, 86. Each interposed pierced

circle 84, 86 is substantially equidistant to the two pierced circles 80, 82, 84, 86 which are the closest to said interposed pierced circle 84, 86.

[0043] Each injection hole 74 localized on a pierced circle 80, 82, 84, 86 is substantially equidistant to the two injection holes 74, localized on the same pierced circle 80, 82, 84, 86, which are the closest to said injection hole 74. Furthermore, the linear density of injection holes 74 on each pierced circle 80 is substantially equal to the linear density of injection holes 74 on each other pierced circle 80.

[0044] Back to Figure 2, the surrounding tube 62 is substantially coaxial with the duct 64.

[0045] The surrounding tube 62 comprises a substantially cylindrical wall 90 defining a free end 92 of the tube 62, and an annular flexible rim 94 projecting from an inner surface 96 of the wall 90 toward a central axis of the tube 62. Said flexible rim 94 lies preferably flush with the free end 92.

[0046] The border of the flexible rim 94 which is the closest to the axis of the tube 62 defines an opening 98 for the injection body 60. Said opening 98 has a section which is substantially equal to the section of the aperture 24 of the support 12, while being substantially complementary to the external radial section of the injection body 60.

[0047] The injection body 60 is movable relative to the surrounding tube 62 along the axis of the surrounding tube 62, between a deployed position in which the injection body 60 extends through the opening 98, the injection wall 66 being far from the free end 92, and a retracted position in which the injection body 60 does not extend through the opening 98, the injection wall 66 being close to the free end 92.

[0048] The injection head 54 further comprises a biasing member 100 to bias the injection body 60 toward its retracted position.

[0049] Said biasing member 100 consists, in the shown example, in a spring 102 surrounding the duct 64, said spring 102 being interposed between the surrounding tube 62 and an annular stop 104 projecting radially outwardly from the wall 70 of the duct 64 and which is integral with said wall 70.

[0050] The injection body 60 is further movable relative to the platform 52 between a compression position in which the support surface 56 and the injection wall 66 are close to each other, and a loosening position in which the support surface 56 and the injection wall 66 are far from each other.

[0051] The surrounding tube 62 is also movable relative to the platform 52 between a pressing position in which the support surface 56 and the free end 92 of the surrounding tube 62 are close to each other, and a release position in which the support surface 56 and the free end 92 are far from each other.

[0052] A filling method for filling the packaging assembly 10 with a cosmetic product, using the filling station 50, will now be described, with reference to Figures 4 to

12.

[0053] First, the packaging assembly 10 is placed into the hollow 58, as shown in Figure 4. The platform 52 is then driven toward the injection head 54, until the free end 92 of the surrounding tube 62 contacts the support 12 at the periphery of the matrix 20, as shown in Figure 5. The surrounding tube 62 is then in its pressing position.

[0054] The platform 52 then keeps moving toward the injection head 54. The surrounding tube 62, which rests on the support 12, is driven in the same direction, and is pulled up along the injection body 60. Thus, the injection body 60 passes through the opening 98, and the injection wall 66 contacts the matrix 20. As the platform 52 keeps going up, the matrix 20 is compressed between the injection wall 66 and the support 12, while the air which was contained in the matrix 20 escapes through the contact between the surrounding tube 62 and the support 12, as shown in Figure 6.

[0055] When the matrix 20 has been integrally compressed, the displacement of the platform 52 is stopped, as shown in Figure 7. The injection body 60 is then in its deployed and compression positions, and the free end 92 of the surrounding tube 62 is pressed against the support 12 thanks to the biasing action of the biasing member 100.

[0056] The matrix 20 is then impregnated with the cosmetic product in a liquid form. To that end, the duct 64 is fed with the cosmetic product in a liquid form, while the platform 52 is driven away from the injection head 54. Consequently, the matrix 20 is progressively decompressed, while simultaneously the cosmetic product is injected into the matrix 20, the cosmetic product passing through the injection holes 74, 75 and filling the spaces (not shown) which reappear in the matrix 20 further to its decompression, as shown in Figure 8. Meanwhile, the sealing ring 27 prevents air from entering the chamber 22 and filling the matrix 20.

[0057] The surrounding tube 62 being still biased toward the support 12 by the biasing member 100, it goes down along the injection body 60, while its flexible rim 94 scrapes the outer surface of the duct 64, thus cleaning the outer surface from the cosmetic product which may have coated said outer surface. Moreover, the surrounding tube 62 presses the support 12 against the bottom of the hollow 58, thus ensuring that the support 12 follows the displacement of the platform 52 and preventing the support 12 from hanging stuck to the injection body 60.

[0058] Preferably, the driving speed of the platform 52 is adapted so that the matrix 20 remains in contact with the injection wall 66. To that end, the platform 52 is driven so that the speed of removal of the injection wall 66 from the support 12 is less than 50 mm/sec. Advantageously, the speed of removal is more than 0.1 mm/sec, to ensure a quick filling of the packaging assembly 10.

[0059] Preferably, the flow rate of the cosmetic product during the injection, defined as the flow rate of cosmetic product through the injection wall 66 during the injection, is comprised between 0.5 ml/sec and 30 ml/sec to ensure

a quick yet satisfactory impregnation of the matrix 20.

[0060] When the matrix 20 is integrally decompressed, as shown in Figure 9, the feeding of the duct 64 with the cosmetic product is stopped. The platform 52 keeps being displaced away from the injection head 54. Since the surrounding tube 62 is still biased toward the support 12, the free end 92 remains in contact with the support 12.

[0061] Finally, the surrounding tube 62 reaches a stop, and the injection body 60 is then in its retracted position, as shown in Figure 10. The platform 52 then keeps moving away from the injection head 54, as shown in Figure 11, until the space between the platform 52 and the injection head 54 is sufficient for allowing removal of the packaging assembly 10 from the hollow 58.

[0062] The displacement of the platform 52 is then stopped, and the chamber 22 is closed by sealingly fixing a cap 110 to the support 12, said cap 110 covering the aperture 24, as shown in Figure 12.

[0063] Next, the filled packaging assembly 10 is removed from the hollow 58, and returned so that the cap 110 defines a lower surface of the packaging assembly 10.

[0064] The packaging assembly is then ready to use. To that end, the user merely needs to separate the lid 16 from the support 12, thus releasing the applicator 18. He then takes the applicator 18, removes the cover 14, and impregnates the applicator 18 with the cosmetic product contained in the matrix 20.

[0065] Thanks to the invention describes here above, it is possible to fill the packaging assembly 10 quickly and in an efficient manner, without part of the cosmetic product remaining at the surface of the matrix 20.

[0066] Moreover, since the matrix 20 is impregnated while it is housed in the packaging assembly 10, handling of the impregnated matrix 20 is limited. This ensures low risks of soiling the outer surface of the packaging assembly 10.

[0067] With reference of Figures 13 to 15, in an alternative embodiment of the invention, the inner passage 72 of the duct 64 is divided into at least two compartments 120, 122 separated by a wall 124 which extends substantially axially. Each compartment 120, 122 is fluidly connected to a specific cosmetic product provider (not shown), providing a specific cosmetic product in a liquid form.

[0068] Preferably, at least one of the cosmetic product providers is adapted for providing a cosmetic product which is visually different from the cosmetic product provided by at least another of the cosmetic product providers.

[0069] The injection wall 66 is then divided in a plurality of regions 126, 128, the injection holes 74 located in each region 126, 128 emerging in a specific compartment 120, 122. In other words, for each region 126, 128 of the injection wall 66, each injection hole 74 located in this region 126, 128 emerges in a compartment 120, 122 which is identical to the compartment in which emerges each other injection hole 74 located in said region 126, 128,

while being different from the compartment 120, 122 in which emerges each injection hole 74 located in each other region 126, 128.

[0070] Preferably, as shown, the injection holes 74 are disposed along the periphery of the region 126, 128 in which they are located. Optionally, some injection holes 74 are disposed in a center area of the region 126, 128 in which they are located; thus, the cosmetic products can be delivered more homogeneously.

[0071] In a first alternative of this embodiment, shown in Figure 13, the wall 124 extends through the inner passage 72. In particular, the radial section of the wall 124 is S-shaped.

[0072] Each compartment 120, 122 is then defined between the wall 124 and the cylindrical wall 70. The injection holes 74 are distributed along the outer periphery of each region 126, 128.

[0073] In the second and third alternatives of this embodiment, shown in Figures 14 and 15, the wall 124 defines a closed contour within the inner passage 72. In particular, the radial section of the wall 124 is star-shaped in the second alternative, and L-shaped in the third alternative.

[0074] A first of the compartments 120 is then defined between the wall 124 and the cylindrical wall 70, while the second compartment 122 is surrounded by the wall 124. The first compartment 120 thus surrounds the second compartment 122. The injection holes 74 are then distributed along the outer periphery of the second region 128, and along the inner and outer peripheries of the first region 126.

[0075] Thanks to this alternative embodiment, impregnation of the matrix 20 with the cosmetic products provided by the cosmetic product providers will result in forming a pattern in the matrix 20.

Claims

1. A filling method for filling a packaging assembly (10) with at least one cosmetic product, the method comprising the following steps:
 - providing the packaging assembly (10), said packaging assembly (10) comprising a porous matrix (20),
 - compressing the matrix (20), and
 - impregnating the matrix (20) with the or each cosmetic product, this step comprising decompressing the matrix (20) while simultaneously injecting the or each cosmetic product into the matrix (20).
2. The filling method according to claim 1, wherein the matrix (20) is compressed between a support (12) and an injection wall (66) of an injection head (54) during the compression step, and wherein, during the impregnation step, the matrix (20) remains in contact with the injection wall (66) of the injection head (54), the or each cosmetic product being injected through a plurality of injection holes (74, 75) formed in the injection wall (66).
3. The filling method according to claim 2, wherein the injection holes (74, 75) consist in a single central injection hole (75) and in a plurality of distributed injection holes (74), and the injection wall (66) comprises a plurality of pierced concentric circles (80, 82, 84, 86), each distributed injection hole (74) being localized on one of said pierced circles (80, 82, 84, 86), the linear density of distributed injection holes (74) on each pierced circle (80, 82, 84, 86) being substantially equal to the linear density of distributed injection holes (74) on each other pierced circle (80, 82, 84, 86).
4. The filling method according to claim 3, wherein each distributed injection hole (74) localized on a pierced circle (80, 82, 84, 86) is substantially equidistant to the two distributed injection holes (74), localized on the same pierced circle (80, 82, 84, 86), which are the closest to said distributed injection hole (74).
5. The filling method according to claim 3 or 4, wherein the pierced circles (80, 82, 84, 86) comprise at least one interposed pierced circle (84, 86) which is interposed between two other pierced circles (80, 82, 84, 86), the or each interposed pierced circle (84, 86) being substantially equidistant to the two pierced circles (80, 82, 84, 86) which are the closest to said interposed pierced circle (84, 86).
6. The filling method according to claim 2, wherein the injection wall (66) is divided in a plurality of regions (126, 128), the injection holes (74) located in each region (126, 128) being fluidly connected to a specific cosmetic product provider providing a specific cosmetic product.
7. The filling method according to any one of claims 2 to 6, wherein decompressing the matrix (20) comprises taking the injection wall (66) away from the support (12) at a speed comprised between 0.1 mm/sec and 50 mm/sec, and injecting the or each cosmetic product into the matrix (20) comprises injecting the or each cosmetic product with a flow rate comprised between 0.5 ml/sec and 30 ml/sec.
8. The filling method according to any one of claims 2 to 7, wherein the support (12) defines a chamber (22) housing the matrix (20), and an aperture (24) emerging into the chamber (22) and into an external face (26) of the support (12), for the penetration of the injection wall (66) into the chamber (22).
9. The filling method according to any one of claims 2

to 8, wherein the injection head (54) comprises a surrounding tube (62) and an injection body (60) surrounded by the surrounding tube (62), the injection body (60) being movable relative to the surrounding tube (62) along an axis of the surrounding tube (62), the injection body (60) comprising the injection wall (66) and a duct (64) for the circulation of the or each cosmetic product, the injection wall (66) closing an end (68) of the duct (64), the compression step comprises displacing the injection body (60) relative to the surrounding tube (62) so that the injection wall (66) compresses the matrix (20) against the support (12), the method comprises an additional step of enclosing the matrix (20) between the support (12) and the injection head (54), said step comprising displacing the surrounding tube (62) relative to the injection body (60) until a free end (92) of the surrounding tube (62) contacts the support (12) at the periphery of the matrix (20), and pressing the free end (92) against the support (12), and the impregnation step comprises displacing the injection body (60) relative to the surrounding tube (62) so that the injection wall (66) gets away from the support (12), while maintaining pressure of the free end (92) against the support (12) and feeding the duct (64) with the or each cosmetic product.

10. The filling method according to claim 9, wherein the surrounding tube (62) comprises a cylindrical wall (90) and an annular flexible rim (94) projecting from an inner surface of the cylindrical wall (90) toward a central axis of the surrounding tube (62), the opening being defined by the border of the flexible rim (94) which is the closest to the central axis, the section of the opening (98) being substantially complementary to an external radial section of the injection body (60).
11. The filling method according to any one of claims 8 to 10, further comprising a step of closing the chamber (22) by sealingly fixing a cap (110) to the support (12), the cap (112) covering the aperture (24).
12. The filling method according to any one of claims 2 to 11, wherein the support (12) is part of the packaging assembly (10).
13. The filling method according to claim 12 considered together with any one of claims 8 to 12, wherein the support (12) defines an orifice (28) emerging into the chamber (22) and into the external face (26) of the support (12), opposite the aperture (24), and the packaging assembly (10) further comprises a watertight cover (14) covering the orifice (28) opposite the chamber (22), a lid (16) covering the watertight cover (14), reversibly attached to the support (12), and, between the cover (14) and the lid (16), an applicator (18) for applying the or each cosmetic product on

the skin of a user.

14. The filling method according to any one of the preceding claims, wherein the or each cosmetic product is injected in a liquid form.
15. A filling station (50) adapted for implementing a filling method according to any one of the preceding claims.

Amended claims in accordance with Rule 137(2) EPC.

1. A filling method for filling a packaging assembly (10) with at least one cosmetic product, the method comprising the following steps:
- providing the packaging assembly (10), said packaging assembly (10) comprising a porous matrix (20),
 - compressing the matrix (20), and
 - impregnating the matrix (20) with the or each cosmetic product, this step comprising decompressing the matrix (20) while simultaneously injecting the or each cosmetic product into the matrix (20),

wherein the matrix (20) is compressed between a support (12) and an injection wall (66) of an injection head (54) during the compression step, and wherein, during the impregnation step, the or each cosmetic product is injected through a plurality of injection holes (74, 75) formed in the injection wall (66), the method being **characterized in that** decompressing the matrix (20) comprises taking the injection wall (66) away from the support (12) at a speed comprised between 0.1 mm/sec and 50 mm/sec, so that, during the impregnation step, the matrix (20) remains in contact with the injection wall (66) of the injection head (54).

2. The filling method according to claim 1, wherein the injection holes (74, 75) consist in a single central injection hole (75) and in a plurality of distributed injection holes (74), and the injection wall (66) comprises a plurality of pierced concentric circles (80, 82, 84, 86), each distributed injection hole (74) being localized on one of said pierced circles (80, 82, 84, 86), the linear density of distributed injection holes (74) on each pierced circle (80, 82, 84, 86) being substantially equal to the linear density of distributed injection holes (74) on each other pierced circle (80, 82, 84, 86).
3. The filling method according to claim 2, wherein each distributed injection hole (74) localized on a pierced circle (80, 82, 84, 86) is substantially equidistant to

the two distributed injection holes (74), localized on the same pierced circle (80, 82, 84, 86), which are the closest to said distributed injection hole (74).

4. The filling method according to claim 2 or 3, wherein the pierced circles (80, 82, 84, 86) comprise at least one interposed pierced circle (84, 86) which is interposed between two other pierced circles (80, 82, 84, 86), the or each interposed pierced circle (84, 86) being substantially equidistant to the two pierced circles (80, 82, 84, 86) which are the closest to said interposed pierced circle (84, 86).
5. The filling method according to claim 1, wherein the injection wall (66) is divided in a plurality of regions (126, 128), the injection holes (74) located in each region (126, 128) being fluidly connected to a specific cosmetic product provider providing a specific cosmetic product.
6. The filling method according to any one of claims 1 to 5, wherein injecting the or each cosmetic product into the matrix (20) comprises injecting the or each cosmetic product with a flow rate comprised between 0.5 ml/sec and 30 ml/sec.
7. The filling method according to any one of claims 1 to 6, wherein the support (12) defines a chamber (22) housing the matrix (20), and an aperture (24) emerging into the chamber (22) and into an external face (26) of the support (12), for the penetration of the injection wall (66) into the chamber (22).
8. The filling method according to any one of claims 1 to 7, wherein the injection head (54) comprises a surrounding tube (62) and an injection body (60) surrounded by the surrounding tube (62), the injection body (60) being movable relative to the surrounding tube (62) along an axis of the surrounding tube (62), the injection body (60) comprising the injection wall (66) and a duct (64) for the circulation of the or each cosmetic product, the injection wall (66) closing an end (68) of the duct (64), the compression step comprises displacing the injection body (60) relative to the surrounding tube (62) so that the injection wall (66) compresses the matrix (20) against the support (12), the method comprises an additional step of enclosing the matrix (20) between the support (12) and the injection head (54), said step comprising displacing the surrounding tube (62) relative to the injection body (60) until a free end (92) of the surrounding tube (62) contacts the support (12) at the periphery of the matrix (20), and pressing the free end (92) against the support (12), and the impregnation step comprises displacing the injection body (60) relative to the surrounding tube (62) so that the injection wall (66) gets away from the support (12), while maintaining pressure of the free end (92) against the support (12) and feeding the duct (64) with the or each cosmetic product.
9. The filling method according to claim 8, wherein the surrounding tube (62) comprises a cylindrical wall (90) and an annular flexible rim (94) projecting from an inner surface of the cylindrical wall (90) toward a central axis of the surrounding tube (62), the opening being defined by the border of the flexible rim (94) which is the closest to the central axis, the section of the opening (98) being substantially complementary to an external radial section of the injection body (60).
10. The filling method according to any one of claims 7 to 9, further comprising a step of closing the chamber (22) by sealingly fixing a cap (110) to the support (12), the cap (112) covering the aperture (24).
11. The filling method according to any one of claims 1 to 10, wherein the support (12) is part of the packaging assembly (10).
12. The filling method according to claim 11 considered together with any one of claims 7 to 11, wherein the support (12) defines an orifice (28) emerging into the chamber (22) and into the external face (26) of the support (12), opposite the aperture (24), and the packaging assembly (10) further comprises a watertight cover (14) covering the orifice (28) opposite the chamber (22), a lid (16) covering the watertight cover (14), reversibly attached to the support (12), and, between the cover (14) and the lid (16), an applicator (18) for applying the or each cosmetic product on the skin of a user.
13. The filling method according to any one of the preceding claims, wherein the or each cosmetic product is injected in a liquid form.
14. A filling station (50) adapted for implementing a filling method according to any one of the preceding claims.

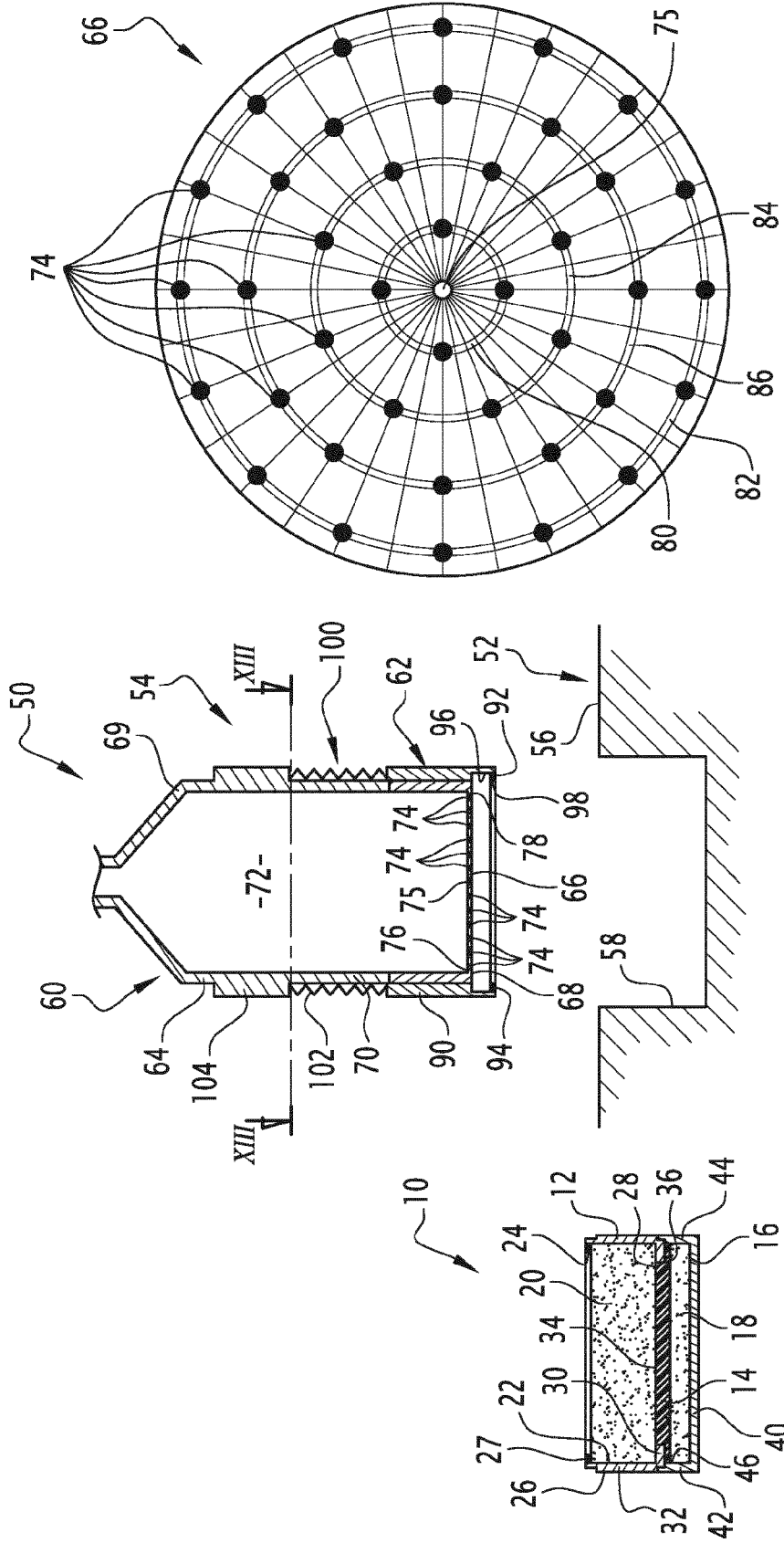


FIG. 3

FIG. 2

FIG. 1

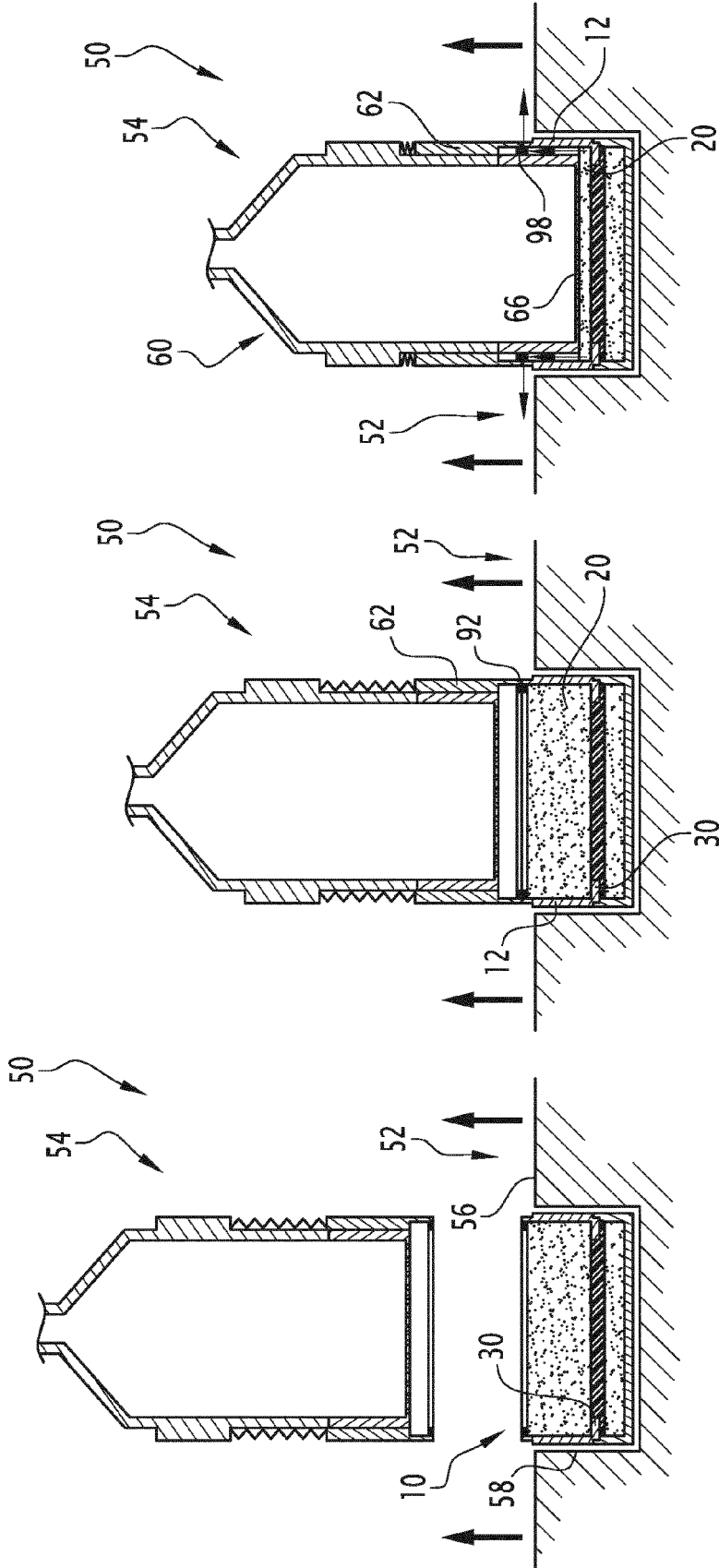


FIG.6

FIG.5

FIG.4

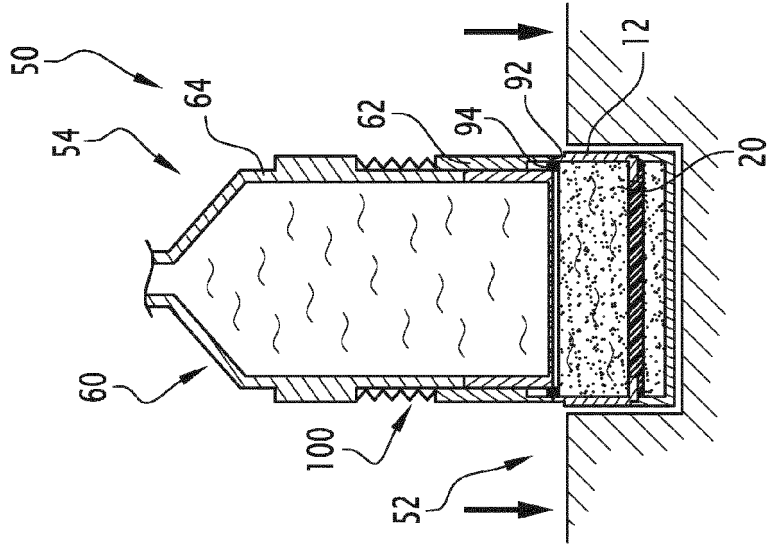


FIG. 9

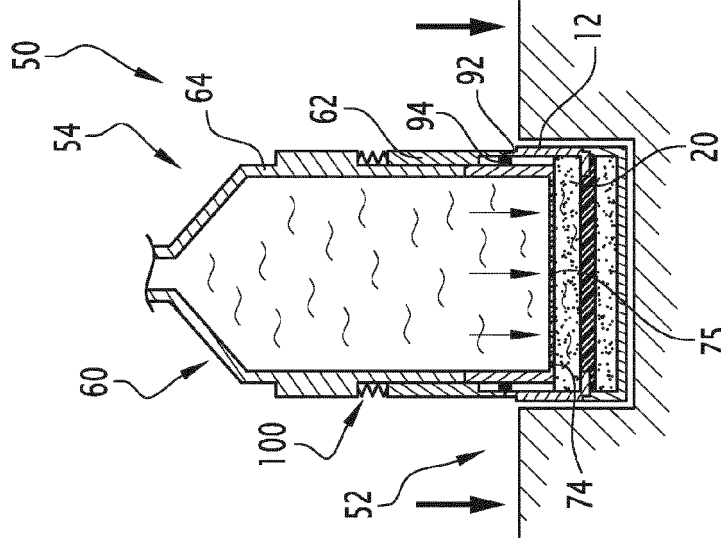


FIG. 8

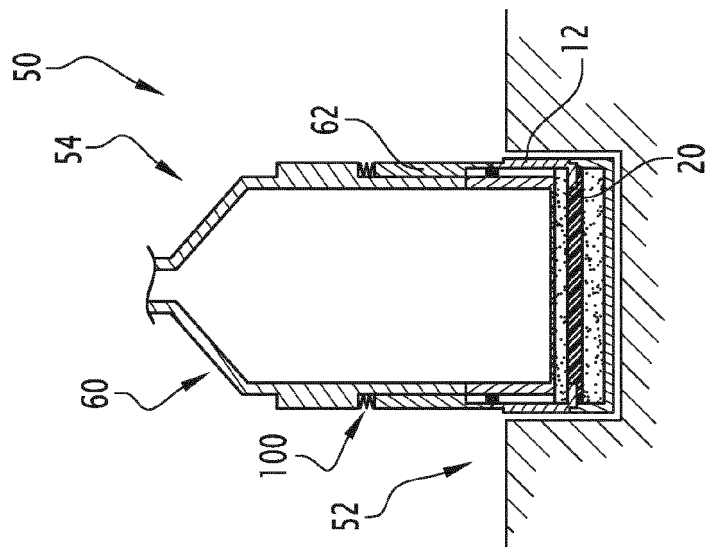


FIG. 7

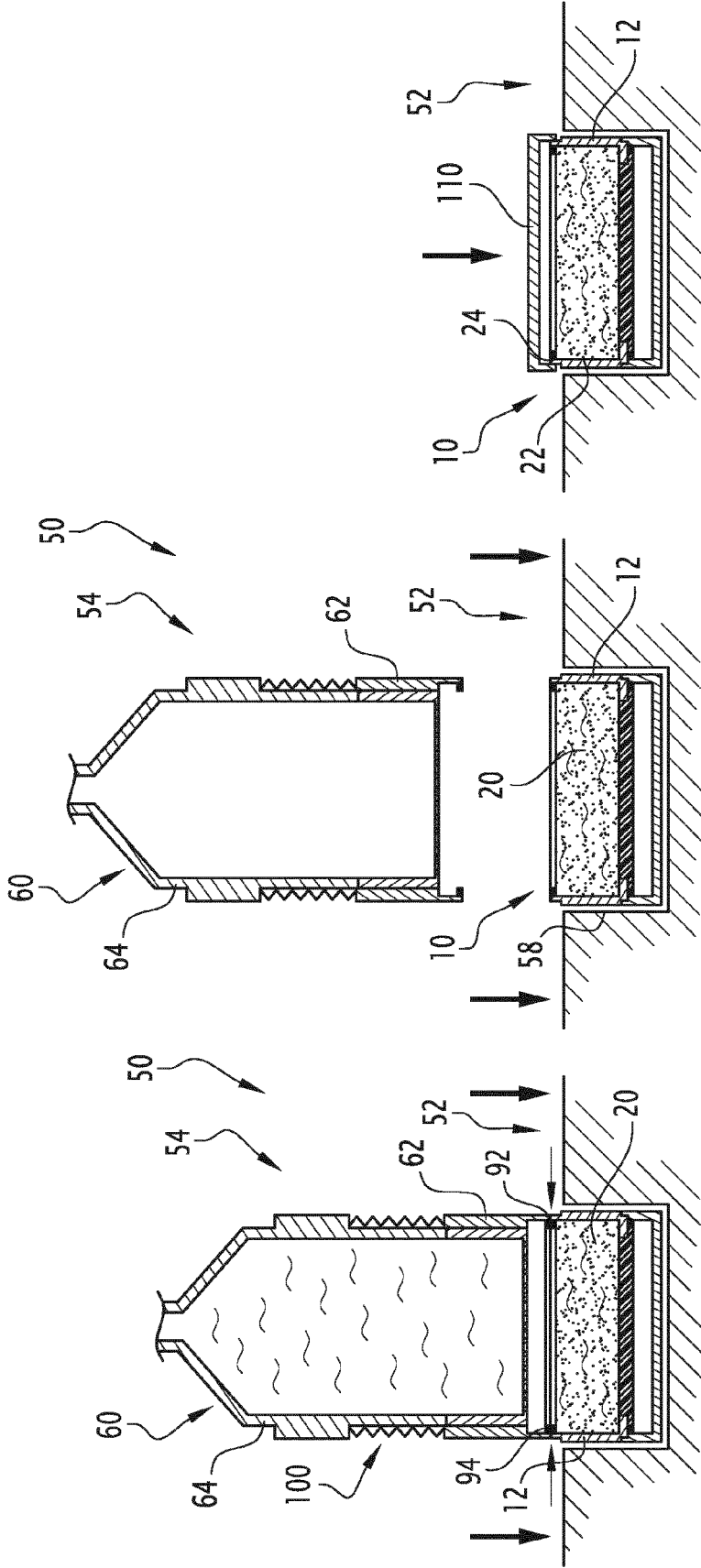


FIG.12

FIG.11

FIG.10

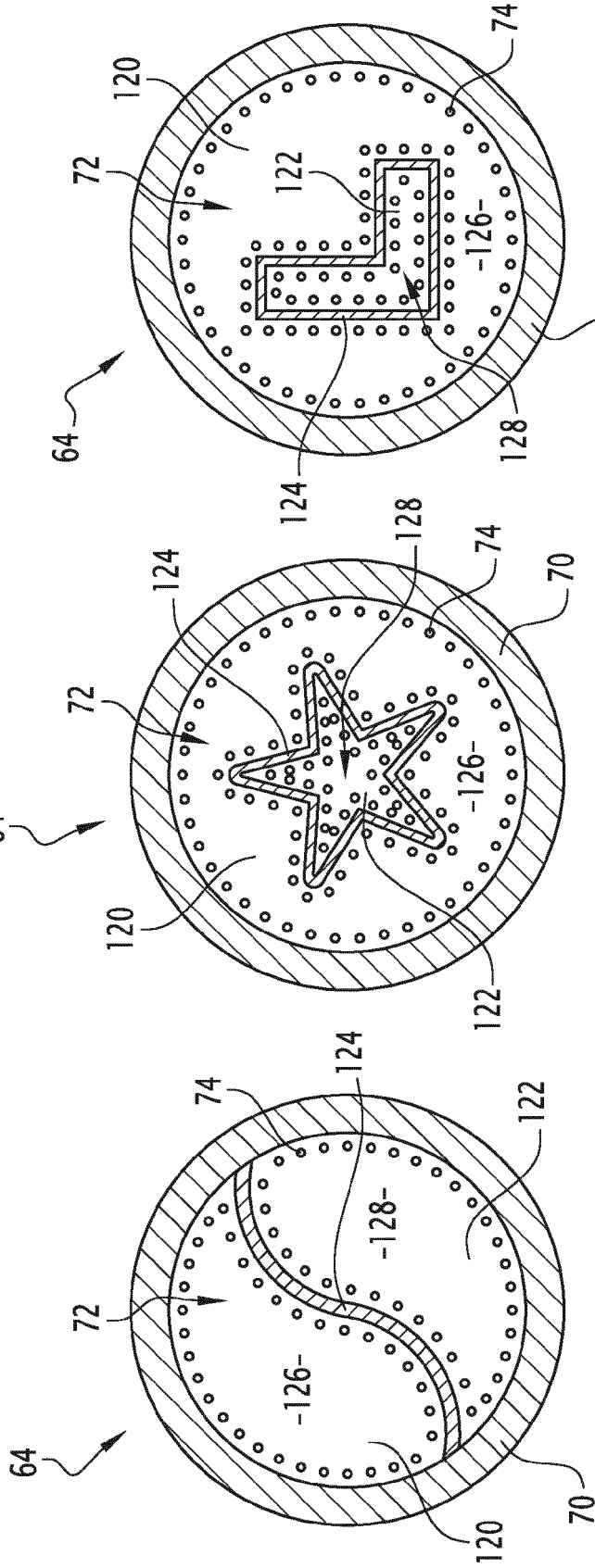


FIG.15

FIG.14

FIG.13



EUROPEAN SEARCH REPORT

Application Number
EP 15 30 5576

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Y	* figures 1, 5, 6a, 6b * * paragraphs [0001], [0007], [0010], [0027], [0040] - [0050], [0052] *	8,11,12	A45D34/04 B65B3/04
X	WO 2015/046698 A1 (KIM JIN WOO [KR]; CTK CO LTD [KR]) 2 April 2015 (2015-04-02)	1,8,11, 12,14,15	ADD. B65B7/28 B65B39/04
Y	* figure 18 * * paragraphs [0001], [0053] - [0064] *	8,11,12	
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Place of search		Date of completion of the search	Examiner
Munich		4 September 2015	Schmitt, Michel
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