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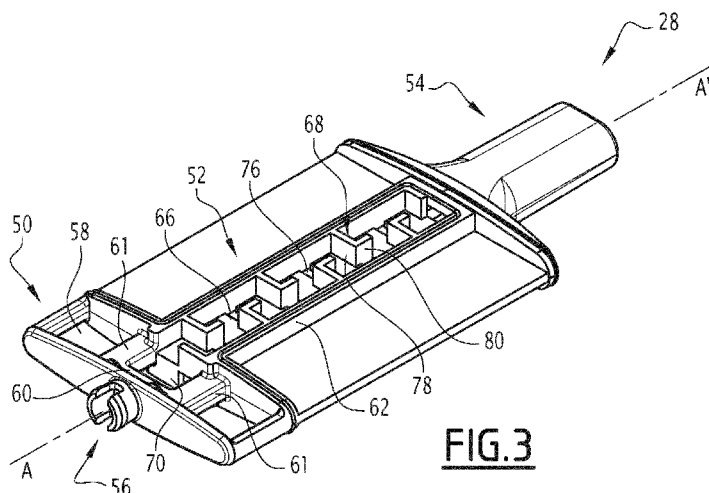
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- (54) **Title:** DISTRIBUTION HEAD FOR DISTRIBUTING A COSMETIC COMPOSITION FORMED BY MIXING A FIRST COSMETIC PRODUCT WITH A SECOND COSMETIC PRODUCT, RELATED DEVICE AND PROCESS



- (57) **Abstract:** Distribution head for distributing a cosmetic composition formed by mixing a first cosmetic product with a second cosmetic product, related device and process This head (20), comprises a duct for preparing and distributing the cosmetic composition and a static mixer (28) arranged in the duct for preparing and for distributing. The mixer (28) comprises at least one longitudinal wall (66) for separating the passage into a first region and into a second region, with the longitudinal wall (66) defining at least one through-hole (76) connecting the first region to the second region, at least one first element for mixing (68) protruding in the first region and at least one second element for mixing protruding in the second region.



Distribution head for distributing a cosmetic composition formed by mixing a first cosmetic product with a second cosmetic product, related device and process

This invention relates to a head for distributing a cosmetic composition formed by mixing a first cosmetic product with a second cosmetic product, comprising:

5 - a duct for preparing and distributing the cosmetic composition able to be connected simultaneously to a first reservoir of a first cosmetic product, and to a second reservoir of a second cosmetic product, with the duct for preparing and for distributing opening outside of the head;

10 - a static mixer arranged in the duct for preparing and for distributing, with the static mixer defining a passage for the circulation and the mixing of the first cosmetic product with the second cosmetic product.

This head is intended to be mounted on a receptacle containing at least two cosmetic products intended to be mixed. The receptacle, provided with its head, forms a device for packaging and distributing the cosmetic composition.

15 A cosmetic product is in particular a product as defined in EC Regulation N° 1223/2009 of the European Parliament and the Council of November 30, 2009, relating to cosmetic products.

20 The aforementioned distribution head can be used in particular to form a cosmetic composition from two different products, that react together and which cannot be stored in contact with one another, but which must be mixed just before use.

This is the case in particular for oxidation dyes for hair. In this type of compositions, the oxidant and the coloring agent must be stored separately and are mixed only at the time of application of the dyeing composition on the hair.

25 Oxidation dyes are sometimes marketed in a packaging containing a bottle filled with oxidant, a tube filled with a coloring paste, and a light tray made from a thermoformed plastic material, wherein the oxidant and the coloring agent are mixed. This packaging also contains, most often, a brush for mixing the two products in the tray and the application of the mixture obtained, lock by lock, on the hair.

30 Such a method of packaging requires a manual intervention from the user in order to form the composition, which is tedious, in particular for an individual.

35 Other methods of packaging and delivery of cosmetic compositions, in particular in the form of aerosols are much more practical to use. In particular, there are distribution heads comprising a diffuser that allows for the simultaneous actuating of the two stems of the aerosol, either with a single aerosol and two bags of products (such as for example in EP2597055 and EP2657151), or with two aerosols maintained together (FR2875797). The product exits through a distribution nozzle.

These heads operate satisfactorily with fluid products that are easily mixed. However, coloring products are products that are particularly viscous, with the oxidant able to have a viscosity of about 10,000 mPa.s and the coloring about 5,000 mPa.s. Consequently, the mixing thereof does not take place naturally.

However, in order to obtain a dyeing composition with good properties, it is essential to have a homogeneous mixture between the oxidant and the coloring, with a constant volume ratio during the distribution, and in particular in a ratio of one to one. A heterogeneous mixture does not make it possible to guarantee satisfactory properties for use, and requires manual action from the user.

In order to improve this mixture, receptacles comprising a distribution nozzle provided with a static mixture of the helical or baffle type are known. However, these distributed coloring products are too viscous to form a turbulent flow in such mixers. This type of mixture is therefore unsuitable.

A purpose of the invention is to obtain a distribution head for a cosmetic product that allows for an effective mixing of two viscous cosmetic products in order to simply deliver and without manual mixing from the user a cosmetic composition have very satisfactory properties for use.

For this purpose, the subject matter of the invention is a head of the aforementioned type, characterized in that the mixer comprises:

- at least one longitudinal wall for separating the passage into a first region and into a second region, the longitudinal wall defining at least one through-hole connecting the first region to the second region;
- at least one first element for mixing protruding in the first region;
- at least one second element for mixing protruding in the second region.

The head according to the invention can include one or more of the following features, considered alone or in any combination that is technically possible:

- the longitudinal wall for separating defines a plurality of successive through-holes spaced longitudinally along the longitudinal wall;
- the or each first element for mixing and/or the or each second element for mixing is located at the periphery of the through-hole;
- the or each first element for mixing protrudes from a first face of the longitudinal wall delimiting the first region, the or each second element for mixing protruding from a second face of the longitudinal wall delimiting the second region;
- a plurality of first elements for mixing arranged in staggered fashion in the first region and/or a plurality of second elements for mixing, arranged in staggered fashion in the second region;

- the or each first element for mixing and/or the or each second element for mixing comprises a transverse partition, and a longitudinal partition protruding from the transverse partition;

- the longitudinal partition passes through the through-hole;

5 - the longitudinal wall extends over the entire width of the passage;

- the mixer defines an upstream chamber for collecting of the first cosmetic product and of the second cosmetic product, arranged upstream of the passage of circulation, and a distribution nozzle of the cosmetic composition, devoid of elements for mixing, arranged downstream of the passage for circulation;

10 - the mixer is removeably mounted in the duct for preparing and for distributing.

The subject matter of the invention is also a device for packaging and/or distributing a cosmetic product, comprising:

- a first reservoir containing a first cosmetic product;

- a second reservoir containing a second cosmetic product;

15 - a head such as defined hereinabove, the duct for preparing and for distribution being able to be connected simultaneously to the first reservoir and to the second reservoir.

The device according to the invention can include one or more of the following features, considered alone or in any combination that is technically possible:

20 - the viscosity of the first cosmetic product is greater than 1000 mPa.s, in particular greater than 5000 mPa.s;

- the viscosity of the second cosmetic product is greater than 1000 mPa.s, in particular greater than 10,000 mPa.s.

25 The subject matter of the invention is also a cosmetic product distribution method, comprising the following steps:

- provision of a device such as defined above;

- simultaneous distribution of a first cosmetic product and of a second cosmetic product in the duct for preparing and for distributing from respectively the first reservoir and from the second reservoir.

30 - formation of the cosmetic composition in the mixer via the passage of at least one portion of the mixture of the first cosmetic product with the second cosmetic product successively in contact with a first element for mixing, through a through-hole, and/or in contact with a second element for mixing.

The method according to which the invention may have the following feature:

- the Reynolds number of the first cosmetic product at its inlet into the duct for the preparing and the distributing is less than 1 and the Reynolds number of the second cosmetic product at its inlet into the duct for mixing is less than 1.

The invention will be easier to understand in view of the following description, provided solely as an example and with reference to the appended drawings, wherein:

- figure 1 shows a first device for the packaging and the distributing of a cosmetic product, with the device comprising a mixture according to the invention;

- figure 2 is a side view of the head in figure 1;

- figure 3 is a perspective three-quarters bottom view of the mixture of the device of figure 1;

- figure 4 is a bottom view of the mixture of the device of figure 1;

- figure 5 is a front view of the mixture of the device of figure 1;

- figure 6 is a cross-section view according to the longitudinal plane VI-VI of figure 5.

A first device 10 for packaging and distributing a cosmetic composition obtained by mixing a first cosmetic product and a second cosmetic product is shown in figures 1 to 5.

The cosmetic composition is for example a composition for coloring keratin fibers of a user, in particular the hair of a user.

The cosmetic composition is carried out using a first cosmetic coloring product and a second oxidizing cosmetic product. The first cosmetic product and the second cosmetic product are stored separately in the device 10.

The first cosmetic product comprises in a known manner an alkaline agent. The alkaline agent is for example mineral such as ammonia, organic, such as an organic amine or hybrid such as an amine salt. It advantageously comprises at least one coloring agent such as an oxidation dye precursor, a direct coloring or mixtures thereof. It may contain at least one anionic, nonionic, cationic, amphoteric and/or zwitterionic surfactants.

The second cosmetic product contains at least one oxidizing agent, different from the oxygen in the air, such as hydrogen peroxide. It comprises at least one fatty substance. The term "fatty substance" refers to an organic compound insoluble in water at ordinary temperature (25 °C) at atmospheric pressure (760 mm of Hg) (solubility less than 5% and preferably 1% and even more preferably 0.1%). The fatty substances are chosen for example from hydrocarbons, oils, fatty alcohols, esters of fatty acid and/or of fatty alcohols different from triglycerides and plant waxes, non-silicone waxes, silicones, and mixtures thereof.

It may contain at least one anionic, nonionic, cationic, amphoteric and/or zwitterionic surfactants.

The first cosmetic product and the second cosmetic product are here viscous products. The first cosmetic product and the second cosmetic product can each have a viscosity ranging from 1,000 mPa.s to 60,000 mPa.s preferably from 5,000 mPa.s to 40,000 mPa.s.

5 For example, the viscosity of the first cosmetic product is in particular between 10,000 mPa.s and 40,000 mPa.s.

The viscosity of the second cosmetic product is in particular between 5,000 mPa.s and 15,000 mPa.s.

10 The viscosity of the products is measured at 25°C using a Brookfield LVT viscometer equipped with a mobile M4 rotating at a speed of 12 revolutions per minute. The measurement is taken after 1 minute.

In order to form the cosmetic composition, the first cosmetic product and the second cosmetic product are mixed in the device 10 which distributes the cosmetic product formed as such.

15 In this example, the first cosmetic product and the second cosmetic product are received respectively in a first reservoir 12 and in a second reservoir 14 of the device 10, in the form of an aerosol, comprising a propellant gas.

20 In an embodiment, the propellant gas is common to the first cosmetic product and to the second cosmetic product. It is arranged in a space located outside the first reservoir 12 and outside of the second reservoir 14. Alternatively, the propellant gas is arranged in each reservoir 12, 14.

25 As shown in figure 1 and in figure 2, the device for packaging and for distributing 10 comprises a receptacle 16 receiving the reservoirs 12, 14, and a head 20 for mixing cosmetic products and for distributing the cosmetic composition, mounted on a neck 18 of the recipient 16.

Each reservoir 12, 14 is provided at its upper end with a member 22 for distributing the product. The distributing member 22 is here a mobile rod that controls the opening of a valve.

30 The displacement of the member for distributing the product 22 authorizes the distribution of each product from the reservoir 12, 14 outwards.

In reference to figure 1, the head 16 for mixing and for distributing comprises a band 24 for mounting on the neck 18, a diffuser 26 mounted on the band 24, and a mixer 28 for products, inserted into the diffuser 26.

35 The diffuser 26 comprises a cover 30 assembled on the band 24, a duct 32 for preparing and distributing the cosmetic composition, receiving the mixer 28, and at least one mobile member 34 for actuating the mixture and the distribution.

The duct for preparing 32 comprises a first upstream section 36, mounted on the distributing member 22 of the first reservoir 12, a second upstream section 38, mounted on the distributing member 22 of the second reservoir 14, and a distribution nozzle 40 connected to the upstream sections 36, 38. The distribution nozzle 40 protrudes partially outside of the cover 30 in order to receive the mixer 28.

The mobile member for actuating 34 is able to displace the first upstream section 36 and the second upstream section 38 in order to simultaneously actuate the distributing member 22 of the first reservoir 12 and the distributing member 22 of the second reservoir 14.

In reference to figures 3 to 6, the mixer 28 is formed of a removable cartridge inserted into the distribution nozzle 40. It extends along a central axis A-A'.

The mixer 28 comprises an upstream portion 50 for receiving the first upstream section 36 and the second upstream section 38 in order to collect the first cosmetic product and the second cosmetic product. It comprises a central duct 52 for mixing the first cosmetic product with the second cosmetic product in order to form the cosmetic composition, and nozzle 54 for distributing the cosmetic composition outside of the device.

In this example, the mixer 28 further comprises a member 56 for fastening to the nozzle 40 the diffuser 26.

The upstream portion 50 is hollow. It defines an upstream chamber 58 for collecting the first cosmetic product and the second cosmetic product. The upstream section 36 and the second upstream section 38 open on either side of the upstream chamber 58, on each side of the axis A-A'. The upstream chamber 58 has a central region 60 of convergence, located on the axis A-A', at the inlet to the central duct 52.

Membranes 61 laterally limit the central region 60.

The central duct 52 here extends along the axis A-A' between the upstream chamber 58 and the nozzle 54. It comprises a tubular peripheral wall 62 defining a central passage 64 of axis A-A'.

According to the invention, the central duct 52 further comprises a longitudinal wall 66 for separating the central passage 64, a plurality of first elements for mixing 68 arranged in a first region of the central passage 64, on one side of the longitudinal separation wall 66 and a plurality of second elements for mixing 70 arranged in a second region of the central passage 64 of another side of the longitudinal separation wall 66.

In this example, the central passage 64 has an extended transverse section along an axis B-B' perpendicular to the axis A-A', visible in figure 5. This section here is substantially oval.

The longitudinal wall 66 separates the central passage 64 into the first region and into the second region according to the axis B-B'. The first and second regions are separated. They are delimited respectively by a first face 72 of the longitudinal wall 66 and by a second face 74 of the longitudinal wall 66.

5 The longitudinal wall 66 extends over the entire width of the central passage 64 between two opposite sides of the peripheral wall 62.

The longitudinal wall 66 is perforated. It has a plurality of through-holes 76, extending perpendicularly to the axis A-A' by being spaced longitudinally from one another.

10 The through-holes 76 open onto the first face 72 and onto the second face 74 in order to connect the first region to the second region. In this example, they also extend over the entire width of the central passage 64. The adjacent through-holes 76 are separated longitudinally between them by a solid portion of the longitudinal wall 66.

15 The first elements for mixing 68 are longitudinally spaced from one another along the axis A-A'. They are arranged in staggered fashion. They protrude towards the axis A-A' respectively from a first side and from a second side of the peripheral wall 62 towards the axis A-A'. They also protrude separate from the longitudinal wall 66 from the first face 72.

20 In this example, the first elements for mixing 68 are each located facing a through-hole 76.

Each first element for mixing 68 has a horizontal section in the shape of an L.

25 Each first element for mixing 68 as such comprises a transverse partition 78 that extends perpendicularly to the axis A-A' towards this axis, and at the free end of the transverse partition 78, a longitudinal partition 80 extending parallel to the axis A-A' in the direction from upstream to downstream.

The transverse partition 78 partially borders the through-hole 76. It extends over the entire height of the first region of the central passage 64.

The longitudinal partition 80 passes through the through-hole 76 over its entire length.

30 In this example, the number of first elements for mixing 68 is greater than 2 and is in particular between 3 and 10.

35 The second elements for mixing 70 are arranged in the second region symmetrically according to the axis A-A' with respect to the first elements for mixing 68. They have a structure that is identical to that of the first elements for mixing 68, which will not be shown again in detail.

The longitudinal partition 80 of each second element for mixing 70 joins the longitudinal partition 80 of a first element for mixing 68 through the through-hole 76.

The longitudinal wall 66, the first elements for mixing 68 and the second elements for mixing 70 as such define in the central duct 52 winding paths for the passage of the mixture formed by the first cosmetic product and by the second cosmetic product. These paths pass successively over then under the longitudinal wall 66 through the through-holes 76. They also pass as a zig-zag on either side of the longitudinal wall 66, by being delimited laterally and transversally, respectively against the first elements for mixing 68 and against the second elements for mixing 70.

The nozzle 54 extends to the downstream end of the central duct 52. It protrudes longitudinally along the axis A-A'.

In this example, the member for fastening 56 is formed by a clipping lug 82 intended to be received in a corresponding opening arranged in the diffuser 26, at the back of the nozzle 40.

Advantageously, the mixer 28 is mounted removeably in the duct 32. In the example shown in figures 3 to 6, the upstream chamber 58 and the central passage 64 are open downwards. The nozzle 40 seals off downwards the upstream chamber 58 and the central passage 64 when the mixer 28 is received in the nozzle 40.

The distribution nozzle 54 protrudes outside of the nozzle 40, as can be seen in figure 2.

Such an arrangement allows for the simple cleaning of the mixer 28 when this is required. Furthermore, the molding of the mixer 28 as a single piece is possible.

The assembly of the device 10 shall now be briefly described.

Initially, the first reservoir 12 and the second reservoir 14 are filled respectively with the first cosmetic product and with the second cosmetic product in the receptacle 16. The diffuser 26 is placed on the assembly band 24 which is then assembled on the neck 18.

During the assembly, the first upstream section 36 and the second upstream section 38 are respectively connected on the distribution members 22 of the first reservoir 12 and of the second reservoir 14.

The mixer 28 is provided separately and is inserted into the distribution nozzle 40.

The use of the device 10 shall now be described.

Initially, the user grasps the receptacle 16 and presses the mobile member 34. The displacement of the mobile member 34 causes the simultaneous movement of the first upstream section 36 and of the second upstream section 38 and the activation of the distribution members 22. This produces the simultaneous distribution of the first cosmetic

product from the first reservoir 12 and of the second cosmetic product from the second reservoir 14.

The first cosmetic product and the second cosmetic product rise respectively through the first upstream section 36 and through the second upstream section 38 in order to reach the upstream chamber for collection 58. The first cosmetic product and the second cosmetic product are joined together in the central region of convergence 60 and penetrate into the central duct 52 by carrying out a 90° angle.

In the central duct 52, the flow of the first product and the flow of the second product are each separated horizontally by the longitudinal wall 66 and are combined on either side of this wall 66.

In contact with the first elements for mixing 68 and the second elements for mixing 70, the flows are offset laterally with respect to the axis A-A' and follow a winding path as a zig-zag until a through-hole 76 is reached.

During the passage facing each hole 76, a portion of the flow circulating above the longitudinal wall 66 passes through the hole 76 in order to mix with another portion of the flow circulating under the longitudinal wall 66.

Likewise, a portion of the flow circulating under the longitudinal wall 66 passes through the hole 76 in order to mix with another portion of the flow circulating over the longitudinal wall 66.

The flows of cosmetic products therefore follow both a winding horizontal path in the form of a zig-zag on either side of the longitudinal wall 66 by progressing along the axis A-A', but also a vertical path perpendicular to the longitudinal wall 66 through the successive through-holes 76.

The mixture of the first cosmetic product with the second cosmetic product is therefore particularly effective, in light of the turbulences generated, and this despite the high viscosities of the of the first cosmetic product and of the second cosmetic product.

This produces a very homogeneous cosmetic composition, with a weight ratio between 0.25 and 4 preferably between 0.5 and 2, in particular of one for one, which as such has properties for optimum use. This is obtained without the manual intervention of the user for mixing the products, with a simple mixer 28 presenting the structure defined hereinabove.

As an example, when the rods of the distribution members 22 have a transverse section of about 2 mm, the respective output speed of the first cosmetic product and of the second cosmetic product outside of the reservoirs is about 2 m/s. The Reynolds number of the first cosmetic product is then about 0.2 for a viscosity of 10,000 mPa.s and the

Reynolds number of the second cosmetic product is about 0.4 for a viscosity of 5,000 mPa.s.

The global restitution speed is about 0.2 m/s at the output of the distribution nozzle 40. In the absence of a mixer 18, the flow in the nozzle 40 is purely laminar and no mixing will take place between the first cosmetic product and the second cosmetic product.

The presence of the mixer 18 ensures a very effective mixing, thanks to the winding displacement in three dimensions in the mixer 18, making it possible to form the composition and the end of its passage in the central duct 52.

Such an effect is not obtained using simple baffles in two dimensions, or using a helix devoid of windings.

CLAIMS

1. - Distribution head (20) for distributing a cosmetic composition formed by mixing a first cosmetic product with a second cosmetic product, comprising:

5 - a duct for preparing and distributing (32) the cosmetic composition able to be connected simultaneously to a first reservoir (12) of a first cosmetic product, and to a second reservoir (14) of a second cosmetic product, the duct for preparing and for distributing (32) opening outside of the head (20);

10 - a static mixer (28) arranged in the duct for preparing and for distributing (32), the static mixer (28) defining a passage (64) for the circulation and the mixing of the first cosmetic product with the second cosmetic product;

characterized in that the mixer (28) comprises:

15 - at least one longitudinal wall (66) for separating the passage (64) into a first region and into a second region, the longitudinal wall (66) defining at least one through-hole (76) connecting the first region to the second region;

 - at least one first element for mixing (68) protruding in the first region;

 - at least one second element for mixing (70) protruding in the second region.

20 2. - Head (20) according to claim 1, wherein the longitudinal wall (66) for separating defines a plurality of successive through-holes (76) spaced longitudinally along the longitudinal wall (66).

 3. - Head (20) according to claim 1 or 2, wherein the or each first element for mixing (68) and/or the or each second element for mixing (70) is located at the periphery of the through-hole (76).

25 4. - Head (20) according to any of the preceding claims, wherein the or each first element for mixing (68) protrudes from a first face (72) of the longitudinal wall (66) delimiting the first region, the or each second element for mixing (70) protruding from a second face (74) of the longitudinal wall (66) delimiting the second region.

30 5. - Head (20) according to any of the preceding claims, comprising a plurality of first elements for mixing (68) arranged in staggered fashion in the first region and/or comprising a plurality of second elements for mixing (70), arranged in staggered fashion in the second region.

35 6. - Head (20) according to any of the preceding claims, wherein the or each first element for mixing (68) and/or the or each second element for mixing (70) comprises a transverse partition (78), and a longitudinal partition (80) protruding from the transverse partition (78).

7. - Head (20) according to claim 6, wherein the longitudinal partition (80) passes through the through-hole (76).

8. - Head (20) according to any of the preceding claims, wherein the longitudinal wall (66) extends over the entire width of the central passage (64).

5 9. - Head (20) according to any of the preceding claims, wherein the mixer (28) defines an upstream chamber (58) for collecting of the first cosmetic product and of the second cosmetic product, arranged upstream of the passage of circulation (64), and a distribution nozzle (54) of the cosmetic composition, devoid of elements for mixing, arranged downstream of the passage for circulation (64).

10 10. - Head (20) according to any of the preceding claims, wherein the mixer (28) is removeably mounted in the duct for preparing and for distributing (32).

11.- Device (10) for packaging and/or dispensing a cosmetic composition, comprising:

- a first reservoir (12) containing a first cosmetic product;
- 15 - a second reservoir (14) containing a second cosmetic product;
- a head (20) according to any of the preceding claims, the duct for preparing and for distribution (32) being able to be connected simultaneously to the first reservoir (12) and to the second reservoir (14).

12. Device (10) according to claim 11, wherein the viscosity of the first cosmetic product is greater than 1000 mPa.s, in particular greater than 5000 mPa.s.

13. Device (10) according to any of claims 11 or 12, wherein the viscosity of the second cosmetic product is greater than 1000 mPa.s, in particular greater than 10,000 mPa.s.

14.- Cosmetic composition distributing method, comprising the following steps:

- 25 - supply of a device (10) according to any one of claims 11 to 13;
- simultaneous distribution of a first cosmetic product and of a second cosmetic product in the duct for preparing and for distributing (32) from respectively the first reservoir (12) and the second reservoir (14);
- formation of the cosmetic composition in the mixer (28) via the passage (64) of at least one portion of the mixture of the first cosmetic product with the second cosmetic product successively in contact with a first element for mixing (68), through a through-hole (76), and/or in contact with a second element for mixing (70).

15. - Method according to claim 14, wherein the Reynolds number of the first cosmetic product at its inlet into the duct for the preparing and the distributing (32) is less than 1 and the Reynolds number of the second cosmetic product at its inlet into the duct for mixing (32) is less than 1.

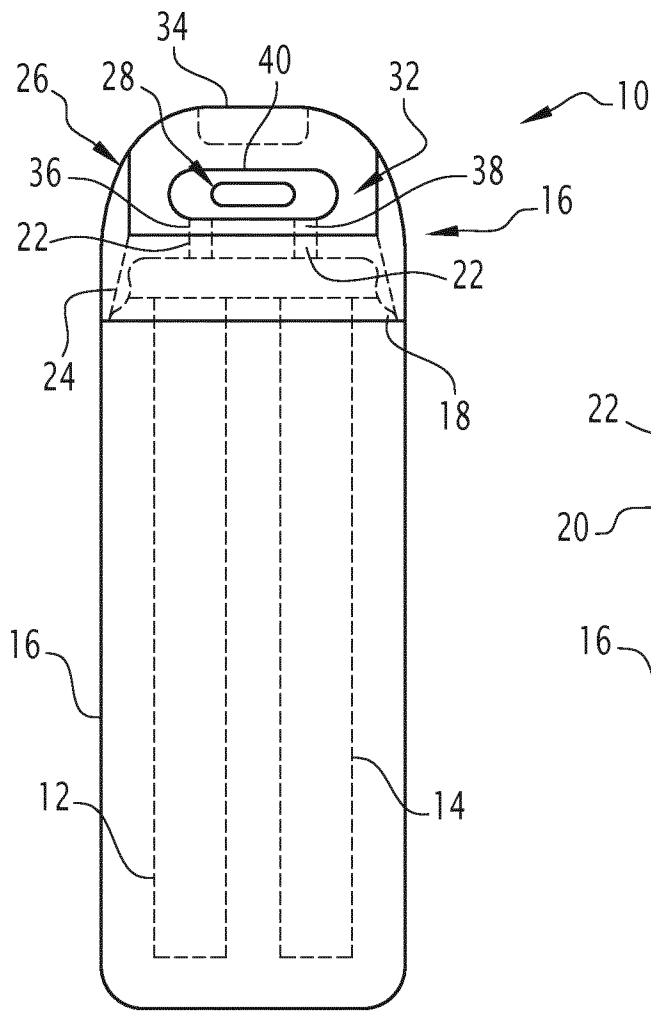


FIG. 1

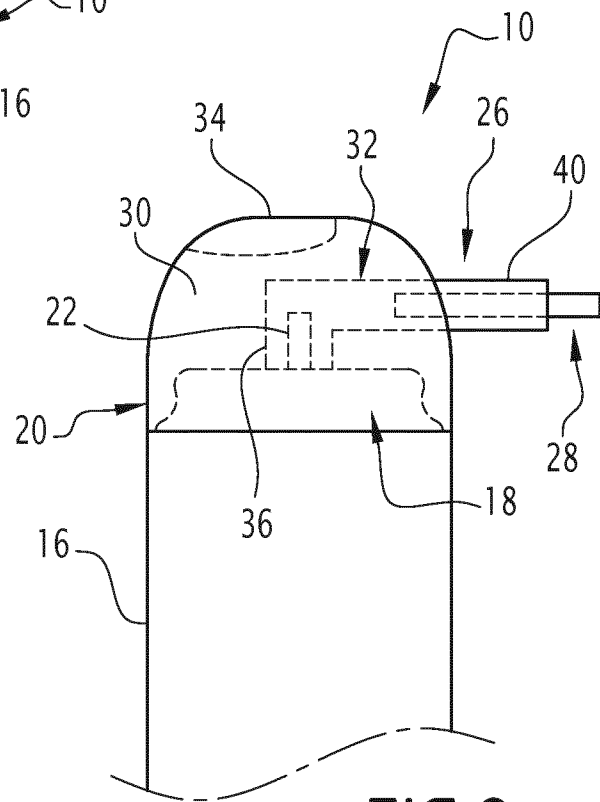


FIG. 2

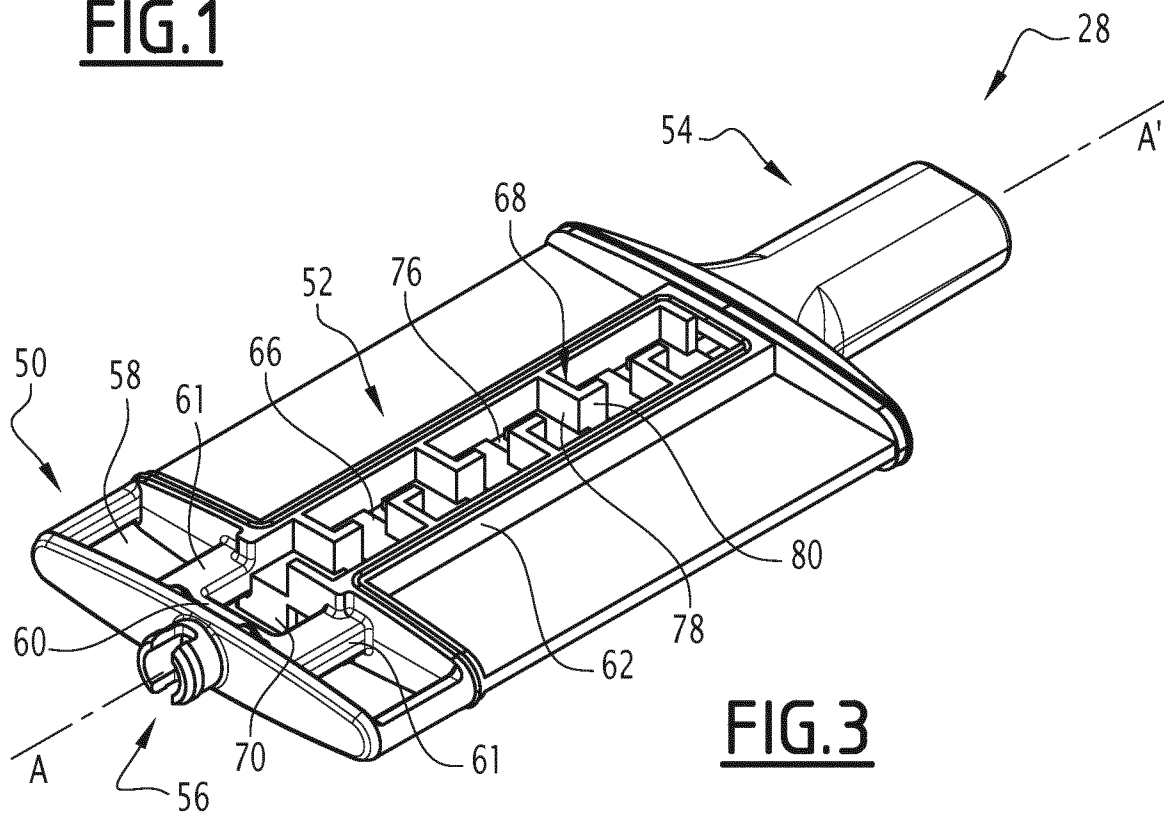


FIG. 3

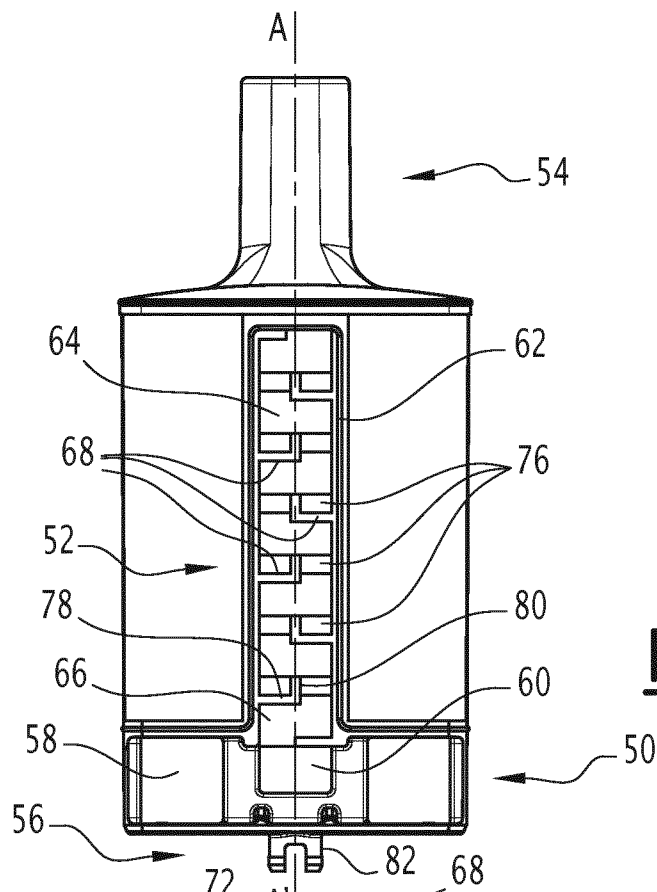


FIG. 4

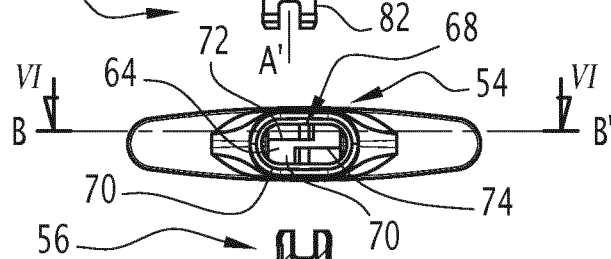


FIG. 5

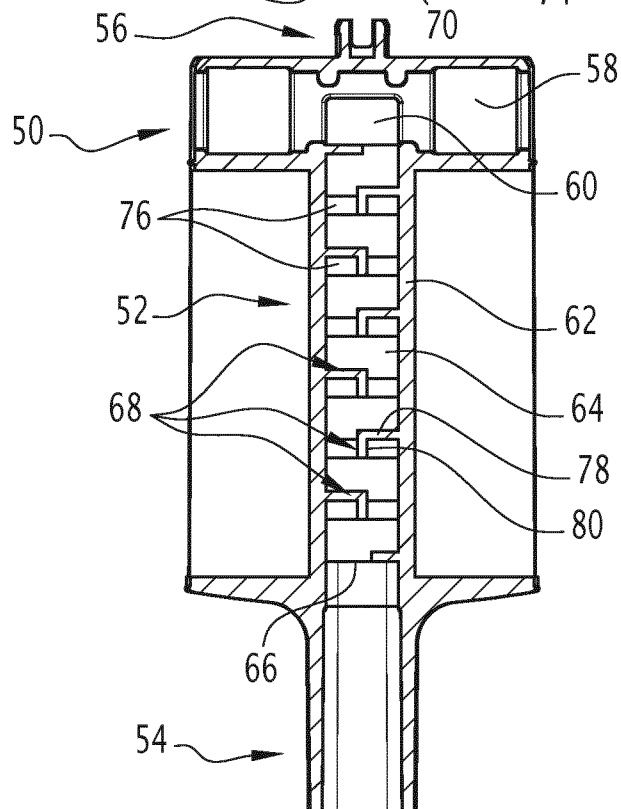


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/079752

A. CLASSIFICATION OF SUBJECT MATTER
INV. B01F5/06 B01F3/10 B65D83/68
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 335 817 A2 (HILTI AG [LI]) 22 June 2011 (2011-06-22) paragraph [0004] paragraphs [0009] - [0010] paragraph [0012] paragraphs [0019] - [0025] figure 2	1-15
X	US 2001/015936 A1 (HEUSSER ROLF [CH] ET AL) 23 August 2001 (2001-08-23)	1-5
A	paragraphs [0002], [0003] paragraph [0005] paragraph [0021] figure 6	6-15
A	EP 2 548 634 A1 (SULZER MIXPAC AG [CH]) 23 January 2013 (2013-01-23) paragraphs [0033] - [0034]	11-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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