The present invention relates to a device (1) for dispensing a cosmetic product, in particular a perfume, comprising:

- at least one reservoir (11) containing a product to be dispensed, in particular a plurality of reservoirs (11) containing respective products to be dispensed at the same time,
- at least one additional reservoir (14) containing a rinsing fluid, and
- an inlet chamber (2) that communicates with an outlet orifice (13), the product or products and the rinsing fluid being delivered into the inlet chamber prior to being outlet through the outlet orifice, the device being configured such that the rinsing fluid delivered into the inlet chamber pushes the product or products present therein towards the outlet.

**Title:** DEVICE FOR DISPENSING A COSMETIC PRODUCT

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**Device for dispensing a cosmetic product**

The present invention relates to the dispensing of a cosmetic product.

The art of producing mixtures in an automatic, regulated and controllable manner is well known in industry. However, it is employed little, if at all, for personal or domestic uses.

For cosmetics, it would be advantageous to provide a mixing device which is able to take the form of a portable personal or domestic object of small size and which would allow the user to produce mixtures himself, to test them and, by continual testing, to develop his own formulas. This device would also allow the user to select formulas from a range of his own or imported formulas.

Such a device thus has to be able to reproduce numerous formulas, both quickly and in a practical manner,

in order to pass from one formula to another, it is conceivable to use a rinsing fluid in order to ensure that the next mixture is not contaminated by the previous mixture.

In industry, rinsing employs particular operations, hi the case in question, industrial solutions are not conceivable, since they require large quantities of rinsing fluid and this would take up a large amount of space in the device and would require the rinsing liquid to be discharged.

Furthermore, a specific rinsing operation requires a little time. Thus, when the user wishes to produce a number of mixtures in order to make progress ha the development of his formula, it is inconvenient to wait while a rinsing operation takes place between two tests.

In the case of perfumes, the user may wish to schedule the production of a plurality of mixtures which the device will deliver one after another. The user will apply the different mixtures to his forearm, for example, in order to appreciate their effects. If the device excretes a rinsing liquid between each of the different mixtures, the user risks loss and inconvenience on account of the excretion of these liquids and also risks confusion with useful mixtures.

There exist inkjet printers which comprise a collecting reservoir formed by a kind of absorbent blotter. This solution is difficult to envisage in the case in question, since it would require the provision of a large collecting reservoir.

Moreover, in the case of perfumes, where the solvents are often ethanohe and the active ingredients are fragrant, it would be necessary to provide an airtight collecting reservoir. This would complicate implementation and would oblige the user to remember to regularly empty this collecting reservoir.

In the case of coloured formulas, the operation is difficult to implement, in particular because the operation of emptying the collecting reservoir would entail a risk of staining.
In the case of the dispensing of dermatological or care active agents, it may be desirable to seek to prevent the active agents from being able to collect and from coming into contact with the skin in a concentrated form. The problem is all the more inconvenient since these active agents are often colourless and odourless and thus cannot be detected easily.

It should be added to this that most chemical compounds are fairly expensive and that any device that entails a loss of these compounds during rinsing adds significant costs to its use.

We have thus sought to propose a mixing device which avoids contamination of a mixture by the compounds of the previous mixture, Ibis device operating rapidly, being clean, easy to use, reliable and maintenance-free, and having a cost that is compatible with the economic constraints imposed by the large-scale distribution of devices for personal or domestic use.

The subject of the invention is thus, according to a first of its aspects, a device for dispensing a cosmetic product, in particular a perfume, comprising:

- at least one reservoir containing a product to be dispensed, in particular a plurality of reservoirs containing respective products to be dispensed at the same time,

- at least one additional reservoir containing a rinsing fluid,

- an inlet chamber that communicates with an outlet orifice, the product or products and the rinsing fluid being delivered into the inlet chamber prior to being outlet through the outlet orifice,

the device being configured such that the rinsing fluid delivered into the inlet chamber pushes the product or products present therein towards the outlet.

In one embodiment, the device according to the invention is intended for the production of mixtures and comprises at least two reservoirs containing products, the proportions of which in the output composition may vary at the discretion of the user. In another embodiment, the device is intended to output a compound in a more or less concentrated form, and the device only comprises the reservoir containing this compound and the reservoir containing the rinsing fluid, which also serves as a medium for diluting the compound to a greater or lesser extent.

The invention makes it possible to avoid a specific rinsing operation between two successive productions of mixtures or dilutions and meets the above objective.

The rinsing fluid may advantageously be delivered into the inlet chamber through an inlet orifice located opposite the outlet orifice. Thus, the progression of the rinsing fluid into the inlet chamber, towards the outlet, cleans the inlet chamber more or less over its entire length.

It may be desirable for the cross section of the inlet chamber to be relatively small in order to allow the product or products to be pushed by the rinsing liquid, using just small quantity of the latter.
Preferably, this cross section is between 0.0001 mm² and 10 mm², better still between 0.01 and 1 mm².

The length of the Met chamber is for example between 1 and 1000 mm, better still between 10 and 200 mm.

It is possible for the inlet chamber not to be linear. It may be circular for example or comprise a succession of straight parts connected by curved parts.

The device may be configured such that the injection of the product or products into the inlet chamber precedes that of the rinsing fluid. This may make it possible to minimise the quantity of rinsing fluid used.

Alternatively, the injection of the product or products into the inlet chamber is carried out at the same time as the injection of the rinsing fluid, the rinsing fluid then being pressurized in order to push the product or products towards the outlet orifice.

The product or products may not be delivered into the inlet chamber by a Venturi effect.

The contents of the inlet chamber may be pressurized in various ways. The rinsing fluid may be pressurized in order to push the other compounds present in the chamber out of the latter. This pressurization may result in vaporization of the rinsing fluid. The contents of the inlet chamber may be pressurized without the internal volume of the chamber being changed. Alternatively, this pressurization of the inlet chamber may be carried out by way of a reduction in its internal volume.

The rinsing fluid advantageously comprises a volatile solvent, comprising for example a liquefied gas, which may be chosen from isohutane, DME, neopentane or n-butane, inter alia. The volatile solvent may also be a volatile alcohol and/or a volatile silicone oil. The rinsing fluid may be water or an aqueous-alcoholic solution. The rinsing fluid may also be oily or belong to the PEG family.

The expression "volatile alcohol" is understood to mean any compound comprising at least one alcohol function having a vapour pressure at 20°C of greater than 17.5 mm of mercury.

For the purposes of the invention, the expression "volatile silicone oil" means any silicone compound that is capable of evaporating on contact with the skin or the keratin fibres in less than one hour, at room temperature and atmospheric pressure.

The volatile alcohols are chosen for example from C₁-C₅ lower monoalcohols, for example from methanol, ethanol, propanol isopropanol n-butanol, isobutanol and t-butanol, and more particularly ethanoi.
Examples of volatile silicone oils that may be mentioned include volatile linear or cyclic silicone oils, especially those with a viscosity ≤ 6 centistokes (6.10^{-6} m^2/s) and especially containing from 2 to 10 silicon atoms, these silicones optionally comprising alky] or alkoxy groups containing from 1 to 22 carbon atoms. As examples of volatile silicone oils that may be used in the invention, mention may be made especially of octanethyldicyclohexasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiioxane, heptamethylhexyltrisiloxane, heptamethylactyltrisiloxane, haxamethyldisiloxane, octamethyltrisiloxane, decamihyldetrasiloxane and dodecamethylpentasiloxane, and mixtures thereof.

The outlet orifice may be permanently open, or alternatively be provided with a valve or any other mechanism that makes it possible to open and close it selectively, or be provided with a flap.

For example, the outlet orifice is only open when the pressure in the inlet chamber exceeds a predefined value. This may facilitate for example dispensing by spraying or in the form of a jet of fluid and avoid the entry of impurities. Alternatively, the outlet orifice is only open when the rinsing fluid is admitted into die inlet chamber, so as to avoid the uncontrolled departure of compounds previously introduced into the inlet chamber.

The volume of the inlet chamber is for example less than or equal to 10 mm^3, preferably less than or equal to 0.5 inm^3.

The inlet chamber has preferably an elongate shape along a rectilinear or curved longitudinal axis, the outlet orifice being preferably located at one end thereof.

The total quantity of product dispensed during each use of the device is for example less than or equal to 10 000 µl (1 mm^3) or preferably less than 500 µl.

The different products can be introduced into the inlet chamber with the aid of containers which are pressurized, for example mechanically or with the aid of a gas. If appropriate, a micropump may be used to deliver a product or the rinsing liquid into the Met chamber.

A further subject of the invention, according to another of its aspects, is a method for dispensing a cosmetic product in which at least one product to be dispensed and at least one rinsing fluid are introduced into an inlet chamber that communicates with an outlet orifice, the rinsing fluid being delivered into the inlet chamber so as to push the product or products present in the inlet chamber towards the outlet. This method may implement all the features of the device that are described above, alone or in combination.
The product or products introduced into the inlet chamber may be chosen from fragranced or fragrancing substances. The expression "fragrancing substance" or "fragranced substance" is understood to mean any substance that is liable to release a pleasant odour.

Fragrances and aromas of natural or synthetic origin and mixtures thereof may be used as fragranced substance.

Examples of fragrances and aromas of natural origin that may be mentioned include extracts from flowers (lily, lavender, rose, jasmine, ylang ylang), from stems and leaves (patchouli, geranium, petitgrain), from fruit (coriander, aniseed, cumin, juniper), from fruit peel (bergamot, lemon, orange), from roots (angelica, celery, cardamom, iris, rattan palm), from wood (pinewood, sandalwood, gaiac wood, rose of cedar), from grasses and graxnineae (tarragon, lemongrass, sage, thyme), from needles and branches (spruce, fir, pine, dwarf pine) and from resins and balsms (galbanum, elemi, benjoin, myrrh, olibanum, opopanax).

Examples of perfumes of synthetic origin that may be mentioned include compounds of the ester, ether, aldehyde, ketone, aromatic aiehol and hydrocarbon type, and mixtures thereof.

Esters that may be mentioned in particular include benzyl acetate, benzyl benzoate, phenoxyethyl isobutyrate, p-tert-butylicetoxyethyl acetate, citronellyl acetate, citronellyl formate, geranyl acetate, !maly! acetate, dimethylbenzylcarbinyl acetate, phenylethyl acetate, linalyl benzoate, benzyl formate, ethylmethylpbenyl glycinate, alkyicyclohexyl propionate, styrallyl propionate and benzyl salicylate.

An ether that may be mentioned is benzyl ethyl ether.

Examples of aldehydes that may be mentioned include linear alkana's comprising from 8 to 18 carbon atoms, citral, citroneilai, citronellyoxyacetaidehyde, cyclamenaldehyde, hydroxycitronellal, lilial and bourgeoai.

Examples of ketones that may be mentioned include ionones, for instance alpha-isometliyionone and methyl cedryl ketone.

Among the aromatic and especially ierpenic alcohols, mention may be made of anethole, citronellol, eugenol, isoegenoL gerarsiol, linalool, phenylethyl alcohol and terpeneol.

Hydrocarbons that may especially be mentioned are terpenes.

Moreover, it is also possible to use essential oils, aroma components, for instance essences of sage, camomile, clove, balm, mint, cixmamon leaves, lime tree blossom, juniper, vetiver, oHbanum, galbanum, labulanum and lavandln.

Essence of bergamot, dihydromyrcenol, lilial, lyrall, citronellol, phenylethyl alcohol, alpha-hexylchniamaldehyde, geraniol, benzylacetone, cyclamenaldehyde, linalool, arabroxane, indol, hedione, sandelice, essences of lemon, mandarin and orange, ailylamine glycolate.
cyclovertal, essence of lavandin, essence of sage, beta-damascone, essence of geranium, cyclohexyl salicylate, phenylacetic acid, geraniyl acetate, benzy1 acetate and rose oxide is used for example as substance, alone or as a mixture.

In one exemplary embodiment of the invention, a mixture of different fragrant compounds that generate in common a note that is pleasant to the user is dispensed by virtue of the device.

Among the known olfactory notes, mention may be made, for example, of citrus fragrances, aromatics, floral fragrances, musks, fruity fragrances, spicy fragrances, oriental fragrances, marine fragrances, aquatic notes, chypre fragrances, woody fragrances, and fern fragrances, and xnixtures thereof

In a variant, the reservoir(s) may comprise one or more make up products.

The invention may be understood better from reading the following description of non-limiting implementation examples thereof, and with reference to the attached drawing, in which:

- Figure 1 schematically shows a first example of a device according to the invention, and

- Figures 2 and 3 are views similar to Figure 1 of variant embodiments.

Figure 1 shows an example of a mixing device 1 according to the invention. This mixing device is advantageously portable, and can be held in the hand or in a handbag.

The device 1 comprises an inlet chamber 2, into which various fluid inlets 3, which are controlled by valves 5, open.

The chamber 2 communicates with the outside via an outlet orifice 13, which serves to dispense the mixture for the user.

As many inlet orifices 3 are provided as there are fluids which can enter into the composition of the mixture dispensed, and at least one additional inlet 4 for a rinsing fluid is provided, this inlet being controlled by a valve 7, the rinsing fluid oogmating from a reservoir 14.

The valves 5 and 7 are for example electronic valves that are connected to an electronic circuit 6.

Upon each mixture, the electronic circuit 6 controls the valves 5 to carry out two operations, namely the opening of the valves 3 to admit fluids in the quantities necessary for producing the desired mixture, and the opening of the valve 7 to admit the rinsing fluid.

The electronic circuit is for example a microcomputer or smartphone or the like, which is equipped with the necessary I/O interfaces, or a dedicated electronic circuit having a microcontroller, programmable logic array or microprocessor.
The electronic circuit 6 comprises a human-machine interface, for example a keyboard, a screen, a touchscreen, etc., so that the user can dispense a formula of his choice.

The electronic circuit may also be arranged to communicate with a server or other similar devices in order to exchange recipes or to enable the user to seek advice.

The electronic circuit may comprise a memory in order to save the best formulas, to reproduce them as required and to exchange them. It is possible to achieve a new approach for the dispensing of cosmetic compositions, which is more fun, more creative, and a new relationship between the user and the cosmetic.

The inlets 3 communicate with respective reservoirs 11.

The contents of the reservoirs 11 and 14 may flow towards the inlet chamber by virtue of a pressurization of the reservoirs, for example by a mechanical device which tends to reduce their internal volume or with the aid of a gas present above the liquid or a propellant gas. The flow may also take place by gravity or with the aid of a micropump.

The valve 7 that controls the admission of the rinsing fluid may be opened immediately after the inlet of the various products to be mixed, coming from the reservoirs 11.

The inlet chamber 2 is preferably elongate, such that the rinsing liquid is admitted opposite the outlet orifice 13, as illustrated in Figure 1.

As in the example of this figure, the inlets 3 may open laterally, and the inlet 4 axially, into the chamber 2.

In a variant which is illustrated in Figure 2, the inlets 3 and 4 are both lateral, in particular in this case, all of the fluids may be admitted concomitantly, in order that the chamber is filled properly, on the side opposite the outlet orifice 13, with the rinsing liquid.

In the examples of Figures 1 and 2, the outlet orifice 13 is permanently open. Alternatively, the outlet opening 13 is equipped with a flap or, as is the case in the example of Figure 3, with a valve 16 controlled by the electronic circuit 6.

In order to cause a mixture to be dispensed, the contents of the inlet chamber 2 may be mechanically pressurized, or heated, in order to create a pressure by expansion or evaporation of the rinsing fluid.

Figure’s 1 to 3 schematically show means 20 for pressurizing the contents of the inlet chamber 2.

These means 20 comprise for example an electromechanical actuator for reducing the volume of the Met chamber or a heating resistor.

The contents of the chamber 2 may be pressurized by at least partial evaporation of the rinsing fluid, for example as a result of the use of a liquefied gas for the latter.
In a general manner, and in particular in the examples illustrated, the admission of the rinsing liquid has three effects, namely that of pushing the other fluids intended to form the mixture towards the outlet orifice 13, to make them mix, and b rinse the inlet chamber 2.

The device 1 also has the advantage of using relatively more rinsing liquid without a mixture being polluted by the one that was produced previously.

The device therefore does not need to store large quantities of rinsing liquid, thereby providing more capacity for holding liquids that are intended to be mixed. For example, the capacity of the reservoir 14 is less than or equal to 20 sL.

The mixture is only diluted by the rinsing fluid to a small extent, thereby making it possible to produce precise mixtures of very small quantities. For example, the quantity dispensed upon each use is between 10 μl and 1 ml...

By virtue of the invention, it is no longer necessary to provide a separate rinsing operation, in other words, the rinsing liquid is dispensed at the same time as the desired quantity of the other compound or compounds. Thus, the device 1 makes it possible to make fill! use of the active agents without losing them.

The device 1 may be in the form of a console for mixing perfumes from a plurality of fragranced fluids. It is possible to dispense mixtures which are produced in order to evaluate the olfactory notes and to the change the formulation until it is satisfactory.

It is also possible to use the mixtures produced to perfume oneself every day. Several members of the same family may use the same console and each demand the production of a personalised mixture.

The device may also be used to produce mixtures of coloured cosmetic products. A certain quantity, for example a drop, of coloured composition is then produced by the device 1 and serves for the application of makeup or is intended to be mixed with a complexion cream or any other coloured or non-coloured base. The device 1 makes it possible to easily generate the colour desired by the user, who can for example produce hi a short time several mixtures of different colours in order to treat for example several parts of the body.

In particular in the application of the device to the dispensing of a perfume, the rinsing fluid is preferably a volatile solvent, for example is or contains a liquefied gas such as isohutane, DME, neopentane or n-butane.

In this case, the flow of the solvent into the inlet chamber 2 may produce a depressurization, that is to say an expansion of the rinsing fluid, helping to move the other fluids.

The flow of the rinsing fluid into the mixing chamber may also take place without depressurization or with partial depressurization. It is possible to cause admission without
substantial depressurization, then cause depressurization by opening the outlet valve 16 provided
at the outlet orifice 13.

It is also possible for the various valves to be opened while the outlet orifice 13 is
closed, for the contents of the inlet chamber to be pressurized, and for the outlet orifice 13 to be
opened.

The rinsing fluid may be a mixture of at least one volatile solvent and at least one
non-volatile solvent. The latter may help to redissoive traces during a subsequent test, to intensify
the perfume once it has been applied or may help the staving power of the perfume on the skin.

The device may possibly comprise one or more sensors, for example pressure sensors,
temperature sensors or sensors for the filling of the inlet chamber or of one or more reservoirs.

The device may be arranged to enable a greater degree of rinsing, removal or
replacement of the inlet chamber, as the case may be,

The device according to the invention may be used to produce the same mixture at
different dilutions, for fragrancmg or applying a colouring or care product.

**Examples**

A tubular inlet chamber is produced, having four lateral inlets for liquid. Electronic
valves of the Chipsol® type control the inlets.

A programmable electronic circuit controls all of the electronic valves. The user gives
orders relating to the quantities of each of the ingredients which he wishes to have in the
composition dispensed. For this purpose, the electronic circuit comprises a screen and switches
which serve as an interface.

The inlets communicate via the valves with four reservoirs, of which the one furthest
away from the outlet orifice is filled with ethanol, which constitutes the rinsing liquid.

The device is produced such that a pneumatic pressure can be applied to all of the
reservoirs, being sufficiently impermeable for the pressure to be maintained for several weeks in
the event of non-use. When used, the device is repressurized regularly, for example after having
let out 3 mL of mixtures, corresponding to around 20 uses in the example in question.

Use is made of fragrant fluids. In order to better visualize the efficacy of the device, a
different dye is placed in each fragrant fluid, namely ambrox in ethanol with a blue dye, geraniol
in ethanol with a red dye, and vanillin in ethanol with a yellow dye. No dye is added to the rinsing
liquid.

The following mixtures are produced:

1. 17 µl of aqueous-alcoholic solution of ambrox with 10% of ambrox + 17 µl of
aqueous-alcoholic solution of vanillin with 10% of vanillin + X µl of rinsing fluid.
2. 35 µl of geraniol + X µl of rinsing fluid.

3. 17 µl of aqueous-alcoholic solution of ambrox with 10% of ambrox + 17 µl of aqueous-alcoholic solution of vanillin with 10% of vanillin + X µl of rinsing fluid.

The ambrox + vanillin mixtures of step 1 and step 3 are collected. Next, purging is carried out and a new test is performed with a different quantity of rinsing fluid.

The quality of the mixtures is evaluated by eye in order to determine whether a mixture has contaminated the following mixture. To do this, the colours of the mixtures of aqueous-alcoholic solutions of ambrox and vanillin from step 1 and from step 3 are compared by eye.

Tests are carried out with different quantities X of rinsing liquid. It is noted that with minimal quantities of rinsing fluid, namely 50 µL, non-contaminated mixtures of quality are obtained.

Furthermore, a perfumes expert has performed a comparative evaluation of the ambrox and vanillin mixtures from steps 1 and 3. The expert did not know the contents of the compositions and had just to determine if olfactorily, the mixtures were identical or not. It is noted that with 50 µl of rinsing liquid, the mixtures were given as being equivalent.

The invention is not limited to the examples illustrated.

In particular, the outlet orifice may open into a duct through which a driving air flow passes, for example an air flow generated inside an airbrush.

The expression "comprising a" should be understood as being synonymous with "comprising at least one", unless specified to the contrary. The terms "product" and "composition" are synonymous.
CLAIMS

1. Device (1) for dispensing a cosmetic product comprising:
   - at least one reservoir (11) containing a cosmetic product to be dispensed,
   - at least one additional reservoir (14) containing a rinsing fluid,
   - an inlet chamber (2) that CGXmuicrates with an outlet orifice (13), the product or products and the rinsing fluid being delivered into the inlet chamber prior to being outlet through the outlet orifice,
   the device being configured such that the rinsing fluid delivered into the inlet chamber pushes the product or products present therein towards the outlet,

2. Device according to claim 1, said device comprising a plurality of reservoirs (11) containing respective products to be dispensed at the same time.

3. Device according to claims 1 or 2, a plurality of products being delivered into the inlet chamber (2).

4. Device according to any one of the preceding claims, the rinsing fluid being delivered into the inlet chamber through an inlet orifice (4) located opposite the outlet orifice (13).

5. Device according to any one of the preceding claims, which is configured such that the injection of the product or products into the inlet chamber (2) precedes that of the rinsing fluid.

6. Device according to any one of claims 1 to 4, the injection of the product or products into the inlet chamber being carried out at the same time as the injection of the rinsing fluid, the latter then being pressurized in order to push the product or products towards the outlet orifice.

7. Device according to any one of the preceding claims, the rinsing fluid comprising a volatile solvent, in particular an aqueous-alcoholic solution.

8. Device according to any one of the preceding claims, the rinsing fluid comprising a liquefied gas, chosen in particular from isobutane, DME, neopentane or si-butane.

9. Device according to any one of the preceding claims, the outlet orifice (13) being permanently open.

10. Device according to any one of claims 1 to 8, the outlet orifice (13) being selectively open.

11. Device according to any one of the preceding claims, the volume of the inlet chamber (2) being less than or equal to 10 mm$^3$. 
12. Device according to any one of Claims 1 to 11, the Met chamber (2) having an elongate shape, the outlet orifice (13) being located at one end thereof.

13. Device according to any one of the preceding claims, the total quantity of product dispensed during each use of the device being less than or equal to 10 000 microlitres.

14. Device according to any one of the preceding claims, the volume of the additional reservoir (14) being predefined.

15. Device according to the preceding claim, the capacity of the additional reservoir (14) being less than or equal to 20 mL.

16. Method for dispensing a cosmetic product, in which at least one cosmetic product to be dispensed and at least one rinsing fluid are introduced into an inlet chamber (2) that communicates with an outlet orifice (13), the rinsing fluid being delivered into the inlet chamber (2) so as to push the other product or products present in the inlet chamber towards the outlet.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. B05B7/24

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)

B05B

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 practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>DE 197 31 829 Al (TI ETZ PATRICK [DE]) 28 January 1999 (1999-01-28) col umns 3-4; figure 1</td>
<td>1-5, 7-13</td>
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<tr>
<td>A</td>
<td>FR 2 631 254 Al (PHAM KI EN DUONG [FR]; SEVIL LUIS [FR]) 17 November 1989 (1989-11-17) page 6, paragraph 4; figures</td>
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<td>X</td>
<td>US 5 071 070 A (HARDY DUARD I [US]) 10 December 1991 (1991-12-10) the whole document</td>
<td>1, 13, 6</td>
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Further documents are listed in the continuation of Box C. □ See patent family annex. □

* Special categories of cited documents :

**A** document defining the general state of the art which is not considered to be of particular relevance

**E** earlier document but published on or after the international filing date

**L** document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

**O** document referring to an oral disclosure, use, exhibition or other means

**P** document published prior to the international filing date but later than the priority date claimed

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**X** document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step, when the document is taken alone

**Y** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

**T** document member of the same patent family

Date of the actual completion of the international search 15 February 2012

Date of mailing of the international search report 22/02/2012

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016

Authorized officer Rol dan Abal os, Jaime
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